DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY, WEST
NAVAL FACILITIES ENGINEERING COMMAND
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HUNTERS POINT
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Ser 1832.1/6347
August 16, 1996

From: Commanding Officer, Engineering Field Activity, West, Naval Facilities Engineering Command
To: Distribution

Subj: COMPLETION OF PARCEL B REMEDIAL INVESTIGATION REPORT, ENGINEERING FIELD ACTIVITY, WEST, NAVAL FACILITIES ENGINEERING COMMAND, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Encl: (1) Response to Agency Comments on Draft Final Parcel B Remedial Investigation Report, Engineering Field Activity, West, Naval Facilities Engineering Command, Hunters Point Shipyard, San Francisco, California.
(2) Revised pages, Appendix N.

1. Enclosures (1) and (2) are forwarded in accordance with the Hunters Point Annex, Federal Facilities Agreement. The Navy appreciates the Agencies efforts to reduce the volume of reproduction required for full document revisions. Please attach enclosure (1) to the Draft Final Report for use with the final document as suggested in our July 18 meeting. Enclosure (2) is a set of replacement pages which should be inserted in Appendix N. These two additions complete the Parcel B RI Report.

2. In response to agency comments on the Draft Final RI report, the Navy plans to address the issues raised within upcoming CERCLA documentation or the enclosed responses to comments. Addressing the issues raised in the comments will require the preparation of two technical memoranda separate from the Draft Final Parcel B RI report. The first of these technical memoranda will present the agreed upon Hunters Point Groundwater Ambient Levels (HGALs), along with documentation of the calculation methodology and results. The second of these technical memorandum will address the data gaps issues by providing an sampling and analysis plan for (1) further characterization of volatile organic compounds and DNAPLs at Parcel B, (2) further characterization of the B and Bedrock Aquifers, and (3) a storm drain monitoring plan to evaluate infiltration following the proposed removal of sediment from the storm drain system.

3. If you have any questions regarding this matter, please contact William McAvoy, Code 1832.1 at (415) 244-2554.

Richard E. Powell

RICHARD E. POWELL
By direction of
the Commanding Officer

Ser 1832.1/6347
August 16, 1996

Subj: COMPLETION OF PARCEL B REMEDIAL INVESTIGATION REPORT, ENGINEERING FIELD ACTIVITY, WEST, NAVAL FACILITIES ENGINEERING COMMAND, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

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DRAFT FINAL REPORT
PARCEL B REMEDIAL INVESTIGATION

DATED 03 JUNE 1996

IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00217.003163 THROUGH N00217.003174, N00217.003689 AND N00217.003690**

RESPONSE TO AGENCY COMMENTS ON THE DRAFT FINAL REMEDIAL INVESTIGATION FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

This document presents the U.S. Navy's (Navy) responses to comments from the regulatory agencies on the draft final remedial investigation (RI) report, dated June 3, 1996 for Parcel B of Hunters Point Shipyard (HPS). The comments addressed below were received from the U.S. Environmental Protection Agency (EPA) and the California Department of Toxic Substance Control (DTSC) on July 3, 1996, and from the California Regional Water Quality Control Board, (RWQCB), San Francisco Bay Region on July 18, 1996. The DTSC comments below are presented separately for the RI report; human health risk assessment (HHRA), which is Appendix N of the RI report; and Appendix P of the RI report.

RESPONSE TO EPA COMMENTS ON RI REPORT

1. Comment: **The concerns deal with conclusions and recommendations for further actions with regard to data gaps described in Section 5 of the text. Although it will not be necessary to resolve these data gaps for purposes of the final RI, it will be necessary to take measures to deal with the gaps in the draft final FS and perhaps the remedial design phase for Parcel B. The data gaps that need to be addressed in future documents are discussed below:**

1. Establishing background levels for groundwater will require that the potential exposure pathways and associated risks posed by inorganics in groundwater be re-evaluated in the draft final FS.

2. Likewise, due to the rescoping of the IR-50 Storm Drain removal action, a follow-up infiltration study will need to be performed on the storm drains after sediment has been removed. The impact of migration of hazardous substances in groundwater to the bay, either through storm drain conduits and the sand and gravel packs that may surround utility lines, or through migration within the A-aquifer, will have to be investigated and any necessary remedial action taken. It is important to realize that the Ecological Risk Assessment (ERA), repeatedly referred to in the RI, examines the effects of Hunters Point activities on sediment contamination, but does not address the impact of groundwater on aquatic receptors or the effects of mass loading of contaminants for groundwater on the Bay.

3. The extent of potential VOC and DNAPL plumes at sites IR-6, IR-10, and IR-26 need further characterization before or during the remedial design stage. There is a danger that any remediation performed on soils at

ENCLOSURE (1)

these sites could be compromised by volatilization of potential contaminants in groundwater back into the soil.

Response: 1. The potential exposure pathways and associated risks posed by inorganics in groundwater will be re-evaluated in the draft-final FS report using Hunters Point groundwater ambient levels (HGAL). Preliminary HGALs were submitted to EPA and DTSC on June 21, 1996, and the Base Realignment and Closure Act of 1990 Closure Team (BCT) verbally approved the HGAL calculation methodology during a meeting on July 2, 1996. The agreed upon methods, calculated HGALs, and assumptions were presented to the regulatory agencies on July 24, 1996. The final HGALs and supporting documentation will be submitted to the BCT in a technical memorandum documenting the HGAL determination process and calculated values. The Parcel B FS will have an appendix presenting these HGALs.

2. After the storm drain sediment removal action has been performed, portions of the storm drain system below the water table will be monitored for 3 months to evaluate the impact of migration of hazardous substances in groundwater to San Francisco Bay. If the monitoring results indicate that the storm drain system is a conduit that allows hazardous substances in groundwater to migrate to the bay, damaged portions of the system will be lined. Cutoff walls will also be installed to prevent contaminant migration through storm drain backfill materials into the bay. The groundwater cleanup standards in the FS report will be based on the National Ambient Water Quality Criteria and HGALs at the point-of-compliance (POC). The POC is now being evaluated using the U.S. Army Corps of Engineers, Presidio of San Francisco, methodology as well as evaluating the zone of tidal influence as the POC. The FS report evaluates areas potentially requiring remediation by comparing groundwater analytical results to groundwater screening criteria. Each area potentially requiring remediation will then be evaluated to determine if: (1) chemical concentrations are diluted or attenuated before the POC, (2) the mass flux of contaminated groundwater is insignificant compared to other discharges to the bay, and (3) the relative cost and benefit of potential groundwater cleanups is comparable. This cost benefit analysis will be evaluated in the FS report. Migration of contaminants along preferred pathways will be considered during this evaluation.

3. A sampling and analysis plan (SAP) will be prepared for agency review to address further characterization of volatile organic compounds (VOCs) and DNAPLs at Parcel B. Volatilization of potential contaminants in groundwater back into soil is evaluated in the FS report.

2. Comment: Apart from the concern with data gaps, EPA would like to provide two general comments. The first comment pertains to the responses to comments found in Appendix P. In some instances a response has been given but has not been subsequently incorporated into the text or has been incorporated in a place other than that stated, or the comments has not been fully responded to. For

future documents these inconsistencies can be easily resolved by stating in the response section where the changes have been made in the revised text. This step will enable the writers to verify that the changes have been incorporated into the revised document and will allow the reader to easily find the relevant changes.

The second general comment relates to the use of the OSHA permissible exposure limits (PELs) as the standard by which to evaluate indoor air pathways and associated risk. The OSHA standards are levels designed to assure worker safety in an industrial setting and they do not take into account potential additional exposures caused by environmental contaminants. It is more appropriate to compare indoor air pathway risk levels to residential air PRGs, and use the industrial defaults, than to use PELs as a comparison.

Response: The Navy apologizes for any incomplete responses. In future documents, the responses will state where the changes have been made in the revised text. See the response to Comment No. 3 from DTSC on HHRA.

RESPONSE TO DTSC COMMENTS ON RI REPORT

1. **Comment: In our comment letter of March 18, 1996, the Department requested the Navy to identify and discuss data gaps. These data gaps have been known to the Navy for several years. For example, area adjacent to IR-18 was identified as a data gap in 1994. It is still unclear to us how the Navy failed to fulfill its obligation to fill data gaps in the allotted time. Chapter 5 of the Draft Final RI identifies some data gaps though no discussion is provided as to how and where they will be carried out.**

Response: Data gaps that require further characterization will be addressed in the SAP technical memorandum, which will be submitted to the BCT separately from the draft-final RI report.

2. **Comment : In addition, the draft final RI did not contain modifications as stated in the response to comments. For example, response to comment 3 of the Hydrogeological Sections states "Figures 3.7-6 through 3.7-10 have also been amended to incorporate first encountered groundwater". This information has not been added to the new pertinent figures 3.7-10 through 3.7-10.**

Response: The Navy apologizes for any misstated response, such as not incorporating first encountered groundwater in Figures 3.7-10 through 3.7-14. First encountered groundwater is shown in the boring logs in Appendix J of the RI report.

3. Comment: The Draft Final Parcel B RI report also provides a window to the cleanup activities by another Navy unit outside of the FFA and CERCLA oversight. To the concerns raised by the Department on the cleanup activity by the Caretaker site Office at Hunters Point, the Navy has not been able to find any documentation on the nature of the cleanup. The RI report indicates that some removal actions have taken place by that office. However, it is not known to what degree that office has been conducting independent cleanups. We ask the Navy to adhere to the FFA. Any CERCLA activities outside the FFA is considered a violation of that agreement subject to dispute resolution.

Response: The Navy always strives to adhere to the FFA. However, HPS maintenance, construction, demolition, and other related activities may involve assessing and handling non CERCLA substances outside the FFA.

4. Comment: The report appears to have confused differences between removal and remedial actions. It is not clear if, for example the exploratory excavation is considered a remedial action or a removal action. The Exploratory Excavation Engineering Evaluation/Cost Analysis was scoped for a removal action. Although, the Navy plans to remove limited amount of contaminated soils, it is premature to consider the removal as final.

Response: In future reports, the Navy will strive to ensure that the differences between removal and remedial actions are clearly explained. The exploratory excavations (EE) are scoped as a removal action. Sites proposed for EEs are evaluated in the Parcel B FS report to determine if further remedial actions are necessary.

5. Comment: The site characterization and plume maps in the RI report seem to have focused on contamination from surface to 10 feet below surface. However, there are areas with contamination deeper than 10 feet below ground surface that have not been addressed. There is a potential that such contamination might impact the groundwater. Present development of migration measures do not address those contaminants that will potentially migrate into the groundwater.

Response: Each installation restoration (IR) site has a table in Volume II of the RI report that summarizes contaminant fate and transport. Each of these tables also summarize by contaminant type future migration and fate in the environment for soil and groundwater contaminants. This evaluation is factored into the proposed actions at each IR site in the FS report, and should address those areas where contaminated soil could potentially impact groundwater.

6. Comment: Despite our request, the Navy has not considered the impact of groundwater migration to the Bay. Instead, the Navy has deferred the potential impact of the groundwater to the bay to the Ecological investigation. It is important to note that the Ecological investigation has only focused on the sediments in the

Bay. It does not address any groundwater migration from different parcels into the Bay. The Navy needs to explain how such investigation will be addressed in the ecological investigation.

Response: The Phase 1B ecological risk assessment (ERA) will only address toxicity issues related to offshore sediments and not related to groundwater migrating to the bay. HGALs have been calculated and verbally approved by the BCT during a meeting on July 2, 1996. These HGALs will be compared to the U.S. EPA National Ambient Water Quality Criteria (NAWQC) to evaluate the potential risks posed by metals from A-aquifer groundwater to aquatic life in the Bay. Potential risk posed by organic compounds to aquatic life in the Bay are evaluated in the RI report by comparing organic concentrations to the NAWQC.

7. Comment: The Draft Final RI contains references to removal actions which have not been planned by the BCT. It is not clear how these removal actions will fit into the overall cleanup at parcel B. For example, fuel line and DNAPL removal actions have not been planned and it is not clear when they will be completed.

Response: The fuel line and potential DNAPL remedial actions referred to in the RI report were recommended as a means for addressing data gaps. They are not being proposed as CERCLA Removal Actions. The remedial action which involve the physical removal of the fuel lines and potential DNAPLs are considered to be final remedial actions. Recommended remedial actions are discussed in the FS report.

8. Comment: The bedrock aquifer seems to be characterized in order to understand the extent of contamination. We have found that groundwater samples in some bedrock aquifer wells were not analyzed for VOCs. We believe it is important to understand if contamination in the bedrock aquifer has extended onto Parcel A. We recommend the Navy to undertake the analysis as part of the monitoring program.

Response: A total of 13 bedrock monitoring wells are located in Parcel B. Groundwater samples collected from the 12 bedrock wells located at IR-06 and the 1 bedrock well at IR-07 have been analyzed for VOCs as shown in Tables 4.4-4 and 4.5-7. The 12 bedrock monitoring wells summarized in Table 4.4-4 are identified by an "F" in the station number. The bedrock monitoring well at IR-07 is well no. IR07MWS-1 (see Table 4.5-7). Contaminants in groundwater from the bedrock water-bearing zone were detected in wells located downgradient from Parcel A; therefore, contaminants in the bedrock water-bearing zone at Parcel B would not migrate in groundwater to Parcel A, based on apparent groundwater gradients.

RESPONSE TO DTSC COMMENTS ON HHRA

1. **Comment: Please amend Table N.3-4 to clearly indicate which uptake factors are from Baes, et al. (Section 3.2.2.4, page N-3-18) and those which are calculated using equation 3-7 (Section 3.2.3.2.4), page N-3-21). Table N-3-4 contains a footnote referring to equation 3-7 for only some contaminants. I assume that all the other uptake factors are from Baes, et al. But a footnote indicating the source should be included for the uptake factors not currently footnoted.**

Response: Table N.3-4 has been revised to clearly indicate by footnote the uptake factors from Baes, et al ,and those calculated using Equation 3-7.

2. **Comment: We do not agree with the overly-broad statement that "Mutagenesis is rarely seen in mammals" (Section 4.5, page N-4-7). Broadly defined, mutagenesis includes induction of DNA damage and all types of genetic alterations ranging from changes in one or a few DNA base pairs to gross changes in chromosome structure or chromosome number (Casarett and Doull's Toxicology). Please amend or remove this sentence.**

Response: This sentence has been removed.

3. **Comment: We appreciate the effort which went into removing the concrete to obtain an air sample from building 134 for use in this risk assessment (Section 5.2.2, page N-5-9). The degree to which one sample can reflect site-specific conditions is always in question. Ambient concentrations of benzene in the San Francisco Bay region have been detected at concentrations higher than the building 134 concentration of 1.82 ug/m^3. This original proposal from U.S. EPA Region IX was to compare indoor air to U.S. EPA in door air Preliminary Remediation Goals (PRGs). Comparison of air concentration with U.S. EPA Region IX PRGs, as long as exposures are summed, is the appropriate comparison for RI/FS decisions. Comparison of air concentrations with lower of the OSHA Permissible Exposure Levels (PELs), or the California PELs contained in Title 8 of the California Code of Regulation (CCR), would allow evaluation of a work place after any RI/FS cleanup.**

Response: The benzene concentration measured in the air in Building 134 is less than the ambient benzene level in the San Francisco Bay region. Although benzene was detected in groundwater in a localized area of the A-aquifer, the extent of benzene volatilization and migration from the A-aquifer into Building 134 appears minimal as modeled in Appendix N, Attachment N-E. As suggested by the EPA, the RI report compares modeled indoor air concentrations of VOCs in residential buildings with EPA Region IX ambient air PRGs. Measured air concentrations were compared to the OSHA PELs as discussed below.

Measured indoor air concentrations reflect current conditions in HPS buildings, including current work activities (if any), building ventilation rates, and the physical condition of the building. In buildings housing ongoing industrial activities such as Building 134, measured air VOC concentrations are probably more indicative of emissions from industrial activities; and the contribution of VOCs in groundwater to indoor air is less likely to be significant. Building 134 has recently been used as machine shop and for general storage. Sludge and oily liquid observed in a dip tank and a sump during sampling have been removed. The dip tank and the sump along, with the floor tiles, have been cleaned. Current conditions at Building 134 reflect those after cleanup actions. Therefore, the RI report compares measured indoor air concentrations to OSHA PELs. As suggested by California Environmental Protection Agency (Cal/EPA) for evaluation of workplace cleanup, the table on Page N-5-10 of the HHRA has been revised to include the Cal/EPA PELs. The revised table is attached to this document. Comparison of measured indoor air concentrations with the Cal/EPA PELs show that VOC concentrations are all below the California PELs as well as OSHA PELs.

Building 134 is scheduled for demolition; therefore, receptors such as industrial workers will no longer be exposed to contaminants in the building. Furthermore, A-aquifer groundwater in the vicinity of Building 134 is expected to be remediated; thus, other potential future receptors will also not be exposed to VOCs in groundwater. The Navy plans to monitor VOC concentrations in groundwater during remediation of the A-aquifer.

RESPONSE TO DTSC COMMENTS ON APPENDIX P

1. Comment: The response to General Comment number 1 and Appendix P Specific Comment number 4 indicate that information has been included to allow the San Francisco Regional Water Quality Control Board (SFRWQCB) to make a determination regarding the beneficial uses of Aquifer A in Parcel B. Has the SFRWQCB yet made a determination regarding Aquifer A?

Response: The beneficial uses of A-aquifer groundwater have not yet been determined by the RWQCB. However, the SFRWQCB indicated during a meeting on July 18, 1996, that the A-aquifer and bedrock water-bearing zone at HPS will most likely not be used as a drinking water source based on staff a report that evaluates the Bay Front Groundwater Basin and Islais Valley Groundwater Basin.

2. Comment: The response to Specific Comment number 5 on volume II of the draft RI indicates that site-specific screening criteria (HGALs) will be included in the "...final remedial investigation report". Do not include site-specific screening criteria in the final RI without submittal for review and discussion. We recommend

that any site-specific screening criteria be submitted as a separate project note for review and discussion.

Response: Please see the response to Comment No. 1 from EPA.

3. **Comment: We agree that the Phase 1A ecological risk assessment is adequate for characterization of the terrestrial ecological threat (Response to Specific Comment 11). I was unable to locate the reference text in the new formulation of the risk assessment, but any reference to "adverse ecological effects" should refer to "adverse terrestrial ecological effects" to indicate that the aquatic assessment is not yet completed.**

Response: In future documents, "adverse ecological effects" will be referred to as "adverse terrestrial ecological effects" until the aquatic assessment is completed. Also, see the response to Comment No.1 from EPA.

4. **Comment: The point of Specific Comment 9 was that comparison of measured or modeled indoor air concentrations with indoor air PRGs does not consider the added dose of some organic compounds from "ambient" air or other routes of exposure. We will accept the comparison with U.S. EPA PRGs as long as correct methodology is utilized.**

Response: As suggested by the EPA, the RI report compares modeled indoor air concentrations of organic compounds with EPA Region IX ambient air PRGs. As stated in the response to Comment No. 3 from DTSC on the HHRA, indoor air concentrations were evaluated by comparing measured concentrations to OSHA PELs.

RESPONSE TO RWQCB COMMENTS

1. **Comment: Utility lines/Groundwater as a Potential Exposure Pathway to the Bay: Board staff are concerned with utility lines acting as horizontal conduits to the Bay through potential pollution source areas. This concern has also been identified by the Navy in *Potential Hydrogeologic Data Gaps, Section 5* of the Draft Final RI. The Navy's proposed solution in the RI is to resolve this data gap for the storm drain lines involves identifying and monitoring groundwater infiltration of reaches below the water table during the storm drain (IR-50) removal action. However, the May 24, 1996 version of the IR-50 removal action, will no longer examine groundwater infiltration. Therefore an infiltration study to identify areas where polluted groundwater may be entering the storm sewer system and other utilities is still required. Further, suggested in the *Contaminant Exposure Pathways and Receptors Section of the Draft Final RI, pg. 5-31,* a toxicity study involving bioassay should be conducted to determine cleanup levels. Phase 1B ERA data,**

HGALs, and *toxicity* (bioassay) information should be evaluated to determine impact of groundwater contamination on saltwater aquatic life.

Response: Please see the responses to EPA Comment No. 1 and DTSC Comment No. 6 on the RI report.

2. Comment: Sites posing an ecological threat from groundwater contamination, stated in our earlier comments on the Draft RI, will not be addressed by the Phase 1B ERA. Board staff suggest the establishment of an aquatic protection zone along Parcel B. The purpose of this zone would be to establish groundwater concentrations protective of saltwater aquatic species. It is our understanding from page 5-31 of the Draft Final RI, that bioassay will be used to establish cleanup levels for petroleum compounds. These data will appear in the Draft Final FS. Bioassay for CERCLA (mixed) and petroleum only contaminants in groundwater could then be used to back-calculate soil cleanup values within that zone. This approach and variations of this approach, have been used at other sites within this region.

Response: See the response to EPA Comment No. 1 and DTSC comment No. 6 on the RI report. As discussed during the BCT/remedial project managers (RPM) meeting on July 18, 1996, the establishment of an aquatic protection zone is being considered by the Navy. The definition of such a zone alone with its possible implementation and schedule is still under discussion. The use of bioassays for contaminants within the groundwater would be included within the framework of such an approach, along with issues such as mass loading of contaminants to the bay.

When a toxicity value is not available, a substitute toxicity value may be used or the hazard or risk from a COPC may be evaluated qualitatively. When substitute toxicity values are used, additional uncertainty is introduced into the estimation of risk or hazard from exposure to a given chemical. This does, however, allow the risk from exposure to that COPC to be included in the final quantification of risk. For example, although several PAHs are identified as B2 carcinogens under U.S. EPA's weight-of-evidence classification system, no SF is available for them. However, ECAO has approved the use of a SF for benzo(a)pyrene for all PAHs with weight-of-evidence classifications of B2 (U.S. EPA 1990b). For the purposes of this HHRA, the Cal/EPA potency equivalency factor weighting scheme based on benzo(a)pyrene is used (Cal/EPA 1994). This may lead to over- or underestimation of the total risk.

Quantitative estimation of risks and hazards from exposure to petroleum hydrocarbons is possible for only the lighter constituents of petroleum products such as BTEX. The exclusion of heavier constituents of petroleum products from the HHRA may lead to underestimation of total risk.

In summary, sources of uncertainty arise from (1) use of dose-response information from effects observed at high doses to predict adverse health effects that may occur after exposure to low levels of the chemical, (2) use of dose-response information from animal studies to predict effects in humans, (3) the assumptions associated with route-to-route extrapolation for COPCs, (4) the model used to calculate SFs, (5) use of dose-response information from short-term exposure studies to predict the effects of long-term exposures, and (6) the availability of data for chemicals.

4.5 TOXICITY PROFILES

A short description of the toxic effects of each COPC is presented in the toxicity profiles in Attachment N-G of this report. The toxicity profiles focus on effects most likely to be observed at the environmental exposure levels that are the basis for the toxicity values. Toxic effects other than the carcinogenic and noncarcinogenic effects quantitatively assessed include reproductive effects, teratogenic effects, and mutagenic effects. Many of the chemicals known to have reproductive effects are not common environmental contaminants. One of the contaminants known to cause reproductive effects is lead and these effects are discussed in the toxicity profile. The only reasonably certain human mutagen is ionizing radiation, which is not a COPC at Parcel B. Most known teratogens are drugs or disease-causing microorganisms. Pesticides such as aldrin and dieldrin are exceptions, and teratogenic effects of aldrin are

ENCLOSURE (2)

discussed in the profiles. The toxicity values, critical effects, and any uncertainty factors used in the calculation of toxicity values are also summarized in the toxicity profiles.

these locations are incomplete. Under current land-use conditions, potential exposure to lead in soil therefore does not pose any significant risks or hazards to industrial workers.

5.2.1.2 Average Exposure Case

Total ELCRs for all eleven exposure areas for which total ELCRs were calculated are less than 1×10^{-6} and considered insignificant. Similarly, total HIs for all eleven exposure areas are less than 1 and considered insignificant.

As discussed in Section 5.2.1.1, lead poses no significant risks or hazards to industrial workers under current land-use conditions.

5.2.2 A-Aquifer Groundwater

Risks and hazards associated with potential exposure to COPCs in A-aquifer groundwater under the current industrial land-use scenario are evaluated based on the assumption that volatile COPCs present in A-aquifer groundwater may be released from groundwater, migrate as soil gas, and enter on-site buildings through cracks in walls or foundations (see Section 5.1.3). Measured indoor air concentrations of volatile COPCs were compared against OSHA PELs to determine whether industrial workers face unacceptable risks from inhalation of volatile COPCs present in air inside current on-site industrial buildings. Because a single indoor air sample was collected at Parcel B, the potential for risks and hazards associated with exposure to indoor air cannot be evaluated under both the RME and average cases; therefore, a single risk and hazard analysis was performed.

The single indoor air sample, sample No. I0134, was collected on January 30, 1996, from inside Building 134 at IR-25. The method used to collect this indoor air sample and the complete results associated with this sample are discussed in Appendix D to the RI.

Several factors support the use of the single air sample from Building 134 as a conservative surrogate for air in other Parcel B buildings. First, the concentrations of COPCs in A-aquifer groundwater are generally highest in the vicinity of IR-25. Based on the RME case, the concentrations of COPCs in A-aquifer groundwater directly beneath the indoor air sampling location (within residential exposure area B3824) are from two to several thousands of times higher than COPC concentrations measured in A-aquifer groundwater at other locations across Parcel B (see Table N-E-3 in Attachment N-E).

Second, Building 134 was observed to have very little ventilation (PRC 1996). The building is reasonably well sealed, with the exception of several small broken glass window panes. Building 134 is infrequently used, indicating that doors and windows are seldom opened. These conditions favor the potential for indoor air concentrations of VOCs to build up within the building.

As shown in the table below, none of the indoor air concentrations of the six COPCs measured in the air in Building 134 exceeded their respective OSHA PELs or Cal/EPA PELs. These PELs are calculated as an 8-hour, time-weighted average and represent indoor air concentrations that industrial workers may be exposed to routinely over a 40-hour work week (8 hours per day, 5 days per week) without adverse health effects.

COPC	Concentration Measured in Building 134 ($\mu g/m^3$)	OSHA PEL[a] ($\mu g/m^3$)	Cal/EPA PEL[c] ($\mu g/m^3$)
Benzene	1.82	3,250	3,190
Dichlorodifluoromethane	16.6	4,950,000	4,950,000
Methylene chloride	311	1,765,000	174,000
Toluene	4.22	776,000	188,000
Trichlorofluoromethane	2.81	5,600,000	5,600,000
m,p-Xylene	1.95	435,000	435,000

Notes:

a NIOSH 1994

b Calculated as a ceiling concentration

c Barclays California Code of Regulations 1995. Pages 189-210.

6.3 TOXICITY ASSESSMENT

The toxicity assessment identifies the toxicity values used to quantify potential adverse effects to human health associated with exposure to COPCs at Parcel B. These toxicity values include RfDs for noncarcinogenic COPCs and SFs for carcinogenic COPCs. A discussion of toxicity values for noncarcinogens and carcinogens is presented in Sections 4.1 and 4.2 of this HHRA. A discussion of chemicals without published toxicity values is presented in Section 4.3 of this HHRA. When a route-specific toxicity value was not available, route-to-route extrapolation assumptions were used based on an approach used by U.S. EPA Region IX (U.S. EPA 1995b).

Toxicity values for chromium VI were used whenever chromium VI was detected. Based on comparison of chromium VI and total chromium concentrations in detected in Parcel B soil, chromium VI concentrations in soils were found to be 0.3 percent of the measured total chromium concentration in samples analyzed for chromium VI. In groundwater, all samples with detected total chromium concentrations were assumed to consist of 100 percent chromium VI. Because no SF is currently available for lead, risk to future residents from lead was evaluated using Cal/EPA's Blood Lead Model (DTSC 1994a) and U.S. EPA's Integrated Exposure Uptake Biokinetic (IEUBK) model (U.S. EPA 1994b). Risks to industrial workers from exposure to lead were evaluated by comparing soil lead EPCs to U.S. EPA Region IX soil lead PRGs of 1,000 mg/kg under the industrial scenario. The evaluation of risks from lead is presented in Attachment N-J.

Risks to future residents from exposure to VOCs in indoor air were evaluated by comparing indoor air concentrations with U.S. EPA Region IX PRGs for ambient air. Risks to industrial workers were evaluated by comparing indoor air concentrations inside an industrial building with the OSHA-established PELs for occupational exposure. Uncertainties associated with toxicity values are discussed in Section 4.4, and a short description of the toxic effects of each COPC is presented in the toxicity profiles in Attachment N-I.

6.4 RISK CHARACTERIZATION

In Section 5.0 of this HHRA, risks for each current and future land-use exposure pathways are characterized. Information presented in Sections 3.0 and 4.0 on exposure and toxicity assessments were combined to assess the risk for each exposure scenario. Risks are quantified and evaluated (1) for individual COPCs, (2) for multiple COPCs within specific exposure pathways, and (3) across multiple exposure pathways. In addition, risks associated with exposure to lead and VOCs in indoor air are assessed.

Risks to human health from exposure to COPCs at Parcel B vary widely among exposure areas. Significant risks associated with potential exposure, along with the COPCs that contribute to risks are summarized below for the current, future residential, and future industrial land-use scenarios and for exposure to VOCs in indoor air and exposure to lead in soil.

6.4.1 Current Land-Use Scenario

Based on the HHRA, current risks are within or less than acceptable range and hazards are insignificant. Total ELCRs and HIs for exposure to surface soil by industrial workers are summarized below.

- Under the RME case, only five exposure areas, B-072 in IR-07, B-003 and B-004 in IR-18, B-247 in IR-26, and B-118 in IR-23 and IR-62 have total ELCRs exceeding 1×10^{-6}, but less than 1×10^{-5}. The COPCs contributing most to the ELCRs are Aroclor-1260 and PAHs.
- Under the average exposure case, total ELCRs are less than 1×10^{-6} in all exposure areas.
- Total HIs are less than 1 for all exposure areas under both the RME and the average exposure cases.
- Dermal contact with and ingestion of soil are the dominant exposure pathways.

Table N.3-4 (Continued)

UPTAKE FACTORS FOR HOMEGROWN PRODUCE
HUNTERS POINT SHIPYARD, PARCEL B REMEDIAL INVESTIGATION

Chemical of Potential Concern	Kow (a)	Koc (a)		Uptake Factor
Volatile Organic Compound				
Acetone	5.8E-01	2.2E+00		3.8E+00
Benzene	1.3E+02	8.3E+01		2.6E-01
Bromoform	2.5E+02	1.2E+02		2.5E-01
Carbon Disulfide	1.0E+02	5.4E+01		3.4E-01
Carbon Tetrachloride	4.4E+02	4.4E+02		9.2E-02
Chlorobenzene	6.9E+02	3.0E+01		1.6E-01
Chloroform	9.3E+01	4.7E+01		3.8E-01
1,2-Dichloroethane	3.0E+01	1.4E+01		8.8E-01
1,1-Dichloroethene	6.9E+01	6.5E+01		2.5E-01
1,2-Dichloroethene (total)	4.0E+00	5.4E+01		1.7E-01
cis-1,2-Dichloroethene	5.0E+00	4.9E+01		1.9E-01
trans-1,2-Dichloroethene	3.0E+00	5.9E+01		1.5E-01
Ethylbenzene	1.4E+03	1.1E+03		8.0E-02
Freon 113	1.0E+02	6.2E+01	(b)	3.0E-01
2-Hexanone	6.3E+01	3.9E+01	(b)	4.0E-01
Methyl ethyl ketone	1.8E+00	4.5E+00		1.9E+00
Methyl isobutyl ketone	3.8E+01	2.3E+01		5.6E-01
Methylene Chloride	1.8E+01	1.1E+01	(b)	1.0E+00
Styrene	8.9E+02	5.5E+02	(b)	1.2E-01
Tetrachloroethene	4.0E+02	3.6E+02		1.1E-01
Toluene	5.4E+02	3.0E+02		1.5E-01
1,1,1-Trichloroethane	3.2E+02	1.5E+02		2.2E-01
1,1,2-Trichloroethane	3.0E+02	5.6E+01		5.7E-01
Trichlorethene	2.4E+02	1.3E+02		2.3E-01
Vinyl acetate	5.4E+00	3.3E+00	(b)	2.8E+00
Vinyl chloride	2.4E+01	5.7E+01		2.0E-01
Xylene	1.8E+03	2.4E+02		4.4E-01
Semivolatile Organic Compounds				
Acenaphthene	1.0E+04	4.6E+03		8.0E-02
Acenaphthylene	5.0E+03	2.5E+03		8.8E-02
Anthracene	2.8E+04	1.4E+04		5.8E-02
Benzo(a)anthracene	4.0E+05	1.4E+06		4.5E-03
Benzo(a)pyrene	1.2E+06	5.5E+06		2.5E-03
Benzo(b)fluoranthene	1.2E+06	5.5E+05		2.5E-02
Benzo(g,h,i)perylene	3.2E+06	1.6E+06		1.9E-02
Benzo(k)fluoranthene	1.2E+06	5.5E+05		2.5E-02
Benzoic acid	7.4E+01	4.6E+01	(b)	3.6E-01
Bis(2-ethylhexyl)phthalate	9.5E+03	5.9E+03		6.0E-02
Butylbenzylphthalate	6.3E+04	3.9E+04	(b)	3.9E-02
Carbazole	3.9E+03	2.4E+03	(b)	7.6E-02
2-Chlorophenol	1.4E+02	4.0E+02		5.5E-02

Table N.3-4 (Continued)

UPTAKE FACTORS FOR HOMEGROWN PRODUCE
HUNTERS POINT SHIPYARD, PARCEL B REMEDIAL INVESTIGATION

Chemical of Potential Concern	Kow (a)	Koc (a)	Uptake Factor
Chrysene	4.1E+05	2.0E+05	3.1E-02
Di-n-butylphthalate	4.0E+05	1.7E+05	3.6E-02
Dibenzo(a,h)anthracene	6.3E+06	3.3E+06	1.6E-02
Dibenzofuran	1.3E+04	8.1E+03 (b)	5.6E-02
1,2-Dichlorobenzene	4.0E+03	1.7E+03	1.1E-01
1,4-Dichlorobenzne	3.9E+03	1.7E+03	1.1E-01
Diethylphthalate	3.2E+02	1.4E+02	2.4E-01
2,4-Dimethylphenol	2.6E+02	2.2E+02	1.4E-01
2-Fluorophenol	5.8E+01	3.5E+01 (b)	4.2E-01
Fluoranthene	7.9E+04	3.8E+04	4.7E-02
Fluorene	1.6E+04	7.3E+03	7.2E-02
Indeno(1,2,3-cd)pyrene	3.2E+06	1.6E+06	1.9E-02
2-Methylnaphthalene	1.3E+04	8.5E+03	5.3E-02
4-Methylphenol	8.7E+01	5.4E+01 (b)	3.3E-01
N-Nitrosodipropylamine	2.3E+01	1.4E+01 (b)	8.2E-01
N-Nitrosodiphenylamine	1.3E+03	8.3E+02 (b)	1.0E-01
Naphthalene	2.8E+03	1.3E+03	1.1E-01
Pentachlorophenol	1.0E+05	5.3E+04	4.0E-02
Phenanthrene	2.9E+04	1.4E+04	5.9E-02
Phenol	2.9E+01	1.4E+01	8.6E-01
Pyrene	7.6E+04	3.8E+04	4.5E-02
1,2,4-Trichlorobenzene	2.0E+04	9.2E+03	6.8E-02
Metals			
Aluminum	NA	NA	1.1E-04
Antimony	NA	NA	5.2E-03
Arsenic	NA	NA	1.0E-03
Barium	NA	NA	2.6E-03
Beryllium	NA	NA	2.6E-04
Cadmium	NA	NA	2.6E-02
Chromium III	NA	NA	7.8E-04
Chromium VI	NA	NA	NA
Cobalt	NA	NA	1.2E-03
Copper	NA	NA	4.4E-02
Lead	NA	NA	1.6E-03
Magnesium	NA	NA	NA
Manganese	NA	NA	8.7E-03
Mercury	NA	NA	3.5E-02
Molybdenum	NA	NA	1.0E-02
Nickel	NA	NA	1.0E-02
Potassium	NA	NA	NA
Selenium	NA	NA	4.4E-03
Silver	NA	NA	1.7E-02

Table N.3-4 (Continued)

UPTAKE FACTORS FOR HOMEGROWN PRODUCE
HUNTERS POINT SHIPYARD, PARCEL B REMEDIAL INVESTIGATION

Chemical of Potential Concern	Kow (a)	Koc (a)	Uptake Factor
Thallium	NA	NA	7.0E-05
Vanadium	NA	NA	5.2E-04
Zinc	NA	NA	1.6E-01
Pesticide/Polychlorinated Biphenyl			
Alrin	2.0E+05	9.6E+04	3.8E-02
alpha-Chlordane	2.1E+03	1.4E+05	8.3E-04
Aroclor-1242	1.3E+04	8.0E+03 (b)	5.6E-02
Aroclor-1254	1.1E+06	4.3E+04	3.1E-01
Aroclor-1260	1.1E+06	5.3E+05	2.5E-02
4,4'-DDD	1.6E+06	7.7E+05	2.3E-02
4,4'-DDE	1.0E+07	4.4E+06	1.7E-02
4,4'-DDT	1.6E+06	2.4E+05	7.2E-02
Endosulfan I	6.8E+03	4.2E+03 (b)	6.6E-02
Endosulfan II	4.0E+03	2.5E+03 (b)	7.6E-02
Endosulfan sulfate	4.6E+03	2.8E+03 (b)	7.3E-02
Endrin aldehyde	4.0E+05	2.5E+05 (b)	2.5E-02
Endrin ketone	NA	NA	NA
gamma-Chlordane	NA	NA	NA
Heptachlor	2.5E+04	1.2E+04	6.2E-02
Heptachlor epoxide	5.0E+02	2.2E+02	2.0E-01
Methoxychlor	8.7E+04	5.4E+04 (b)	3.6E-02
Other			
Cyanide	5.6E-01	3.5E-01 (b)	2.4E+01

Notes:

a Unless otherwise noted values obtained from U.S. EPA 1990d

b Calculated using equation 3-7 from section 3.2.3.2.3

NA Not available