



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street
San Francisco, CA 94105-3901

N00217.003526
HUNTERS POINT
SSIC NO. 5090.3

August 15, 1997

Mr. Richard Powell
Mail Code 1832
Engineering Field Activities West
900 Commodore Drive
San Bruno, CA 94066-2402

**SUBJECT: PARCEL E REMEDIAL INVESTIGATION DRAFT REPORT, HUNTERS
POINT NAVAL SHIPYARD**

Dear Mr. Powell:

The Environmental Protection Agency (EPA) has completed review of the subject document. Comments are included in the Attachment. Based on the number of comments we are providing, we request a meeting with the Navy and PRC as soon as possible to discuss global issues that should be addressed and incorporated into the Draft Final RI document and the Draft FS for Parcel E. If you have any questions regarding these comments prior to the meeting, please call me at (415) 744-2387.

Sincerely,

A handwritten signature in cursive script, appearing to read "Sheryl Lauth".

Sheryl Lauth
Remedial Project Manager

cc: Mr. Chein Kao, DTSC
Mr. Rich Hiett, RWQCB
Mr. Jim Sickles, PRC
Ms. Luann Tetirick, Navy
Ms. Karla Braesemle, Weston

**REVIEW COMMENTS ON THE PARCEL E
REMEDIAL INVESTIGATION DRAFT REPORT
HUNTERS POINT SHIPYARD**

GENERAL COMMENTS

1. The site-specific discussions of the nature and extent of contamination need revision. In general, a good effort was made in Section 4.1 to evaluate the distribution patterns of individual analytes in soil and groundwater, however, this information was apparently not used to develop the site-specific discussions. In addition, the sampling density must be considered; the statistical degree of confidence that contamination was detected should be calculated and considered before generic statements like "the distributions of these metals do not indicate a release to the environment" can be accurately made. (Note that the degree of confidence when a small number of samples [e.g., two to four] were collected at the site will not be high.)

Also, the distribution of the maximum detected concentrations of metals is not necessarily significant; this appears from the text to have been erroneously considered to be the major way to determine if a release to the environment has occurred. The distribution patterns (e.g., both vertical and horizontal gradients) of both individual metals and metals associations (e.g., lead-antimony, copper-mercury-zinc-lead, etc.) are much more important.

Finally, if a metal was detected above the HPALs or HGALs, by definition, the detected concentration exceeds "background" and cannot be considered natural, so a "release to the environment" has occurred. It is likely, given the historic use of Hunters Point Shipyard for industry and as a shipyard for well over 100 years, that all of the potential sources of contamination will never be known. It is also likely that some of the fill was contaminated before emplacement at Hunters Point. Therefore, if a metal is detected above HPALs or HGALs, a release has most likely occurred whether or not the source of contamination is known; the only exceptions are statistical outliers, but this approach should only be used when a very small percentage of samples exceed an individual HPAL or HGAL.

SPECIFIC COMMENTS

1. **Table of Contents.** Please correct the figure list. Figures 4-7A and B (Hexavalent chromium) were not included in the figure list, nor were Figures 4-17 A and B (Thallium) included. The Maximum Concentration of Benzo(a)pyrene is depicted in Figures 4.1-18A and B, not Figures 4.1-21 A and

B. The Maximum Concentration of Aroclor-1260 is found in Figures 4.1-19A and B, not Figures 4.1-20A and B, and the numbers for the figures for TPH-diesel, TPH-gasoline, and TPH-motor oil are two numbers too high.

Please add Appendix Q to the list of appendices.

2. **Executive Summary.** The individual site descriptions (size, structures, vegetation), histories and source descriptions are well written and generally succinct, however, it is not necessary to include a detailed history of site investigations (e.g., p. ES-50).
3. **Section 2.3.5, p. 2-18.** Please correct the date in the last sentence. It should read 1997, not 1977.
4. **Table 3.2.1.** According to Figure 1.3-3, Building 809 is actually in IR-56, not IR-72. Also, the wooden shed in IR-12 is not included in the table.

Section 3.7, Geology

General Comments

1. On several cross-sections (e.g., 3.7-15, 3.7-16, and 3.7-18) the symbol used to depict sp does not match the symbol for sp shown in Figure 3.7-9. The correct symbol is generally shown in boring stratigraphic columns, but the symbol used for the stratigraphic unit appears to be incorrect. On other figures (e.g., Figures 3.7-17 and 3.7-19) no symbol was used for the bedrock unit. Please explain and correct as necessary.
2. The extent of the debris zone in the cross-sections should be queried where uncertain.
3. Static water levels in bedrock borings should be indicated.

Specific Comments

1. North arrows on Figures 3.7-1, 3.7-2, and 3.7-3 are missing.
2. **Figures 3.7-1 and 3.7-2.** Please indicate the location of Hunters Point on Figures 3.7-1 and 3.7-2.
3. **Section 3.7.2.2, p. 3-18, introductory paragraph.** The paragraph should explain how the late Quaternary stratigraphy was determined. The Qc/Qal unit is not shown on the cross-sections as stated in the text. Please explain why Qc/Qal was identified for inclusion in this section and revise the text or figures as necessary for consistency.
4. **Figure 3.7-1.** Units in the study area are labeled Fcn, but Fcn is not listed in the legend (explanation). Please explain or correct as necessary.

5. **Figure 3.7-4.** Directional information should be shown on this schematic cross-section to help the reader understand this figure.
6. **Figure 3.7-5.** If available, the bedrock elevation at DMB 245 would allow expanded bedrock elevation contours to the north of Crisp Ave. in the vicinity of IR-76.

Please confirm whether the bedrock elevations at IR56B038, located on Crisp Avenue near the intersection with Spear, is below mean sea level (MSL). The bedrock elevation of this boring is posted as 5.1 but the boring is located between zero and -50 contours.

7. **Section 3.7.3, p. 3-21, paragraph 1, tenth line, typographical error.** One of the "blocks of" phrases should be deleted.
8. **Section 3.7.3, p. 3-21, paragraph 2, fourth sentence.** The slope of the upper bedrock surface appears to slope to the southwest at IR2-NW and IR-03. In the vicinity of IR-02C, IR-13, and IR-38 the bedrock surface does appear to slope to the west.
9. **Section 3.7.3, p. 3-22, paragraph 1.** Please resolve a discrepancy; the second line indicates that Bay Mud is found below 3 ft MSL, but on p. 3-19, paragraph 2 indicates that Bay Mud is found below 5 ft MSL.
10. **Section 2.7.3, p. 3-22, last paragraph.** Figure 3.7-6 should be referenced instead of Figure 3.7-7.
11. **Figure 3.7-6.** The -20 contour in IR-05 at Building 704 terminates and the -10 contour continues into Parcel C as the -20 contour. Please revise this figure.
12. **Figure 3.7-11.** The stratum interpreted as Qu in IR02B240 has common peat interbeds which should be included in Table 3.8-2 and mentioned in the text. Was peat found in other borings?
13. **Figure 3.7-12, Sheet 1.** Please explain the basis for the relatively thin layer of Quus shown in the northwest. If DMB310 was used for interpretation it should be shown on the section.
14. **Figure 3.7-12, Sheet 2.** No supporting evidence is shown for the Kjfm formation shallowing toward the southwest. Perhaps the closest deep boring (e.g., IR03B227) can be projected onto the section line to provide the depth to Kjfm.

The Qbm/Qu contact is missing.

15. **Figure 3-7.13.** The reason the Qaf was chosen to represent the entire interval of in borings IR11MW25A, IR15B001, and

IR15B002 is unclear. It appears that fat clay containing serpentinite gravels occurring just above the Kjfm contact was interpreted as Qaf, but it is possible that this unit is Qbm containing gravels derived from the underlying bedrock surface during deposition of the Qbm (as indicated on the log for IR15B001). If this is correct, then Qbm would extend through the two borings and pinch out between IR15B007 and IR15B002. Similarly, Quus may extend through IR11MW25A (contains light olive brown poorly graded sands) and pinch out between IR11MW25A and IR15B002. Qbm may be present in IR11MW25 as dark gray silt with shell fragments.

16. **Figure 3.7-14, Sheet 1.** The log of IR02B290 indicates dredge spoils similar to underlying Qbm. Please explain how these units are distinguished from Qbm. The Qbm contact at this location may be about 5 ft shallower than shown. Dredge spoils should be discussed in the text.
17. **Figure 3.7-14, Sheet 2.** The Qbm/Qaf contact at IR03B227 appears to be shown about 3 ft lower than the log would indicate. It is unclear why the Qbm/Qu contact in the vicinity of the Kjfm shallows near the center of the section because the Qbm/Qu contacts depicted in other sections are relatively flat-lying (horizontal). This contact may be better represented terminating on the northwest side of Kjfm, as shown in the vicinity of Shag Rock on Figure 3.7-13.
18. **Figure 3.7-15.** The basis for inclusion of Qu in this cross-section is unclear. Please explain and add queries where the contacts are uncertain.
19. **Figure 3.7-18.** The lowermost lithology in boring log IR56B010 is identified as Quus, but the lithology shown on cross-section is Qu. Please explain.
20. **Figure 3.7-19.** Contacts should be queried where uncertain (e.g., lower Qbm contact).

The logs for IR76B009 and IR76B005 indicate Quus is present, but this unit is not shown in this cross-section. Please explain and correct as necessary.

Please explain the purpose of the solid vertical line located approximately 1.5 inches from the southeast edge of the section. If this is a boring it should be labeled.

21. **Figure 3.7-20.** The occurrence of the Quus in the central portion of the section, which is based on IR01B052, may be misleading, because the boring is 110 feet northwest of the section line. Qbm typically thins/pinches out inland, perpendicular to the existing shoreline, and would be expected to thin to the northwest (into the section), and to the north at the northeast portion of the section. Qbm

apparently pinches out between the section line and boring IR01B052. For clarity is suggested that the queried Quus/Qbm contact at IR01B052 be omitted from the section. The resulting Qbm/Quus contact would then be the jagged queried line between IR01B050 and IR01B030.

Lithologic symbols are missing from boring IR01B052, IR01B030, and IR01MW02B in the section.

22. **Figure 3.7-21.** The severely dipping contacts between Quus and Qbm should be reexamined. An alternate interpretation might be an interfingering relationship between the units, which would be shown by extending Quus from the northwest through IR14B010, then thinning and interfingering with Qbm. Quus in borings IR15MW08A and IR15B004 would occur as isolated pockets (i.e, not connected with contact lines)

Section 3.8, Hydrogeology

1. **Section 3.8.1.3, p. 3-25.** The word "rejected" does not seem to be appropriate for the first sentence; "discharged" would be better than "rejected." The second sentence is a repeat of the first sentence, and should be deleted or combined with the first sentence.
2. **Section 3.8.2.2, p. 3-28.** A TDS concentration of 24,800 mg/L cannot be considered slightly saline. The last sentence in the section should read "...Bay and is slightly to very saline...." It would be useful to include a definition of saline water. Also, please provide additional information to support the conclusion that San Francisco Bay is recharging the B-aquifer, since the salinity of the B-aquifer does not necessarily imply recharge.
3. **Section 3.8.2.3, p. 3-28, bottom of the page.** The word "likely" is used to describe the TDS content of bedrock water-bearing zone. The word "likely" implies that the subsequent description are not necessarily based on real data. Please choose another word that reflects the use of actual data.
4. **Table 3.8-2.** This table is missing information for IR-02NW and IR-02SE.
5. **Section 3.8.3.1, p. 3-29, paragraph 3.** The first sentence should be phrased " Depths to groundwater measured in"
6. **Section 3.8.3.1, p. 3-30, paragraph 2.** The calculated hydraulic gradients for all the aquifers are not documented adequately. It is very important to appropriately document the hydraulic gradients because the calculated gradients are used to estimate mass loading to the bay. It is nearly impossible to reproduce or locate the calculated hydraulic gradients. Please provide maps showing the location of the

calculated gradients, or alternatively provide a table showing the wells pair used to calculate gradients.

7. **Section 3.8.3.1, p. 3-31, last paragraph.** In the average linear velocity equation, it is stated that hydraulic conductivity is unitless. This is incorrect; it should read feet per day if average linear velocity is calculated in feet per day. Please correct this.
8. **Section 3.8.3.1, p. 3-32, last bulleted item.** Please provide the basis or source of the values for aquifer porosities.
9. **Section 3.8.3.1, p. 3-32, last paragraph.** The significance of a TDS concentration of 77,000 mg/L should be discussed. This value appears inconsistent with other rounds of sampling.
10. **Section 3.8.3.2, p. 3-34, paragraph 4.** The way the second sentence is written implies that the hydraulic conductivity of the B-aquifer is 14 feet per day when this value actually represents an estimate based on a single pumping test. Please modify the text.
11. **Section 3.8.3.2, p. 3-35, paragraph 1.** The secondary maximum contaminant level for TDS does not preclude the use of water in the B-aquifer. A better comparison would be to use the RWQCB drinking water criterion for TDS.
12. **Section 3.8.3.3, p. 3-35.** Seasonally fluctuating water levels in the bedrock could also be due to pressure head changes rather than recharge in overlying aquifers. Please discuss this possibility.
13. **Figure 3.8-3.** Please include the tidal range observed in the Bay during the study period in Note 2.

The location of the tidal gage should be included on the map. Please provide the mean bay water level elevation.

Contour lines around IR22MW15A, IR36NW12A, IR39MW22A, IR38MW02A (and others) should be hatched indicating water levels below MSL.

The groundwater elevation for PA36MW07A should be in parentheses since it doesn't appear to have been used in contouring. Alternatively, please revise the contours in the vicinity of the well.

The 1 foot contour line in the vicinity of IR09MW38A appears to be an error and should be deleted.

14. **Figure 3.8-4.** Please indicate which groundwater elevations were calculated using the Serfes method.

Show the location of the tidal gage used in the tidal study. Please provide the mean bay water level elevation.

The contour line around PA39MW01A appears to be unnecessary.

15. **Figure 3.8-5.** Please provide the range of tidal fluctuations in the Bay during the period that water level measurements were made.

Many of the water elevation contours representing depth below MSL are missing the hatch pattern.

16. **Figures 3.8-6, 3.8-9, 3.8-10 and 3.8-11.** Please provide the range of tidal fluctuations in the Bay during the period when water level measurements were made.

Also, please include a note to explain all groundwater elevations were based on single point level water level measurements and give the time period when measurements were made.

Please include the dashed line labeled 1935 in the legend.

17. **Figure 3.8-7.** There appears to be an error in the legend. TDS concentrations are in milligrams per liter not micrograms per liter.

Please discuss the criteria used to select the TDS and salinity values used in this figure. The maximum concentration mentioned in the text (77,000 mg/L) was not used.

18. **Figure 3.8-8.** There is an error in the legend; TDS concentrations should be in milligrams per liter not micrograms per liter.

Please note sampling collection period on the figure.

The isoconcentration lines in the vicinity of IR02, IR03, IR13 and IR11 appear to be in error. For example, the 25,000 closed contour should include IR02MW101A1, IR002MWB-1 (19,100) should not be between the 20,000 and 25,000 contours, IR13MW11A (10,600) should not be between the 15,000 and 20,000 foot contours, IR02MW299A (8,350) should be between the 20,000 and 25,000 foot contours, etc. The isoconcentration lines should be reviewed and corrected.

Please provide the basis for selecting the TDS concentrations at individual sampling points. For example, the 77,000 mg/L TDS concentration at IR01MW43A was not used.

Comments by EPA's Hydrogeologist on the Parcel E Draft RI:

1) General Comments

The objectives of the RI process are to 1) adequately characterize a Superfund site to determine if potential environmental risks are posed by specific portions of the site, 2) provide enough characterization to evaluate remediation alternatives for the site, and 3) present the data and evaluations in a manner that is understandable to the public and future users of the site. Based on my review of the document, EPA does not believe the Navy has met these objectives. The presentation and format of the RI is unclear and confusing. A better explanation of the approach of the RI and an explanation of what is and is not presented in the report would be helpful. In addition, the RI report does not present an adequate conceptual site model for each of the source areas. The sources are not evaluated to enough detail to allow for a proper evaluation of remedial alternatives. For example:

- The Navy has not presented any graphical demonstration of data that was collected at depths greater than 10 feet below surface. The reviewer could not find any discussions in the text to explain why the soils and sources below this depth are not addressed. Presentation of this data is necessary for a complete presentation of the conceptual model of the site.
- The text discusses contaminants of potential concern which include volatile and semivolatile organics, pesticides, and radionuclides; however, no graphical presentation of this data showing the limits and extent of these compounds are presented. This is confusing to the reader, leading them to believe the characterization of the limits and extent of these compounds is not necessary.
- The potential presence of remaining source material at each of the sites and the phases and media these sources may present in (such as NAPL's or adsorption to soil) should be discussed. Some discussion of past remedial actions on the Parcel are presented, but no discussion of any remaining sources is presented. A presentation of this information is necessary for the conceptual model and to evaluate a reasonable range of alternatives for selecting remedies.

2) **Executive Summary, p. ES-1 and ES-92.** Parcel E has been redefined to include IR-36. The RI findings for IR-36 were presented in the Parcel D RI report but have not be presented in the Parcel E RI. To make this RI report complete, the pertinent portions of the IR-36 data should be presented. Incorporating discussions and data presentations by reference for such a significant portion of what is now Parcel E, is not appropriate. Incorporate relevant data and presentations in the text or as an appendix.

3) **Executive Summary, p. ES-11.** The discussions of past disposal activities at IR-01/21 mentions 13,000 gallons of paint sludge and 8,000 gallons of solvents being disposed of in the landfill. Little discussion of the fate of these compounds is presented in the RI report. Graphical presentations of the distribution of these contaminants should be included in the RI report.

4) **Section 2.3.4, p. 2-17.** The last sentence of this paragraph states the removal action field activities were completed in mid-1977; this should likely be 1997.

5) **Section 2.3.6, p. 2-18 and 19.** There appears to be two sections labeled with this section number; please correct.

6) **Section 3.7.1.2, p. 3-14.** The third paragraph discusses the major active faults in the area and their estimated maximum magnitude. There is no indication on the referenced Table 3.7.1 what scale the magnitudes are given in; Richter or moment. Moment magnitude (Mm) has replaced Richter magnitude (Ml) as the preferred magnitude scale for reporting earthquakes in California. The California Division of Mines and Geology has more recent data on fault segments including slip rates and their maximum credible earthquake magnitudes. The table and text should be revised to reflect more current data.

7) **Figure 3.7-1.** The Basement Geology of California map has the Franciscan, Central Belt formation labeled as Fcn; however, the legend indicates this formation as Fcm.

8) **Section 4.1, p. 4-20.** No discussions are presented for data collected below a depth of 10 feet. None of the figures present any graphical depiction of contaminants below this level even in areas where the depth to groundwater is greater than 10 feet. Please explain in the text and/or identify as a data gap.

9) **Section 4.1, p. 4-20.** The RI report does not present figures showing the distribution of organics, pesticides, or radionuclides. A complete graphical presentation of all compounds of potential concern must be included in the document.

10) **Section 4.1, p. 4-20.** The RI report does not present any evaluation of the occurrence and distribution of radionuclides in the groundwater. While there is a limited discussion on the subject in Appendix E, it is not adequate to determine if radionuclides are a concern in the groundwater. As stated above, there are also no figures presented to show the distribution of any of these contaminants. This is a data gap.

11) **Section 4.1, p. 4-20.** Figures 4.1-7A and B are identified in the Figures section of the Table of Contents as presenting soil concentrations of hexavalent chromium. These figures are not found in the document and the numbering for the remainder of the figures is incorrect. In addition, the order of figures presented in the Table of Contents, beginning with Arochlor-1260

and continuing through Motor Oil, does not agree with the actual figures presented in the document. Please check the Table of Contents and make appropriate corrections and explain why the hexavalent chromium figures are not presented.

12) **Section 4.1.5, p. 4-57.** The first paragraph of this section states that figures showing the spacial distribution of organic constituents exceeding the screening criteria are presented in the report. Only two organic compounds are presented in any of the figures; Arochlor-1260 and benzo(a)pyrene. Additional figures showing all organic constituents should be presented.

Section 4

General Comments

1. The sample summary tables include sample locations where the only acceptable analytical data was for hexavalent chromium and/or asbestos. This should be clearly indicated in each table so that the reader is not led to believe that a large number of extra samples were analyzed.
2. **General Comment for all Nature and Extent of Contamination Sections.** The discussions in this section are too generic. More site-specific discussion is needed. This section should present a site conceptual model with specific discussions of each contaminant source, chemical and physical interactions, migration in all relevant media and potential receptors. General data and information are provided but there is very little integration of this data and discussion of its direct relevance to each potential contaminant source area.
3. The conditions under which hexavalent chromium occurs naturally are extremely rare. Hexavalent chromium only occurs naturally in the presence of $Mn^{+4}O_2$, which is also uncommon in nature because the equilibrium conditions are unfavorable. Unless it can be proved that $Mn^{+4}O_2$ is present with the hexavalent chromium, it is inappropriate to attribute the presence of hexavalent chromium to natural conditions.
4. **Section 4.x.5.1.** The descriptions found in these sections are rather cursory. Inclusion of a figure depicting potential physical migration routes would provide a clearer understanding of the site. In addition, a discussion of any leachate collection systems and storm drain pathways combined with analytical results from potential source areas and with results along these pathways would provide a clear indication if physical transport is significant.

Section 4.1

1. **Section 4.1.1, p. 4-23, paragraphs 1 and 2.** It is not clear what the following sentence is intended to convey: "The distribution of antimony concentrations exceeding the screening criteria in soil collected between 0 and 2 (2 and 10) feet indicates a lack of apparent horizontal concentration trends within this depth interval." While it is true that there are numerous isolated areas with elevated concentrations, because the data can be contoured, there are horizontal concentration trends. For example, the contoured areas in IR 1/21, IR-02NW, and IR-04 appear to represent horizontal concentration trends.
2. **Section 4.1.1, p. 4-29, paragraph 1, last sentence.** This sentence appears to be incorrect. The concentration contours and posted concentrations of chromium on Figure 4.1-6A suggest that there are areas where there are horizontal concentration trends in IR-04, IR-12, and IR-72.
3. **Section 4.1.1, p. 4-29, paragraph 2, sentence 9.** This sentence appears to be incorrect. The concentration contours and posted concentrations of chromium on Figure 4.1-6B suggest that there are areas where there are horizontal concentration trends in IR-02NW, IR-02C, IR-12, IR-56 and IR-72.
4. **Section 4.1.1, p. 4-30, paragraph 3.** There appears to be a horizontal concentration gradient for cobalt in IR-72.
5. **Section 4.1.1, p. 4-31, paragraph 2, last sentence.** There are several areas where Figure 4.1-8A indicates there are horizontal concentration gradients of copper. These areas include the southern part of IR-01/21, IR-02NW, IR-02SE, IR-04, the southern part of IR-12, IR-13, and possibly IR-03. Most of these areas also have elevated concentrations of mercury, lead, and zinc, suggesting that spent sandblast abrasive was used as fill.
6. **Section 4.1.1, p. 4-31, paragraph 1, first complete sentence.** Other areas where a review of Figure 4.1-8B suggests that there are horizontal concentration gradients of copper include IR-02NW, IR-02SE, IR-03, IR-04, and the southern part of IR-12. Most of these areas also have elevated concentrations of mercury, lead, and zinc and seem to be a vertical continuation of contaminated areas in the 0-2 foot zone, so it is likely that spent sandblast abrasive was used as fill in these areas.
7. **Section 4.1.1, p. 4-33, paragraph 1.** There are several areas where there appear to be a horizontal concentration gradient of lead. These areas occur in (Figure 4.1-9B) IR-01/21, IR-02NW, IR-02SE, IR-03, the southern part of IR-

- 12, and possibly IR-02C. These areas also have elevated levels of copper, mercury, and/or zinc, which suggests that spent sandblast abrasive was used as fill in these areas.
8. **Section 4.1.1, p. 4-37, paragraph 1.** There appear to be horizontal concentration gradients for nickel in IR-12 and IR-71.
 9. **Section 4.1.1, p. 4-37, last paragraph.** For the 2-10 foot interval, there appear to be horizontal concentration gradients for nickel in IR-02NW, IR-2C, IR-05, IR-12, and IR-72.
 10. **Section 4.1.1, p. 4-39, paragraph 2.** Based on Figure 4.1-15A, there appears to be a large area with elevated concentrations of silver and an apparent horizontal concentration gradient in IR-02NW.
 11. **Section 4.1.1, p. 4-39, paragraph 3, sentence 5.** This sentence appears to state the opposite of what the figure shows. Based on Figure 4.1-15B, there appears to be a large area with elevated concentrations of silver and an apparent horizontal concentration gradient in IR-02NW, a small area with an apparent horizontal concentration gradient in the southern part of IR-04 and a small area with elevated concentrations in IR-01 (IR01B021 and IR01B021A), but the nearest sample locations in IR-01 are 185 and 210 feet away, so a horizontal concentration gradient cannot really be evaluated in IR-01/21.
 12. **Section 4.1.1, p. 4-41, paragraph 2.** There also appears to be an area with an apparent horizontal concentration gradient for zinc in the southern part of IR-12.
 13. **Section 4.1.1, p 4-42, paragraph 1.** There also appear to be areas with horizontal concentration gradients of zinc in IR-01, IR-02SE, IR-02C, IR-03, the southern part of IR-04, the southern part of IR-12, and IR-76.
 14. **Section 4.1.2, p. 4-42, Aroclor 1260, Figure 4-19A and Figure 4-19B.** It is misleading to present and discuss data for Aroclor 1260 because there were very high concentrations of other Aroclors detected. For example, in the 2-10 foot interval, detected concentrations of Aroclor 1016 were as high as 740,000 $\mu\text{g}/\text{kg}$ and of Aroclor 1254 were as high as 33,000 $\mu\text{g}/\text{kg}$. Total PCB data must be presented in both the figures and text so that the complete magnitude of the problem can be seen. Also, since the highest detected concentration of Aroclor 1242 (32,000,000 $\mu\text{g}/\text{kg}$) occurred at a depth greater than 10 feet, a figure presenting the concentration of total PCBs at depths greater than 10 feet should also be included.

15. **Section 4.1.1, p. 4-42, paragraph 2, last sentence.** There are horizontal concentration gradients of Aroclor 1260 at IR-03 and the southern part of IR-12. Also, it is not clear whether the inclusion of IR-13 in this sentence was a typographical error.
16. **Section 4.1.3, pp. 4-46 and 4-47.** Please note that the figure references in the text are incorrect (see Specific Comment 1 on the Table of Contents).
17. **Section 4.1.3, p. 4-48, paragraph 3.** There is also evidence (Figure 4.1-22A) for horizontal concentration gradients at IR-73.
18. **Section 4.1.3, p. 4-49, paragraph 1.** A review of Figure 4.1-22B suggests that there are also horizontal concentration gradients at sites IR-73 and IR-76.
19. **Section 4.1.4, p. 4-52, paragraph 1.** Please clarify the meaning of the last sentence. It appears that the only area with an arsenic concentration gradient is in IR-03, not "in this area east to Parcel D."
20. **Section 4.1.6, pp. 4-58 through 4-60.** The citations for the TPH-gasoline and TPH-diesel figures have been reversed. Please change either the figure numbers or the text and table.

Section 4.2, IR-01/21

1. **Section 4.2.1.1, pp. 4-76 and 4-77, Geotechnical Investigation.** It would be helpful to reference Figure 4.2.5, Extent of Debris Zone, in this section. This would help the reader visualize the area filled in 1941-1942 with sand and clay fill and also to visualize where debris was placed.
2. **Section 4.2.1.1, p. 4-78, paragraph 1 and Figure 4.2-1.** Please clarify whether locations IR01MWI-1, IR01MWI-2, and IR01MWI-4 are included on Figure 4.2-1.
3. **Section 4.2.1.3, p. 4-92, paragraph 2.** The mass loading calculations are in Appendix Q, not Appendix C; please change the reference.
4. **Table 4.2-3.** This table is somewhat misleading because it includes samples collected from borings that were unusable. Please indicate when analytical samples collected from borings were unusable. Alternatively, indicate what analytes were acceptable.
5. **Section 4.2.4.1, p. 4-129, paragraph 2.** Please explain the reasoning behind the statement that "a release of hexavalent

chromium to the environment has probably not occurred at IR-01/21." Hexavalent chromium does not occur naturally, so the presence of this analyte implies that a release has occurred. Further, chromic acid is a liquid that is one of the common sources of hexavalent chromium; chromic acid could have been spilled or disposed of in areas outside the debris zone.

6. **Section 4.2.4.1, p. 4-131, paragraph 1.** The presence of PCBs may also be related to sandblast debris and/or painting waste because PCBs were sold for and used in industrial paint between 1950 and 1970.
7. **Section 4.2.4.2, p. 4-147, last paragraph.** The chromium detected in monitor well IR01MWI-9 and the elevated level of chromium detected in soil at depth in boring IR01B274 may be related. The boring log for monitor well IR01MWI-9 shows a sandy fill; this fill may have been sandblast debris.
8. **Section 4.2.4.2, p. 4-148, paragraphs 1 and 2, last 2 sentences.** The blanket statement that "the presence of copper (lead) in soil is also not directly related to the wastes disposed of in the Industrial Landfill" should not be made because it is not entirely true. In some areas, like the central part of IR-01/21, there is a direct correlation between the extent of the debris zone, soil contamination, and groundwater contamination. Based on information presented on figures from Section 4.1, there are large areas of IR-01/21 where soil and groundwater samples were not collected from the same boring and the distances between groundwater sampling locations are large. There are a limited number of monitor wells within the boundary of the debris zone and the distance between many monitor wells is 400 to 600 feet, so it is possible that the sampling density was not sufficient to determine whether there is a correlation with waste disposal. This should be discussed in the text.
9. **Section 4.2.4.2, p. 4-153, paragraph 3, and Section 4.2.7.1, p. 4-187, paragraph 2.** Hexavalent chromium does not occur naturally except under extremely rare conditions, so it is not appropriate to state that "the presence of hexavalent chromium in the B-aquifer is probably not due to a release." One possible source is the disposal of chromic acid, a liquid that may have migrated into the B-aquifer, and paint.
10. **Section 4.2.4.2, p. 4-154, first paragraph and Section 4.2.7.1, p. 4-187, last paragraph.** These organic chemicals do not occur naturally; they must, by definition, have been released to the environment. The isolated nature of the detections may be due to the limited number of monitor wells in the B-aquifer and/or to the limited size of the releases. Please revise the last sentence of these paragraphs.

11. **Section 4.2.5.3.** It is repeatedly stated for many of the contaminants found that they are expected or assumed to "... remain in their present location...". These same contaminants are also detected in groundwater at Site IR-01/21 (see Migration in Groundwater, page 4-157). This indicates that dissolution and migration/transport are occurring at the site and the contaminants of concern are mobile.
12. **Section 4.2.5.3, p. 4-157, Migration Evaluation, Migration in Groundwater, Metals.** The description is general and vague. Include a discussion of actual, site-specific values for pH and redox potential to evaluate inorganic species most likely to be present. Possible approaches would be to include Eh-pH diagrams focusing on site conditions for contaminants present or perform simple geochemical speciation modeling using a program such as MINTEQA2.

It is stated that "Where reduced groundwater encounters oxidizing conditions, metals may be expected to be removed from solution and sorbed ...". The statement is overly general. A number of the metals listed (barium, beryllium, cadmium, hexavalent chromium, copper, sodium, and zinc) do not precipitate under the range of pH and redox potential typically found in oxidizing groundwater and they do not sorb strongly to a soil matrix. This sorption process apparently is not occurring at Site IR-01/21 since the inorganic contaminants are present in groundwater at the site, i.e., they have not been adsorbed from solution.

The text in the last sentence is incorrect and should be revised. No "modeling of conditions" was presented in Appendix O.

13. **Section 4.2.5.3, p. 4-158, Groundwater, Volatile Organic Compounds.** Indicate if downgradient groundwater conditions are such that biodegradation is feasible (i.e., discuss whether conditions are sufficiently oxidizing and whether sufficient nutrients are present).
14. **Section 4.2.5.3, p. 4-158, Semivolatile Organic Compounds.** Dissolution of semivolatile organic compounds into petroleum and migration with petroleum hydrocarbons at the top of the water table occurs only in the presence of a free phase LNAPL. This section should discuss areas where free phase petroleum hydrocarbon is floating on the water table at Site IR01/21.

It is stated that "SVOCs sorb from groundwater to soil and are immobilized." This sorption process apparently is not occurring at Site IR-01/21 since the SVOC contaminants are present in groundwater at the site, i.e., they have not been adsorbed from solution. The use of site specific soil

organic carbon concentrations could be used in conjunction with Koc values presented for organic chemicals of concern to calculate actual partition coefficients and, by incorporating soil density and porosity, retardation factors could be determined.

15. **Section 4.2.5.3, p. 4-158, Pesticides and Polychlorinated Biphenyls.** Dissolution of pesticides and PCBs into petroleum and migration with petroleum hydrocarbons at the top of the water table occurs only in the presence of a free phase LNAPL. Please clarify whether free phase petroleum hydrocarbons are present at Site IR01/21.

It is stated that "... pesticides and PCBs have low solubilities and high organic carbon partitioning coefficients and are therefore not expected to sorb from groundwater to soil or migrate." Compounds with low solubility and high Koc are expected to strongly adsorb to soil organic matter. However, this sorption process apparently is not extensive at Site IR-01/21 since pesticide/PCB contaminants are present in groundwater at the site, i.e., they have not been adsorbed from solution. The use of site specific soil organic carbon concentrations could be used in conjunction with Koc values presented for organic chemicals of concern to calculate actual partition coefficients and, by incorporating soil density and porosity, retardation factors could be determined.

16. **Section 4.2.5.3, p. 4-158, Petroleum Hydrocarbons.** It is stated that "Petroleum may not be degraded very rapidly at IR-01/21 because of the lack of oxygen." Present site-specific groundwater data for dissolved oxygen and redox potential.

The statement that "... hydrocarbons are nearly insoluble in water and are expected to be sorbed by the soil matrix." is inconsistent with the observation that petroleum hydrocarbons are present in groundwater above screening criteria. Sorption processes apparently are not significant at Site IR-01/21 since the contaminants are present in groundwater at the site, i.e., they have not been adsorbed from solution. Revise or clarify the text.

17. **Section 4.2.7.1, p. 4-178, paragraph 3.** The distribution of elevated levels of zinc in 2-10 foot soil samples is very similar to the distribution of elevated levels copper and lead. The distribution of elevated levels of mercury in 2-10 foot samples generally is coincident with areas where copper, lead, and/or zinc were also detected at elevated concentrations. This strongly suggests that the source of mercury and zinc, which are historic antifouling additives, was the disposal of sandblast grit.

The distributions of subsurface arsenic and nickel can be contoured, so it is incorrect to state that there are no "apparent trends or discernable patterns." Also, the fact that metals were detected above HPALs indicates that the metals cannot be considered natural and must be attributed to contamination (or a release).

Section 4.3, IR-02 Northwest

1. **Section 4.3.1.2, p. 4-202, paragraph 4.** Please explain why all samples from IR02MW127B were not analyzed for VOCs (see Table 4.3-10).
2. **Section 4.3.1.3, p. 4-205, last paragraph.** Please clarify whether the test pits and trenches discussed in this paragraph are shown on Figure 4.3-1. It does not appear that any of the 100 foot trenches were depicted on Figure 4.3-1.
3. **Section 4.3.4.1, p. 4-231, paragraphs 1 and 2.** EPA does not agree that there are no patterns of metals distribution. The distribution of elevated levels of the anti-fouling metals copper and zinc covers approximately the same area at both the 0-2 and 2-10 foot depth intervals. Part of this area also has elevated levels of mercury. This strongly suggests that sandblast waste is the likely source of this contamination.
4. **Section 4.3.4.1, p. 4-231, paragraph 1.** Please revise the statement "the distribution and concentrations of these metals do not indicate a release to the environment." Hexavalent chromium is not normally found in nature. Cobalt, molybdenum, selenium, silver, vanadium, barium, and mercury were detected at concentrations that significantly exceeded the HPAL (up to 3 orders of magnitude above the HPAL). By definition, if a metal exceeds the HPAL, it is not naturally occurring and therefore must have been released to the environment.
5. **Section 4.3.4.1, p. 4-231, paragraph 3.** Trichloroethene (TCE) and 1,2-dichloroethene (1,2-DCE) were also detected in the 6.25 foot sample collected from IR02MW127B, so it is likely that the presence of vinyl chloride is not "isolated" but is the result of the progressive dechlorination of TCE and 1,2-DCE. Also, please note that because the detection limit was elevated (690 $\mu\text{g}/\text{kg}$), vinyl chloride could have been present in the 2.75 foot sample from this boring.
6. **Section 4.3.4.2, p. 4-242, paragraph 4.** Please explain why the detections of arsenic, barium, molybdenum, and vanadium "do not appear indicative of groundwater contamination" when the presence of these metals is "likely related to their

presence in soil" and when the detected concentrations exceed screening criteria.

7. **Section 4.3.4.2, p. 4-242, last paragraph.** Please explain the last sentence as it does not logically follow from the text. These metals were detected above screening criteria in multiple sampling rounds at multiple locations and their presence is "likely related to their presence in soils at the site." The logical conclusion is that the occurrence of these metals in groundwater is the result of leaching, which is indicative of a release to groundwater.
8. **Section 4.3.5.2, p 4-246.** The text implies that degradation of halogenated and non-halogenated compounds are assumed to proceed under the same conditions. In general, degradation rates of halogenated compounds are significant only under anaerobic conditions. Include biodegradation half-lives for specific compounds present, when available from the literature.
9. **Section 4.3.5.3, p. 4-247.** It is repeatedly stated for many of the contaminants found that they are expected or assumed to "... remain in their present location...". These same contaminants are also detected in groundwater at Site IR-02 NW (see Migration in Groundwater, page 4-248). This indicates that dissolution and migration/transport are occurring at the site and the contaminants of concern are mobile.
10. **Section 4.3.5.3, p. 4-248, Semivolatile Organic Compounds.** It is stated that "SVOCs have low solubilities in water ... and high organic carbon partition coefficients suggesting they will strongly sorb to soil and remain in place." This sorption process apparently is not occurring at Site IR-02 NW since the SVOC contaminants are present in groundwater at the site, i.e., they have not been adsorbed from solution. The use of site specific soil organic carbon concentrations could be used in conjunction with Koc values presented for organic chemicals of concern to calculate actual partition coefficients and, by incorporating soil density and porosity, retardation factors could be determined.
11. **Section 4.3.5.3, p. 4-248, Soil, Pesticides and Polychlorinated Biphenyls.** It is stated that "... pesticides and PCBs have low solubilities and high organic carbon partitioning coefficients." Compounds with low solubility and high Koc are expected to strongly adsorb to soil organic matter. However, this sorption process apparently is not extensive at Site IR-02 NW since the pesticide/PCB contaminants are present in groundwater at the site, i.e., they have not been adsorbed from solution. The use of site specific soil organic carbon concentrations could be used in conjunction with Koc values presented for organic chemicals

of concern to calculate actual partition coefficients and, by incorporating soil density and porosity, retardation factors could be determined.

12. **Section 4.3.7.1, p. 4-271, paragraph 3.** It is unclear how the presence of elevated concentrations of metals in filtered groundwater (above HGALs) can be attributed to the presence of elevated concentrations of metals in soil, which were due to "the disposal of industrial debris," and not be considered indicative of a release to groundwater when leaching has obviously occurred. Please explain.

Section 4.4. IR-02 Central

1. **Section 4.4, p. 4-280, paragraph 2.** Please describe the "residual product" that was observed in soil at the ground surface east of Triple A Site 18 more completely (i.e., was the product used sandblast abrasive, paint, waste oil, or some other material?).
2. **Section 4.4.1.2, p. 4-286, paragraph 2, sentence 5.** It does not appear that borings are uniformly distributed across site IR-02 Central, so it would be more accurate to state that these additional borings were completed to fill data gaps or to provide information about areas that were not previously sampled.
3. **Section 4.4.4.1, p. 4-316, Summary of Soil Chemistry.** The co-occurrence of anti-fouling metal additives was not considered when evaluating the distribution of analytes. In shallow soil (0-2 ft bgs), copper, mercury, and zinc (and lead) were detected at elevated levels above screening criteria in the firing range area. Copper and zinc were both detected at elevated levels with elevated lead in the vicinity of borings IR02MW149A and IR02B145 as well as in the IR02B100/IR02TA31B area. In the 2-10 foot interval, there were two areas where copper, mercury, zinc, and lead were detected at elevated levels; the largest area is north of Building 600 and the smaller area was in the vicinity of IR02TA29A. These patterns strongly suggest that antifouling metals have been released to the environment in areas where the disposal of sandblast abrasive occurred.

Also, please note that if metals were detected above HPALs, by definition, the metals cannot be considered natural (because detected concentrations are above background) and a release to the environment has occurred.

4. **Section 4.4.4.1, p. 4-317, paragraph 1, last sentence.** Lead was also used in paint; the presence of elevated levels of the antifouling metal additives suggests that the source of lead could be related to the disposal of sandblast abrasive.

5. **Section 4.4.4.2, p. 4-326, paragraph 1.** Please revise the last sentence. Since the metals detected in soil were also detected in filtered groundwater, metals have leached and therefore have been released to groundwater.
6. **Section 4.4.5.3, Migration in Soil.** It is repeatedly stated for many of the contaminants found that they are expected or assumed to "...remain in their present location...". These contaminants are also detected in groundwater at Site IR-02 Central (see Migration in Groundwater, p. 4-331). This indicates that dissolution and migration/transport are occurring at the site and the contaminants of concern are mobile.

Section 4.5, IR-02 Southeast

1. **Section 4.5.1.2, p. 4-363.** The six borings completed in 1988 did not show evidence of subsurface disturbance, but are all included within the burn area as shown in Figure 4.5-1. Please explain how the perimeter of the former burn disposal area was defined.
2. **Section 4.5.4.1, p. 4-392, paragraph 3.** Please explain why "the presence of arsenic, beryllium, chromium, manganese, and nickel may be associated with the use of sandblast waste... as Artificial Fill." The antifouling metal additives were copper, mercury, zinc, and organotin. These antifouling metals are frequently found in association with lead, a common paint additive.

Also please note that if metals were detected above their representative HPAL, they can not be considered natural, so the conclusion that elevated metals concentrations do not indicate a release to the environment should not be made.

3. **Section 4.5.4.1, p. 4-392, last paragraph.** Copper is not normally found in waste oil or petroleum products, but was detected in association with elevated levels of the other antifouling metals, mercury and zinc; elevated lead concentrations were also found in many of the same samples. This strongly suggests that sandblast waste was used as fill in the vicinity of Tank S-505.

In the burn area, elevated levels of copper were often detected in association with elevated levels of zinc and lead, which may be indicative of sandblast waste.

4. **Section 4.5.4.1, p. 4-393, paragraph 1.** Lead may also be mobilized from sandblast waste by the waste oil.
5. **Section 4.5.4.2, p. 4-401, paragraph 4; p. 4-402, paragraph 1, and Section 4.5.7.1, p. 4-429, paragraph 1.** Metals detected in soils were also detected in groundwater. This

implies that there has been a release to groundwater. Please revise these paragraphs.

6. **Section 4.5.5.3, Migration in Soil.** It is repeatedly stated for many of the contaminants found that they are expected or assumed to "...remain in their present location...". These same contaminants are also detected in groundwater at Site IR-02 SE (see Migration in Groundwater, page 4-407). This indicates that dissolution and migration/transport are occurring at the site and the contaminants of concern are mobile.
7. **Section 4.5.7.1.** Metals that were detected above their respective HPAL/HGAL cannot be considered natural; so a release to the environment has occurred. Please revise paragraphs that discuss contamination above criteria where it is stated that a release to the environment has not occurred.

Section 4.6, IR-03

1. **Section 4.6, p. 4-435, paragraph 5 and Section 4.6.7.1, p. 4-515, paragraph 3.** The capacity cited for each of the ponds is incorrect. Based on 7.4805195 gal/cu ft, the capacities for the small and large ponds should be 112,200 gallons and 205,700 gallons, respectively. Please revise.
2. **Section 4.6, p. 4-437, bullets.** Solvents and PCBs should be added to the list of potential contaminants.
3. **Section 4.6.1.2, p. 4-440, paragraph 5.** Please include or reference a table summarizing the measured thickness of floating product, or, at a minimum, discuss the range of measured thicknesses.
4. **Section 4.6.1.2, p. 4-443, paragraph 3.** Please revise the sentence that states that borings IR03MW225A and IR03MW226A were sampled to provide data along the perimeter of the ponds. These borings are in the middle of the ponds.
5. **Section 4.6.3.1, p. 4-462, table.** Please verify that the monitoring well is IR02MW371A, not IR02MW371.
6. **Section 4.6.4.1, pp. 4-480 and 4-481 and Section 4.6.7.1, pp. 4-517 through 4-519.** The lateral extent of elevated levels of copper and zinc are approximately the same at both the 0-2 foot intervals and 2-10 foot intervals. When elevated levels of mercury were detected, those areas were included within the areas with elevated copper and zinc. Also, copper and mercury are not normal constituents of waste oil. This strongly suggests that sandblast waste is the most likely source of contamination from these metals.

Please explain why the presence of antimony, cobalt, and molybdenum is believed to be due to sandblast waste. These metals are not antifouling additives and were not typically added to paint.

Also, the distribution of many metals, e.g., vanadium, beryllium, etc.) detected in subsurface soil roughly corresponds to the distribution of elevated levels of TPH (see Section 4.1 figures). The fact that these metals were detected above HPALS, the fact that the concentrations can be contoured and the correspondence to the distribution pattern with petroleum contamination indicates that a release to the environment has occurred.

7. **Section 4.6.4.2, p. 4-494, last paragraph and top of p. 4-495.** Vanadium is found in petroleum products. Also, if these metals were detected above the HPAL, the detected concentrations were above "background" and the metals are not naturally occurring. If the presence of these metals in groundwater is related to fill material, then a release to the environment has occurred. Please revise this paragraph.
8. **Section 4.6.5.3, Migration in Soil.** It is repeatedly stated for many of the contaminants found that they are expected or assumed to remain in their present location. These same contaminants are also detected in groundwater at Site IR-03 (see Migration in Groundwater page 4-500). This indicates that dissolution and migration/transport are occurring at the site and the contaminants of concern are mobile.
9. **Section 4.6.7.1, p. 516, last paragraph and p. 4-517, paragraph 1.** The fact that the detected concentrations of these metals can be contoured and they occur above the respective HPAL indicates that a release to the environment has occurred (see Comment 7).

Section 4.7, IR-04

1. **Section 4.7.4.1, p. 4-562, paragraph 2 and Section 4.7.7.1, p. 4-592, paragraph 1.** The fact that arsenic, beryllium, and manganese were all detected above the respective HPAL, indicates that the presence of these metals cannot be attributed to natural causes, therefore, a release to the environment has occurred. Also, the fact that this site was a scrapyard/scrap material area for 30 years suggests that the exact sources of contamination will never be known. Please revise this paragraph.
2. **Section 4.7.4.1, p. 4-562, paragraph 3, and Section 4.7.7.1, p. 4-592, paragraph 1.** Antimony is used to harden the lead used in batteries. Since this site was used to store batteries, it is likely that releases from battery storage

were the source of the elevated levels of antimony detected in site soil.

3. **Section 4.7.4.1, p. 4-563, paragraph 3.** The distribution pattern of elevated levels of copper is very similar to the distribution pattern for elevated levels of zinc in shallow soil in the central and southern part of Site IR-04. In the southern part of the site, elevated levels of mercury were often found in the same samples that contained elevated copper and zinc. The samples containing these metals also had elevated levels of lead and PCBs, which are also found in sandblast waste.
4. **Section 4.7.4.1, p. 4-563, last paragraph.** PCBs were added to industrial paint, so the presence of PCBs may also be due to sandblast waste.
5. **Section 4.7.5.1.** Petroleum hydrocarbons migrate laterally at the top of the water table only in the presence of a free phase LNAPL. Please discuss whether free phase petroleum hydrocarbons are present as an LNAPL on the water table at Site IR-04.
6. **Section 4.7.5.3, Migration in Soil.** It is repeatedly stated for many of the contaminants found that they are expected or assumed to remain in their present location. These same contaminants were also detected in groundwater at Site IR-04 (see Migration in Groundwater page 4-576). This indicates that dissolution and migration/transport are occurring at the site and the contaminants of concern are mobile.
7. **Section 4.7.7.1.** The extent of PCBs in soil at the 1 to 3 foot depth in the southern part of IR-04 has not been defined. PCBs may extend from the IR01TA07B area across the site boundary into IR-01/21 and the horizontal extent in the vicinity of IR04MW13A has not been defined. Identify these as data gaps.
8. **Section 4.7.7.1, p. 4-594, paragraph 3.** Since the same metals detected in groundwater at concentrations above HGALs were also detected at elevated concentrations in soil, a release to the environment has occurred. Revise this paragraph.

Section 4.8, IR-05

1. **Section 4.8.4.1, p. 4-624, paragraphs 3 and 4 and Section 4.8.6.1, p. 4-650, last paragraph.** The fact that antimony, arsenic, barium, beryllium, cadmium, copper, mercury, molybdenum, silver, vanadium, and zinc were detected above their respective HPALs indicates that the presence of these metals cannot be considered natural and therefore, the detected concentrations indicate that a release to the

environment has occurred. The distribution pattern of elevated levels of copper and zinc is similar, suggesting that sandblast waste was a possible source. Please revise these paragraphs.

2. **Section 4.8.4.1, p. 4-625, paragraph 3.** Lead is not normally found in oil, so the presence of this metal is unlikely to be related to a release of transformer oil.
3. **Section 4.8.4.2, p. 4-631, paragraph 5.** The location of the maximum concentration of metals is not necessarily important in evaluating whether there are discernable patterns (see General Comment 1).
4. **Section 4.8.5.3.** The metals detected in groundwater were also detected in soil at Site IR-05. This indicates that dissolution and migration/transport are occurring at the site and that the contaminants of concern are mobile.

Section 4.9, IR-11/14/15

1. **Section 4.9.3.1, p. 4-684, paragraph 1.** Please discuss all monitoring wells in which floating product was found. Based on the text in this section floating product was found in monitor wells IR14MW13A and IR15MW08A, but on page 4-666 (paragraph 3), the text states that oil was observed in monitoring well IR15MW07A. It is important to list or discuss all monitoring wells with floating product in one place.
2. **Section 4.9.4.1, p. 4-704, paragraph 4.** Please explain the fifth sentence, since by definition, metals detected above their respective HPAL cannot be considered "background" or natural. Therefore, a release to the environment has occurred.

Also, there are discernable patterns. The antifouling metals copper and zinc, and in some cases mercury, were detected at elevated concentrations (above screening criteria) in many of the same samples collected from the 0-2 foot interval. Lead was detected at elevated concentrations in some of the same samples. This "pattern" suggests that sandblast waste was used as fill material.

3. **Section 4.9.5.3, p. 4-719, paragraph 1.** It may be true that in general, certain metals do not migrate because they preferentially sorb into soil, but beryllium, cadmium, copper, lead, mercury, and silver were also detected at elevated concentrations above screening criteria in groundwater. Therefore, these metals have leached into groundwater. Please revise this paragraph to reflect actual conditions.

Section 4.10, IR-12

1. **Section 4.10.3.1, p. 4-763, paragraph 3.** Please clarify whether the oil sample was collected from monitoring well IR12MW12A, as stated in the text, or from IR12MW21A as shown in Table 4.10-12.

Also, please include a discussion of all wells where floating product was observed.

2. **Section 4.10.4.1, p. 4-782, paragraphs 3 and 4 and Section 4.10.7.1, p. 4-810, paragraph 1.** Based on the Section 4.1 figures, the concentrations of arsenic, beryllium, cadmium, mercury, and vanadium are generally higher in the disposal trench area and/or in the area with residual product in soil. This is a recognizable pattern. Further, the fact that these metals were detected at concentrations that exceeded the HPAL indicates that because these metals were detected above "background," there has been a release to the environment. Please revise these paragraphs.
3. **Section 4.10.5.3, p. 4-794, paragraph 1.** Beryllium, cadmium, copper, lead, and nickel were detected above screening criteria in groundwater, so these metals have migrated. Please revise the statement about the limited migration of these metals.
4. **Section 4.10.7.1.** There are no wells or groundwater samples collected in close proximity to or downgradient (east) of IR12B001, where PCE was detected at 230 $\mu\text{g}/\text{Kg}$ in soil. This is a data gap and should be identified as such.

Section 4.11, IR-13

1. **Section 4.11.4.1, p. 4-850, paragraph 5, and Section 4.11.7.1, p. 4-878, last paragraph.** Based on figures in Section 4.1, the detected concentrations of arsenic and beryllium did form patterns that could be contoured, so it is incorrect to say that there are no discernable patterns. Also, the lack of known sources is not sufficient because there may have been many unknown activities in this area. Because these metals were detected above the HPALs, their occurrence is not natural and must represent a release to the environment. Please revise these paragraphs.
2. **Section 4.11.4.1, p. 4-852, paragraph 1 and Section 4.11.7.1, p. 4-880, paragraph 1.** The presence of copper, lead, and zinc in these samples may also be associated with sandblast waste.
3. **Section 4.11.4.1, p. 4-852, paragraph 3.** The presence of PCBs in association with copper, lead, and zinc may indicate

sandblast waste since PCBs were sold and used as additives to industrial paint.

4. **Section 4.11.4.2, p. 4-859, last paragraph and 4-860, paragraph 3.** At these concentrations, it is possible that there was floating product in some IR-13 monitoring wells. Was floating product observed or measured in any wells? If so, please include a discussion of the wells and floating product observations.
5. **Section 4.11.5.3, p. 4-865, paragraph 2.** Since copper, lead, nickel, and silver were detected above screening criteria in groundwater, these metals have migrated to groundwater. Please revise this paragraph.
6. **Section 4.11.7.1.** High levels of TPH-diesel and motor oil were detected in the groundwater sample collected from IR39B029. These levels suggest the potential for a separate phase layer, please discuss whether any evidence for one was observed. Also, since the groundwater flows across the Parcel D boundary, the extent of TPH contamination in groundwater has not been determined. This should be identified as a data gap.

Section 4.12, IR-38

1. **Section 4.12.2, pl 4-895, paragraph 2, last sentence.** This sentence is incorrect. Please revise it to state "No cross-sections depict the lithology of Site IR-38."
2. **Section 4.12.4.1, p. 4-908, paragraph 1.** Please revise or delete the last sentence of this paragraph. Hexavalent chromium is rarely natural, so it must have been released to the environment. Other metals were detected above their respective HPAL, which indicates that they cannot be considered representative of background conditions. Lead was detected at a concentration nearly an order of magnitude above the HPAL. Zinc was detected frequently enough to be contoured.
3. **Section 4.12.4.1, p. 4-908, paragraph 2 and Section 4.12.7.1, p. 4-927, paragraph 1.** The detected concentrations of arsenic and nickel were contoured (see Section 4.1 figures) so it is not correct to state that there are no discernable trends or patterns. The lack of a known source is also not a sufficient reason to conclude that there has not been a release to the environment. The maximum detected concentrations of nickel and manganese significantly exceed their respective HPAL; therefore a release to the environment has likely occurred.
4. **Section 4.12.7.1.** The extent of PCBs (Aroclor 1260) across the Parcel D boundary and potentially under Building 606

does not appear to have been defined. Please identify this as a data gap or discuss Parcel D data that shows that the extent of PCB contamination has been defined.

5. **Section 4.12.7.2, p. 4-931.** The fact that the contaminated area in IR-38 has already been evaluated in the Parcel D FS should be presented earlier in Section 4.12. As currently presented, the reader reaches the conclusion that based on the calculated risk, IR-38 should be carried forward into the FS.

Section 4.13, IR-39

1. **Section 4.13.2, p. 4-941, paragraph 2.** Please explain how the groundwater level can be higher during the transition period than during the wet season. It might make more sense to revise the wet season depth to groundwater to read 9 to 10 feet bgs. Also note that the ranges are not truly groundwater levels, which would be cited in feet msl, but depth to groundwater measurements.
2. **Section 4.13.4.1, p. 4-953, paragraphs 6 and 7, p. 4-954, paragraph 1, and Section 4.13.7.1, p. 4-974, last paragraph.** The concentrations of nickel and chromium detected in soil in the 2 to 10 ft bgs depth interval could be contoured (see Section 4.1.1 figures). This means that there is a recognizable pattern. Further, the fact that these metals were detected at concentrations above their respective HPALs means that these metals cannot be considered representative of background. It is therefore incorrect to say that there has not been a release to the environment. Please revise these paragraphs.
3. **Section 4.13.7.1.** The extent of TPH-motor oil in groundwater does not appear to have been defined. This should be identified as a data gap.

Section 4.14, RI-40

1. **Section 4.14.1.2, p. 4-981, paragraphs 2 and 3.** It is not possible to visually determine if PCBs (and oil) have permeated concrete. Concrete is permeable, so the only way to tell if oil has migrated into or through concrete is to collect and analyze concrete chip samples. In US EPA's experience, PCBs have been detected in concrete that supported transformers when no visual evidence (staining) of contamination was visible. The text should be revised so that is clear that a visual determination of contamination is not an accurate way to determine the presence of PCBs. Because the pier and building will be demolished, it is not necessary to investigate whether the concrete is contaminated until it is time to dispose of the concrete. This information should be discussed in the text so that the

potential for contamination is considered by the demolition/disposal contractor(s).

Section 4.15, IR-45

1. **Table 4.15-7.** The source of the Detection Limit Average is not clear since all analytes listed in the table were detected. The Detection Limit Average for xylene appears to be inconsistent with the magnitude of the detection. Please explain.
2. **Section 4.15.4, p. 4-997, paragraph 1 and Section 4.15.7.1, p. 4-1000, paragraph 3.** The last sentence (p. 4-997) and the last 2 sentences (p. 4-1000) are incorrect. Copper, lead, manganese, mercury and zinc were detected in both soil and oil samples. Also, two soil samples, one oil sample, and one water sample are too small a data set to allow a conclusion of this magnitude to be drawn, given the length of steam lines in Parcel E. Please revise these paragraphs. Also, please revise the recommendations to reflect the changes.

Section 4.16, IR-47

1. **Section 4.16.4, p. 4-1011, paragraph 3 and Section 4.16.7, p. 4-1017, paragraph 3.** Since analytical results above the respective HPALs imply that metals are not natural, please explain the source of the elevated metals if, as stated in these paragraphs there has not been "a release of metals into the environment." Also, please consider the fact that the distance between test pits generally exceeded 300 feet, so patterns would likely not be evident.

Section 4.17, IR-50 Storm Sewers

1. **Section 4.17.5.3, p. 4-1036, paragraph 1, sentence 3.** The results were "typical of ambient soil" with the exception of lead, which was detected above the HPAL. Please revise.
2. **Section 4.17.5.3, p. 4-1036, paragraph 3.** Different types of soil have different sorptive capacities for petroleum, yet this paragraph implies that all soil has a high sorptive capacity for petroleum. Please revise.

Section 4.18, IR-50 Sanitary Sewers

1. **Section 4.18.4, p. 4-1052, paragraph 6 and Section 4.18.7.1, p. 4-1058, paragraph 1.** The presence of chloroform at low levels may indicate treated water, since trihalomethanes are formed when water is chlorinated. This may indicate that the sanitary sewer has leaked. One other way to tell might be to compare levels of sodium if the monitor well is outside the realm of tidal influence. Sodium was not listed

in Table 4.18.5. Was the sanitary sewer water sample analyzed for sodium?

Section 4.18, IR-51

1. **Section 4.19.2.2.** The conclusion that the investigation of former transformer locations is complete is not supported by any data. It is not possible to visually observe whether PCBs are present; further after a few months, the associated oil spill biodegrades and cannot be seen. It appears that very few soil samples were collected in proximity to the former transformers, so with the exception of sample IR12SS12 and possibly samples collected 13 to 20 feet from transformer I136 in IR-72, samples were not collected close enough to the IR-51 transformer locations to evaluate whether PCB contamination has occurred.

Please discuss whether any soil or concrete chip sampling was done (other than for Transformer 36). Discuss whether the oil stain on the floor of Building 527 was sampled. The fact that PCBs were found in soil at Transformer 36 suggests the potential contamination of other transformer sites. If sampling was not done at these sites a data gap exists.

Section 4.20, IR-52

1. **Section 4.20.4, p. 4-1079, paragraph 2 and Section 4.20.7.1, p. 4-1089, paragraph 4.** It is inappropriate to make the conclusion in the last sentence because detected concentrations did exceed HPALs and because samples were collected at widely spaced intervals along a non-linear path. It is very likely that patterns may not be evident under these conditions. Nevertheless, it is significant that the maximum detections of lead, copper, and zinc occurred in one surface soil sample; these metals may be associated with sandblast waste or spilled paint. Please revise these paragraphs.
2. **Section 4.20.4, p. 4-1079, last paragraph and Section 4.20.7.1, p. 4-1090, paragraph 2.** The conclusion in the last sentence may not be appropriate, because it depends on what the Navy and AAA transported through IR-52. Since this is not known, state this and revise the conclusion because of the uncertainty.
3. **Section 4.20.7.1.** The extent of metals contamination near PA52SS06, the extent of PAH contamination at 3.75 ft depth near IR52B009, and the extent of diesel and/or oil and grease contamination near locations PA52SS02, PA52SS03, and PA52SS04 have not been defined because there is at least a 200 to 300 foot distance to the next sample that was collected at a similar depth. The single boring near PA52SS03 and PA52SS04 is not sufficient to define the extent

of contamination because a single additional boring only defines the extent in one direction and because samples were not collected at the same depth as the surface samples.

Section 4.21, IR-54

1. **Section 4.21.4, p. 4-1103, paragraph 2 and Section 4.21.7.1, p. 4-1112, paragraph 3, fifth sentence.** The presence of metals above HPALs cannot be attributed to "naturally occurring conditions." Revise the sentences.

Section 4.22, IR-56

1. **Section 4.22, p. 4-1116, paragraph 3, and Figure 4.22-1.** Please include the location of the shallow drainage trench (where oily liquid was observed in 1993) on Figure 4.22-1. This is necessary so reviewers can evaluate whether adequate sampling was done.
2. **Section 4.22.1.2, p. 4-1120, paragraph 1.** Please explain why a sample of the oily liquid from the drainage trench was not sampled and analyzed. This would likely have provided additional information for source characterization.
3. **Section 4.22.4.1, p. 4-1140, paragraph 2.** The distributions of zinc in shallow soil and vanadium and copper in the 2 to 10 foot intervals could be contoured, indicating that the distribution of these metals is not sporadic. Further, the antifouling metals copper, mercury, and zinc were detected at elevated concentrations in the shallow soil sample from IR56B021, suggesting that sandblast waste may have been used as fill in this area.

Since the detected concentrations exceed HPALs, the source of metals is not natural so it is incorrect to state "the distribution of these metals do not indicate a release to the environment." Revise this paragraph.

4. **Section 4.22.4.1, p. 4-1140, paragraph 3 and Section 4.22.7.1, p. 4-1159, paragraph 2.** The distributions of these metals were contoured for the Section 4.1 figures, so it is incorrect to say that there were no apparent trends or discernable patterns. further, since many undocumented activities occurred at HPS, it is probable that there were undocumented source areas. Since these metals exceeded both HPALs and PRGs, it is incorrect to state that there has not been a release to the environment. Revise these paragraphs.
5. **Section 4.22.4.2, p. 4-1144, paragraph 2.** Please explain why metals detected in filtered groundwater above screening criteria were not considered "indicative of a release to groundwater." If metals were detected above screening criteria in both soil and groundwater, there has been a

release of metals to soil and subsequently leaching into groundwater.

6. **Section 4.22.4.2, p. 4-1144, last paragraph.** According to the text in Section 4.22.2 (p. 4-1127) groundwater generally flows toward Parcels A and D. An examination of the associated site-wide figures suggests that the primary flow directions are east to northeast. This means that IR-72 and IR-04 are not downgradient of this site, so it is unlikely that TCE from this source (which is also much lower than the levels observed in IR-04) has migrated toward these sites. Revise this paragraph.

Section 4.23, IR-72

1. **Figure 4.23-1.** The locations of the stained soil areas discussed in Section 4.23 on p. 4-1167 and the storm drain system should be shown on the figure.
2. **Section 4.23.4.1, p. 4-1195, paragraph 3.** Antimony concentrations in two areas - shallow soil west of Building 810 and soils at the water table next to Building 811 appear to have a distribution that potentially indicates a release of contaminants to the environment. Also, there is an area in the southwestern part of the site where the antifouling metals (copper, mercury, and zinc) and lead were detected at elevated concentrations in deeper soil, suggesting the probable use of sandblast waste as fill. Please review and discuss.
3. **Section 4.23.4.1, p. 4-1196, paragraph 1.** The distribution of arsenic, beryllium, chromium, lead, manganese, and nickel - detected at almost every IR-72 sampling location at depths up to 20 feet bgs suggests that these metals may be related to the composition of the fill. Also, the fact that these metals were detected above HPALs indicates that these metals cannot be considered to be naturally occurring and therefore must be considered a release to the environment. Please discuss the possibility that the fill materials used at the site were contaminated with metals prior to placement at the site.
4. **Section 4.23.4.2, p. 4-1201, paragraph 4.** The presence of TCE above screening criteria in the A-aquifer groundwater at IR-72 has been established but insufficient data and discussion has been presented to determine the source and extent of this chlorinated compound. Please clarify why it is believed that the extent of TCE contamination has been determined or identify this as a data gap.
5. **Section 4.23.4.2, p. 4-1202, paragraph 3.** The petroleum hydrocarbon data needs to be pulled together and discussed as a plume extending from USTs S-801 and S-802. This data

should be used in conjunction with downgradient groundwater data at site IR-04 to present the TPH groundwater plume on one of the figures and discuss the extent of the contamination. Groundwater contamination plumes that extend beyond site boundaries need to be addressed fully.

Section 4.24, IR-73

1. **Figure 4-24-1.** Please show the stained soil areas on the figure as described on page 4-1226, paragraph 4 and the locations of the fuel and storm drain lines described on page 4-1229, paragraphs 3 and 4. This information is required to understand the sampling location rationale and determine if these locations have been adequately investigated.
2. **Section 4.24.4.1.** The lateral extent of petroleum hydrocarbon soil contamination has not been delineated. All the shallow soil (0.75 foot) sampling locations at the stained soil areas exceed the TPH criteria. Additional surface soil samples are needed to establish the extent of contamination.

The 7,500 ft² of surface soil contamination discussed on page 4-1242, paragraph 4 appears to be the minimum area of soil contamination rather than a confirmed extent of contamination.

3. **Section 4.24.5.2, p. 4-1243.** The vertical and horizontal extent of groundwater contamination has not been determined at IR-73. Even the source of the groundwater contamination has not been established. If the petroleum hydrocarbons detected in groundwater at IR-73 are related to contaminant sources at other sites then the data for these sites need to be presented and discussed as part of Section 4.24. Additional investigation is warranted. Also, this section seems to be misnumbered.
3. **Section 4.24.5.3, p. 4-1249, paragraph 4.** The statement that "high molecular weight hydrocarbons are nearly insoluble in water and are expected to be sorbed to the soil matrix and remain in place" completely ignores the groundwater analytical results for IR-73, which show concentrations of TPH-d, TPH-mo, and TRPH above criteria. This statement needs to be revised and a more realistic discussion of the groundwater contamination included.

Section 4.25, IR-74

1. **Figure 4.25-1.** Please show the approximate location of the former gasoline station on the map including where the gasoline pumps and USTs were in relation to Crisp Avenue.

Without that information it is difficult to determine if the sampling locations are adequate for site characterization.

2. **Section 4.25.1, p. 4-1263, paragraph 4.** Please explain why no sampling points were located east of site IR-74 near Building 821, which appears to be directly downgradient (for groundwater) of the site. The lack of groundwater data is a data gap and should be identified as such in the conclusions and recommendations.
3. **Section 4.25.7.2, p. 4-1267.** Because access to the site could not be obtained, the site has not been adequately investigated to determine if contamination is present at the locations of the former gasoline station USTs. The data collected at the off-site sampling locations do not confirm the absence of contamination. Additional investigation is warranted.

Section 4.26, IR-75

1. **Figure 4.26-1.** The outline of the slough area described on page 4-1268, paragraph 3, needs to be included on Figure 4.26-1 for reference.
2. **Section 4.26, p. 4-1269, paragraph 2.** The potential for metals in sandblast waste should also be considered and discussed for the area where the slough potentially extends beneath IR-75.
3. **Section 4.26.2, p. 4-1273, paragraphs 2, 3, and 4.** The use of the A-aquifer and B-aquifer designations at IR-75 is misleading. With the absence of the Bay Mud aquitard at IR-75 and the occurrence of groundwater at approximately 8 feet bgs, it would be appropriate to combine the A- and B-aquifer groundwater measurements to more fully discuss the shallow/water table groundwater flow direction and gradients. Data from wells and piezometers at nearby sites should be utilized to help determine the local IR-75 groundwater flow conditions. Please revise these paragraphs accordingly.
4. **Section 4.26.4, p. 4-1277.** Because access to the site could not be obtained, the site has not been adequately investigated to determine the nature and extent of contamination. Additional on-site investigation is warranted as recommended on page 4-1294.
5. **Section 4.26.4.1, p. 4-1278, paragraph 3.** The statement that "the presence of metals in the soil at IR-75 is likely due to naturally occurring conditions" is contradicted by the analytical results showing nickel above the sample-specific HPAL in four soil samples. Just because nickel was not detected in the surface soil sample does not mean that

the soil samples collected in the deeper fill were not contaminated. Please revise the text and discuss the nickel concentrations in soil at IR-75.

6. **Section 4.26.4.2, p. 4-1280, paragraph 1.** Nickel was also detected above screening criteria in soil, so the presence of nickel in groundwater is most likely related to nickel in soil, which may be contaminated (see Comment 5).
7. **Figure 4.26-3.** Please revise the figure to include the relevant downgradient groundwater chemistry data at Site IR-76, which is discussed in the IR-75 recommendations on page 4-1294.

Section 4.27, IR-76

1. **Figure 4.27-1.** Several important reference locations (discussed in Section 4.27) need to be added to Figure 4.27-1: identify Building 831, show the slough area, show transformer pad location NE of Building 830, show trace debris zone, and identify all the surrounding sites such as IR-01/21 and IR-75.
2. **Section 4.27.4.1, p. 4-1321, paragraphs 2 and 3 and Section 4.27.7.1, p. 4-1348, last paragraph.** According to Section 4.1 figures, the distributions of elevated concentrations of the antifouling metals (copper, mercury, and zinc) and lead (which is commonly found in paint) in soil coincide approximately in the central area of the site. This strongly suggests that sandblast waste was used as fill, so the distributions of these metals does indicate a release to the environment.

The fact that these metals were detected above HPALs implies that these metals are not natural and there has been a release to the environment. Revise the text of these paragraphs and change or delete that last sentence.

3. **Section 4.27.4.1, p. 4-1321, paragraph 3.** Even a cursory review of the soil TPH and lead data strongly suggests that the elevated lead concentrations detected in soil at the IR-76 site boundary next to Building 820 (IR-75) extending southeastward through the center of IR-76 are related to an old fuel spill that probably originated at the former UST at Building 820. The TPH and lead soil concentrations are highest within the zone of groundwater table fluctuation. The data suggest that floating product moved through the site along the groundwater table some time in the past. Please revise this paragraph and discuss the pattern of lead concentrations detected.
4. **Section 4.27.4.1, p. 4-1321, paragraph 3.** The highest concentrations of arsenic in soil were detected at two

nearby locations (IR76B025 and B026) within the storage yard east of Building 830. According to Section 4.1 figures, the concentrations of arsenic can be contoured. This arsenic distribution needs to be addressed in the report. Please revise the paragraph accordingly.

5. **Section 4.27.4.1, p. 4-1322, paragraph 3.** Although the pesticides aldrin and heptachlor epoxide were only detected at one location, their occurrence should be investigated further. The nearest sampling location is approximately 75 feet away and additional sampling closer to IR76B006 is warranted to determine if there is a pesticide source area. The detection of 1,4-dichlorobenzene, which is also used as a pesticide, in groundwater at IR76B006 further supports the soil evidence suggesting that a pesticide release may have occurred in this area.
6. **Section 4.26.4.1, p. 4-1322, last paragraph and Section 4.27.7.1, p. 4-1349, last paragraph.** The source of TPH-motor oil in subsurface soil is most likely floating product from the former UST at Building 820. The pattern is somewhat biased because no samples were collected along the western site boundary. Also, it appears that this plume was very old and degraded, since only the TPH-motor oil constituents were found in soil samples.
7. **Section 4.27.4.2, p. 1329, paragraph 4.** More discussion and a figure with soil and groundwater TPH contours are needed to adequately present the petroleum hydrocarbon nature and extent for IR-76. The TPH, PAH, and lead data all point to a fuel release that is manifested by soil contamination within the zone of water table fluctuation and a groundwater plume extending up to 600 feet downgradient of Building 820 (IR-75).

Section 5

Specific Comments

1. **Section 5.1.1, p. 5-5, paragraph 2.** The text on page 4-178 states that "seventeen metals and hexavalent chromium...", but this same sentence has been changed in this section to read "sixteen metals...". Which is correct? Please be consistent.

It is incorrect to state that there are no "apparent trends or discernable patterns" (see Section 4.2, Comment 17). Because these metals were detected above their respective HPALs, their presence cannot be attributed to natural conditions and must be considered contamination (or "a release to the environment"). Please revise this paragraph.

2. **Section 5.1.2, p. 5-9, paragraph 2, Section 5.1.3, p. 5-12, paragraph 2, and Section 5.1.4, p. 5-14, paragraph 2.** It is unclear how the presence of elevated concentrations of metals in filtered groundwater (above HGALs) can be attributed to the presence of elevated concentrations of metals in soil, which were attributed to "the disposal of industrial debris," and not be considered indicative of a release to groundwater since leaching has occurred. Please explain and revise as necessary.
3. **Section 5.1.4, p. 5-13, last paragraph, second sentence.** Please delete this sentence, since the presence of metals above HPALs indicates that a release to the environment has occurred; also the next sentence attributes the presence of these metals to spills and leaks of waste oil, debris, or sandblast waste.
4. **Section 5.1.5, p. 5-16, paragraph 2, second sentence.** As stated in Section 4.6 Comments 7 and 10, there are discernable patterns (see Section 4.1 figures) and these metals were detected above their respective HPALs, so it is inappropriate to state that a release has not occurred. Please revise or delete this sentence.
5. **Section 5.1.6, p. 5-18, last paragraph.** Please see Section 4.7, Comment 1 and revise this paragraph.
6. **Section 5.1.6, p. 5-19, last paragraph.** Please see Section 4.7, Comments 1 and 3 and revise this paragraph.
7. **Section 5.1.7, p. 5-20, last paragraph.** Please resolve the discrepancy between the first sentence in this paragraph ("sixteen metals...") and the first sentence of the last paragraph on page 4-650 ("seventeen metals...").

Also, see Section 4.8, Comment 1 and revise the second sentence.
8. **Section 5.1.8, p. 5-23, paragraph 2.** On p. 4-739, the presence of these metals was attributed to fill, petroleum hydrocarbons, and a leaking drum. Also, there are discernable patterns (see Section 4.9, Comment 2). Revise or delete the second sentence of this paragraph.
9. **Section 5.1.8, p. 5-24, paragraph 2.** See Section 4.9, Comment 4, and revise the second sentence.
10. **Section 5.1.9, p. 5-25, last paragraph.** Please see Section 4.10, Comment 2, and revise the second sentence.
11. **Section 5.1.9, p. 5-26, paragraph 3.** Please see Section 4.10, Comment 4, and revise the second sentence.

12. **Section 5.1.10, p. 5-27, last paragraph.** Please see Section 4.11, Comment 1, and revise the second sentence.
13. **Section 5.1.11, p. 5-29, paragraph 2.** Please see Section 4.12, Comments 2 and 3, and revise the second sentence.
14. **Section 5.1.12, p. 5-30, last paragraph.** Please see Section 4.13, Comment 2, and revise the second sentence.
15. **Section 5.1.14, p. 5-32, paragraph 2.** Copper, lead, manganese, mercury, and zinc were detected in both soil and oil samples. Please revise the third sentence.
16. **Section 5.1.19, p. 5-34, paragraph 2 and Section 5.1.20, p. 5-35, paragraph 2.** Metals detected above HPALs cannot be considered natural, so by definition, a release to the environment has occurred. Please revise the second sentence of these paragraphs.
17. **Section 5.1.21, p. 5-36, paragraph 2.** Please see Section 4.22, Comments 3 and 4, and revise or delete the fourth sentence.
18. **Section 5.1.22, p. 5-38, paragraph 2.** Please see Section 4.23, Comments 2 and 3, and revise or delete the fourth sentence.
19. **Section 5.1.25, p. 5-41, last paragraph.** Since nickel was detected above the HPAL, it cannot be considered naturally occurring. Revise the last sentence.
20. **Section 5.1.26, p. 5-43, paragraph 2.** The second and third sentences contradict each other. Also, metals detected above their respective HPAL cannot be considered naturally occurring; the occurrence of metals above HPALs is the result of contamination. Please revise the third sentence.
21. **Sections 5.2.1 and Section 5.2.2.** It is not clear how it is possible to determine whether or not there is contamination if no samples were collected. For example, according to the tables on pages 5-45 through 5-47, no soil or groundwater samples were collected at Sites IR-40, IR-51, and IR-74. The validity of the assumption that no samples were necessary must be examined to assess potential data gaps. For Site IR-51, according to Section 5.1.18, samples were collected near transformers IR-03, IR-12, IR-390, IR-40, IR-72, and IR-76. Evaluate whether samples were collected immediately adjacent to the former transformer locations (e.g., next to the pad or under the pole), whether samples were collected from appropriate depths and whether PCBs were detected in those samples. For IR-40, sediment sampling analytical results must be evaluated.

In the case of IR-51, it appears that the only sample collected in close proximity to transformers was IR12SS12. In IR-72, samples were collected 13 to 20 feet from transformer I136. For all other transformer locations, shallow soil samples were not collected closer than 50 to 90 feet from the transformer location. This should be identified as a data gap.

Also, if soil contamination was found above screening criteria and groundwater samples were not collected, the potential impact to groundwater is unknown. According to these tables, groundwater could potentially be impacted at IR-45, IR-47, IR-50SD, IR-52, and IR-54. This should be identified as a data gap.

22. **Section 5.3.1, p. 5-52, paragraph 2.** There are also horizontal concentration trends for copper in IR-02NW, IR-02SE, IR04, the southern part of IR-12, IR-13, and possibly IR-03 (see Section 4.1, Comment 5).
23. **Section 5.3.1, p. 5-52, paragraph 3.** Other areas where there is a horizontal concentration gradient of lead include IR-01/21, IR-02NW, IR-02SE, IR-03, the southern part of IR-12, and possibly IR-02C.
24. **Section 5.3.1, p. 5-56, paragraph 1.** There are also horizontal concentration gradients of Aroclor 1260 at IR-03 and the southern part of IR-12. It appears that the inclusion of IR-13 may be a typographic error.
25. **Section 5.3.2, p. 5-58, last paragraph.** Please clarify the third sentence because the area with a horizontal concentration gradient appears to be in IR-03, not "east of Parcel D" (all of Parcel E is west of Parcel D).
26. **Section 5.4, p. 5-65, IR-56.** It is also possible that activities associated with the rail lines south of Crisp Avenue may have contributed to observed petroleum hydrocarbon contamination at IR-56.
27. **Section 5.4, p. 5-66, IR-74, paragraph 1.** There is no analytical data, so the conclusion is unwarranted. Please revise the last sentence to state that the potential for contaminant migration toward Parcel A is unknown.
28. **Section 5.4, pp. 5-68 and 5-69, IR-13.** High concentrations of TPH-diesel and TPH-motor oil were also detected in the groundwater sample collected from IR39B029, where groundwater flows northeast into Parcel D.

Also, according to Figure 4.1-32, TPH-motor oil was detected in well IR-38MW02A, which resulted in a plume being drawn across Manseau Street. Please review both the last sentence

in this paragraph and Figure 4.1-32 and revise as necessary for consistency.

29. **Section 5.4, p. 5-69, IR-38.** Please also discuss the extent to which PCBs extend under Building 606. Also, explain the mechanism by which PCBs migrated into Parcel E from Parcel D, since groundwater appears to flow from Parcel E to D, and there are no cross sections to show whether there are sloping layers in soil.
30. **Section 5.4, p. 5-69, IR-39.** According to Section 3.8 figures, groundwater flows to the east, from Parcel E into Parcel D in the IR-39 area, so it is very unlikely that petroleum hydrocarbon contamination would be spread upgradient from the Building 704 area into Parcel E. Revise this paragraph to clarify the location of possible waste oil releases and to incorporate the groundwater flow direction.
31. **Section 5.4, p. 5-70, IR-73, paragraph 1.** Please discuss whether there are Parcel D wells and borings in close proximity to IR-73 to show that petroleum hydrocarbons are not migrating into Parcel D.
32. **Section 5.4, p. 5-70, IR-01/21.** Please discuss whether it is possible that waste oils containing PCBs or gasoline were used either for weed control or dust suppression along the base boundary.
33. **Section 5.4, p. 5-71, IR-74.** Please revise the last sentence to state that the potential for contaminant migration is unknown because no samples were collected.
34. **Section 5.4, p. 5-73, paragraph 2.** If metals were detected above HGALs and VOCs and SVOCs were detected in groundwater from the B-aquifer, a release has occurred. VOCs and SVOCs are typically man-made compounds, it is unclear why the second sentence states that the presence of these compounds does not indicate a release. Please revise the second sentence.
35. **Section 5.5, p. 5-80, Potential Sources of Contamination.** Please add the industrial landfill and radium dial disposal area to the list of potential sources.
36. **Section 5.6.** The EPA review revealed the following additional data gaps; these data gaps should be discussed in this section:

IR-04 The extent of PCB contamination at the 3 foot depth at the southern end of the site. (see Section 4.7, Comment 7).

- IR-12 The source, magnitude, and extent of PCE contamination (see Section 4.10, Comment 5).
- IR-13 The extent of TPH-motor oil and TPH-diesel contamination in the vicinity of boring IR39B029. This contamination likely extends beyond the IR-13 site boundary (see Section 4.11, Comment 6).
- IR-38 The extent of PCB contamination beneath Building 606 and the mechanism by which PCBs migrated from Parcel D into Parcel E media (see Section 4.12, Comment 4 and Section 5, Comment 30).
- IR-39 The extent of TPH-motor oil contamination in groundwater (see Section 4.13, Comment 3).
- IR-40 The extent of contamination near the former transformers.
- IR-51 The extent of contamination near all former transformers except I136 (see Section 4.18, Comment 1 and Section 5, Comment 21).
- IR-52 The extent of metals contamination near PA52SS06, the extent of PAH contamination near IR52B009, and the extent of diesel and/or motor oil contamination near PA52SS02, PA52SS03, and PA52SS04 (see Section 4.20, Comment 3).
- IR-72 The source and extent of TCE contamination in groundwater (see Section 4.23, Comment 4).
- IR-73 The vertical and horizontal extent of groundwater contamination (see Section 4.24, Comment 3).
- IR-74 The nature and extent of potential contamination from the former gasoline station (see Section 4.25 comments).

Appendix C

GENERAL COMMENTS

1. The tidal monitoring analysis had several deficiencies, which should be corrected.

Tidal efficiencies should have been calculated; this is a better measure of the influence of tides on groundwater than "maximum water level change." Tidal efficiencies are independent of the observed tidal range, but maximum water level change is dependent on the observed tidal range. Therefore, the tidal efficiency calculated for each

monitoring point can be used to predicate the tidal fluctuation from any given tidal range in the Bay.

The zone of tidal influence should be based on the observed tidal efficiencies. The basis for the existing zone of tidal influence appears to be based on an ill defined and poorly reproducible criteria.

Mean water elevations for wells and tidal station from the tidal monitoring data should have been calculated using the Serfes filtering method. This filtering technique was noted on Figure 3-8.4 but no data or analysis was provided.

SPECIFIC COMMENTS

1. **Page C-2, paragraph 1.** The text states that barometric pressure was recorded during the tidal studies, but no data is provided. Please provide the barometric pressure data and include a discussion on whether barometric pressure had a significant impact on water levels during the study.
2. **Page C-3, top of the page.** A tidal influence classification system is discussed at the top of the page but individual wells are not classified using this criteria. This system should be discarded or modified using tidal efficiency as the primary criteria for determining tidal influence.
3. **Section 1.2.2, p. C-3.** TDS and salinity are not general indicators of tidal influence but are indicators of seawater intrusion or diffusion. Tidal influence is a physical process mainly due to a pressure response. TDS and salinity are measure of chemical processes.
4. **Section 1.3, p. C-3.** Provide the criteria and/or method for determining the "maximum water level change."
5. **Page C-4, bottom of page.** Please explain why the type of software would make a difference in the analysis of the slug or pumping test data. The statement in the text seems to imply that there would be a difference.
6. **Page C-5, top of page.** It is unclear why slug tests provide a better spatial distribution estimate of aquifer properties. Please clarify the text.
7. **Page C-6, bottom of the page.** One of the assumptions for the slug test analysis is the presence of an unconfined aquifer. The B-aquifer, which for most part confined, was analyzed using the Bouwer and Rice method which according to these assumptions is used only for unconfined aquifers. Discuss how using a method developed for unconfined or confined aquifers impacts the hydraulic conductivity estimates.

8. **Page C-8, top of the page.** The assumption that the aquifer is confined does not appear to be valid for the A-aquifer tests. Please clarify.
9. **Page C-9, last paragraph, third sentence.** This sentence is somewhat confusing. Are the A- and B-aquifers in communication at this point?
10. **Section 2.3.2, p. C-9, Pumping Tests.** Several pieces of data that were apparently used in pumping tests have not been included in the report.

It is stated that background water levels were recorded during the test, but no record of background water level testing or analysis is included.

It stated that barometric pressure changes were recorded during the tests, but no record of barometric pressure measurements or analysis is provided.

It is stated that step-drawdown tests were performed prior to the constant-head pumping tests, but no record and analysis of step-drawdown tests were included.

11. **Section 2.3.2, p. C-9, bottom of the page.** Discuss why well IR01MW02B is a valid observation for an A-aquifer pumping test. It appears that this is an invalid test unless clarification can be provided to show that the test is valid.
12. **Table C-1.** This table is not consistent with the tidal hydrographs. Several wells, monitoring periods appear to be missing and/or duplicated. Please correct and revise this table.
13. **Table C-3, p. C-27.** The k values reported for wells IR01MWI-3, IR01MWI-7, and IR02MW101A2 are extremely anomalous when compared to the description of the hydrostratigraphic units. The lithologic logs and slug test data should be re-evaluated for accuracy.
14. **Appendix C1-D.** Data from the bay tidal gage is missing from several of the hydrographs.
15. **Appendix C2.** The slug test and pump test curve matches were well done. The use of residual drawdown vs. dimensionless time plots provided a useful calibration to the other methods employed.
16. **Appendix C2-A.** Explain the following reference TEST E04, Well IR01P03A (CORRECTED). What does "CORRECTED" refer to? Provide the justification, basis and data for analyzing corrected data.

Appendices E and P**I. Appendix E**

1) **Page E-20, Section 2.3.2.1, second paragraph:** EPA believes that this paragraph may be incorrect. Unfortunately, Mr. Fil Fong has retired from CaDHS and so it is difficult to investigate the validity of this paragraph further. Perhaps Mr. Fong was actually trying to recall the Cesium 137 (Cs137) spill at Building 364. Please call EPA's Mr. Steve Dean at 415-744-2391 to discuss this issue further.

2) **Page E-26:** The statements on this page regarding sampling of monitoring wells are incorrect. EPA NAREL did not collect 25 monitoring well samples for radium analysis in 1993 or at any other time for that matter. A sampling team from NAREL did assist in collecting soil samples from Parcel E during the treatability study for radium contamination. Basing a conclusion on only one round of sampling that Ra²²⁶ has not migrated to groundwater is not convincing. Has any monitoring well sampling been performed to specifically provide data that addresses the radium contamination of groundwater issue? This appears to be a data gap and should be identified as such.

3) **Attachment E-1, Page E1-1, paragraph 1:** NRC's definition of free release and CERCLA's unrestricted use are not identical. They are based on different cleanup standards and criteria. However the document seems to be using the terms interchangeably. NRC's free release criteria are more similar to CERCLA's commercial use criteria than CERCLA's residential use criteria which EPA considers acceptable for total unrestricted use. Please revise the text accordingly.

4) **Attachment E-1, Page E1-5, paragraph 1:** EPA would like to provide some additional information to the Navy regarding the cesium 137 contamination outside of Building 364. In 1985, after presenting a paper to the Waste Management Symposium on Hunters Point radiation contamination issues, EPA's Steve Dean was approached by a gentleman from the audience who claimed to have been an employee at the NRDL during the 1960s. He asked Mr. Dean if anyone had ever found the cesium 137 spill in the parking lot of Building 364. Mr. Dean informed him that it had been discovered and was being investigated as the "peanut shaped hot spot". He then told Mr. Dean that the cesium was spilled there accidentally by a technician who dropped a beaker or laboratory flask containing the cesium in solution. The technician was taking a short cut from the south wing of Building 364 through the parking lot to the south east entrance of the building. While the technician's coworkers knew about the incident, the laboratory's management never found out. Mr. Dean gave the gentleman his business card and asked him to call to further discuss the details of the incident. However, he failed to

contact Mr. Dean and no additional details were provided. Mr. Dean believes that the man's story provides the authentic account of how the cesium peanut spill occurred outside of Building 364. The Navy may want to use this information to better document the history of the spill in the Parcel E RI and Parcel D ROD. Please call EPA's Mr. Steve Dean at 415-744-2391 to discuss this issue further.

5) Attachment E-1, Figure E1-2: This figure appears to have an error. It does not appear that Building 351A is in the correct location in this figure. All the other maps such as Figure P-3 show this building as building 364 not 351A.

6) Attachment E-1, Page E1-5, paragraph 2: Please state whether or not the sediment and debris collected from the sump bottom and from the utility trenches were analyzed for radionuclide contaminants? If not, please explain.

7) Attachment E-1, Page E1-9 Section 2.3.1 paragraph 1: "Detection of residual activity resulting from damaged, destroyed, or leaking devices is best performed by measurement of beta activity?" What level of increased sensitivity can be achieved from using gas proportional counters for dispersed beta activity as opposed to using 2" x 2" NaI scintillometers for gamma emissions from cobalt-60 and cesium-137?

8) Attachment E-1, Page E1-39, first paragraph: EPA recommends that the Navy immediately attempt to identify the unknown radionuclide source via portable gamma spectrometry. Please call EPA's Mr. Steve Dean at 415-744-2391 to discuss this issue further.

9) Attachment E1-4, Section 6.1: "These results satisfy the NUREG-1500 limits for Cesium-137 (2.14 pCi/g at the 3 mrem/yr level for the most restrictive scenario (residential) and that at these levels, human health is protected." NUREG guidance was not the appropriate standard to apply in this situation. CERCLA Preliminary Remediation Goals (PRGs) should be used. The PRG for Cs137 in a residential scenario is 0.020 pCi/gram. Please revise. The residual Cs137 levels left here should be readdressed during the Record of Decision process.

II. Appendix P

1) Appendix P, RADIATION RISK ASSESSMENT: EPA has several general comments regarding the radiation risk assessment for Parcel E. The assessment does an adequate job of characterizing the diffused radium contamination. In areas where the diffused radium contamination is above 5 picoCurie per gram (pCi/gm) the risk for those areas will exceed the acceptable upper 10^{-4} risk range. However, the risk for the total area will average out to values more in keeping with those in this risk assessment.

There remains the risk assessment for the 2,000 to 3,000 discreet radium devices scattered throughout the radiation disposal area of the landfill. RISKCALC/RESRAD risk assessment models do not adequately address the potential health threat to individuals for these point sources. Another strategy must be considered to address this issue. Gamma emissions from these radium devices typically range from 300 microRoentgen per hour ($\mu\text{R/hr}$) to over one milliRoentgen per hour (mR/hr) depending on the device and its state of decomposition. If a person finds a one mR/hr radium device and keeps it in close proximity to himself/herself or to other individuals for more than 15 hours the likelihood of these individuals receiving a 15 millirem or more gamma dose becomes very probable. The current Superfund radiation cleanup standard sets **15 millirem per year** at the upper acceptable risk range of 3×10^{-4} . Gamma rays from radionuclides are carcinogenic. Thus, allowing discreet radium sources to remain in the Parcel E landfill in a state that allows public access to them needs careful scrutiny during the RI/FS phase for Parcel E.

2) **Appendix P, page P-27, paragraph 1:** "...no (point) sources were located below the Bay Mud." This statement appears to be incorrect. Does this statement mean in the bay mud near the Parcel E radiation disposal area or at depth below the fill/Bay Mud contact? Please clarify. EPA's Steve Dean indicated that he observed radiation hot spot marker flags denoting point sources in the mud flats adjacent to the Parcel E radiation disposal area during low tide. This was during a site visit to inspect Eberline's radiation site survey in February 1993. The statement as written is confusing.

Appendix F

Comments on the Hunter's Point Parcel E Terrestrial Risk Assessment

GENERAL COMMENTS

1. Although many of the comments presented below raise questions of approach or present contrary opinions on methods and assumptions used in the assessment, there were many good, correct and insightful analyses and statements in this assessment.
2. General Format - Although the document presents the information, which is, for the most part, consistent with the basic steps outlined in EPA's *Framework for Ecological Risk Assessment* (1992), the content within each of the steps including the presentation of information and the nomenclature of the subsections, does not follow the *Framework*. For example, reference to the Problem Formulation in this risk assessment is relegated to a single paragraph on page F-4. Moreover, the *Framework* discusses discrete technical elements

within each of these steps. The Risk Characterization, for example, contains the following subsections:

Risk Estimation - which includes the integration of Stressor-Response and Exposure Profiles and the Uncertainty Analysis; and the

Risk Description - which includes the Ecological Risk Summary and the Interpretation of Ecological Significance.

While the *Framework* does not necessarily prescribe the format of the technical document, presenting the information consistent with the terminology and the order of the *Framework* would strengthen the relationship of the risk assessment to this guidance.

3. It was not clear if this document was to incorporate methodology outlined in the *Tri-Service Procedural Guidelines for Ecological Risk Assessments* - which states as its purpose "to provide guidance for conducting ERAs for use by risk assessors at Navy, Air Force, and Army installations." This guidance document was not noted in Section 1.1, *Ecological Risk Assessment Framework* of the report. As the *Tri-Service Procedural Guidelines* document did not become final until June 1996, it appears that the preparation of this document may have predated its availability.

SPECIFIC COMMENTS

1. **Section 3.4, p. F-8.** Although the text refers to the Site Conceptual Model (SCM) elsewhere in the RI (Figure 3.10-1), significance of a SCM in describing the key relationships between the chemical stressors and the assessment endpoints suggests the need to present and to discuss the Conceptual Model for the Ecological Risk Assessment herein. The Conceptual Model represents the culmination of the analyses conducted in the Problem Formulation and establishes the focus of the assessment.
2. **Section 4.2, p. F-12, paragraph 1.** The reviewer is not familiar with any data that indicates that aluminum is an "essential" element. Please explain the removal of aluminum as a COPC on this basis.
3. **Section 4.2, p. F-13, paragraph 2.** The document states that "The pesticide alpha-chlordane was added as a COPC due its detection in three out 15 samples at site IR 52." Further discussion indicates that IR 52 was eliminated because of the lack of suitable habitat. Was alpha-chlordane consequently eliminated as a COPC? If not, why not?

4. **Section 4.2, p. F-14, paragraph 1.** There is increasing evidence that the toxicology of PCBs is more closely correlated with specific congener distribution in exposure media than with the Aroclor content in those media. Individual PCB congeners have demonstrated widely varying potencies for a variety of adverse biological effects both in humans and in wildlife. Consequently, the sole use of Aroclor analysis may result in significant error in determining the toxicological significance of PCBs. The traditional analytical approach of visually matching the chromatographic pattern of the environmental sample to that of an Aroclor standard is increasingly recognized as being a somewhat less than adequate method with which to assess risk. Should additional sampling be proposed it might be helpful to analyze a subset of samples to assess congener distribution.
5. **Section 4.2, p. F-15, paragraph 3.** Previous discussion indicates that both endrin aldehyde and MCPA were excluded as COPCs due to infrequency of detection (page F-13, 2nd paragraph). Incorporating these chemicals in this discussion is not necessary and actually is somewhat confusing in the context of this discussion.
6. **Section 5.0, p. F-16, paragraph 1.** The reviewer is unaware of any documented information that quantifies the extent to which fur and feathers represent an adequate barrier to dermal exposure. While intuitively one would think that fur and feathers might provide some protection, further data is needed before one can confidently say that dermal contact is a relatively insignificant route of exposure, especially for small mammals that have intimate contact with soils while burrowing or foraging for soil invertebrates. Moreover, in the early life stages of some small mammals, pelage is either absent or not fully developed.
7. **Section 5.1, p. F-17.** It is not clear why plants and soil invertebrates were not evaluated in this assessment. Although the assessment of risk to higher level receptors is important, it seems no less important to evaluate the risk to the forage base that supports their use of this habitat. The intent of the ecological risk assessment is not just to evaluate the extent to which the COPCs at a site affect potential terminal receptors; more importantly, it is to more clearly define the extent to which habitat structure and function have been or may be impaired. Unfortunately, assessment of risk can often only be done at the organism or population level. Nevertheless, there are data that would allow the evaluation of other components of this habitat. It is curious to have developed the trophic relationships in Figure F. 3-1, only to disregard the significance of each of the trophic levels in this analysis.

8. **Table F. 5-1, Assessment Endpoints for the Parcel E Terrestrial Assessment.** This table refers to only two assessment endpoints for evaluation viz., the deer mouse, which serves as a surrogate for the small mammals inhabiting the site, as well as the American kestrel, which serves as a surrogate for raptors, ingesting small mammals and insects on site.

It would seem that at a minimum, additional assessment endpoints should include:

- Survival, growth and diversity of vegetation at the site.
- Survival, growth, and reproduction of soil invertebrates.

Both of these serve as the significant elements of the forage base for this habitat and in order to look at the potential impacts of site chemicals, should be evaluated as a resource to be protected.

Also, the nomenclature of what are assumed to be the 'measurement' endpoints, is not consistent with the *Framework* guidance.

9. **Section 5.3, p. F-22, Dose Estimate Equations.** Please clarify the concentration terms and the ingestion rates in the dose equations in dry or wet weight. It is essential that the ingestion rates and the media concentrations are consistent. In addition, consider changing the C_{prey} term to C_{forage} or something comparable, if the term is to include plants.
10. **Table F. 5-2.** Please clarify whether the daily ingestion rates for the deer mouse are in dry or wet weight.
11. **Section 5.3.1.2, p. F-25.** The intent of an ecological risk assessment is to evaluate the risk of chemical contamination to communities and populations of plants and organisms. On occasion, an endangered or threatened species warrants evaluation and protection at the organism level. The fact that a single deer mouse could meet its home range requirement within the confines of the parcel has limited meaning. The question rather should be whether that area is sufficiently large to sustain a population of small mammal species and is that population at risk. The use of home range and site use factors should not be removed from the context of what is to be evaluated. (See Table F.5-1 - where the assessment endpoint is stated as the 'protection of the population'.)
12. **Section 5.4.1, p. F-31.** It is not clear in the text if the soil-to-invertebrate biotransfer factor (BTF) is based on a dry weight tissue concentration. Please clarify. Also a more appropriate use of these data from the literature would be to

normalize the organic chemical data by the lipid content in the invertebrate tissue and the total organic carbon content in the soil. The way this factor is currently used requires the assumption that the relative characteristics influencing organic partitioning at the site (i.e. lipid content of the invertebrate and the organic carbon content in the soils) are similar to those from which the literature-derived BTF was obtained.

13. **Table 5-16.** The 'high' default soil-to-plant transfer factors for several of the organics, viz, DDT, and PCBs appear to be much too conservative when reviewing the results of the individual literature studies. In addition, there is some question in the Hebert et al. 1994 study as to what process was actually responsible for the vegetative tissue levels and whether uptake from soil and translocation was the responsible for the observed levels.
14. **Section 5.4.1, p. F-32, bullet 5.** See Comment 12. The use of lipid normalized tissue concentration and organic carbon soil concentrations represents a more accurate method for extrapolation of literature-derived data. Otherwise, the assumption is that the relative characteristics influencing organic partitioning at the site (i.e. lipid content of the invertebrate and the organic carbon content in the soils) are similar to those from which the literature-derived BTF was obtained.
15. **Section 5.4.2, p. F-32.** EPA was unable to reproduce the biotransfer factors used in the risk assessment from the Baes et al, 1984 paper. Also the use of the vegetative BTF seems to contradict the deer mouse significant dependence on seeds and grain (in which case, the reproductive (roots, tubers, seeds) value (B_r) would have been used). Table 5-3 suggests that seed is the predominant form of vegetation consumed. Please clarify.
16. **Section 5.4.2, p. F-33.** Please clarify if C_{plant} is dry weight or wet weight.
17. **Section 5.4.3, p. F-33, last bullet.** It is not clear why lipid-normalized tissue concentrations and organic matter-normalized soil concentrations were not considered applicable. While these data may not have been collected on site, default estimates of these parameters could be obtained from the literature. See Comment 12.
18. **Section 5.4.3, p. F-34.** Please clarify if C_{invert} is dry weight or wet weight.
19. **Section 5.4.5, pp. F-36 and F-37, Use of the Trophic Transfer Coefficient and Calculation of the Dose Estimate.** The

technical basis for the Trophic Transfer Coefficient is seriously limited and conclusions based on these results should be regarded as highly uncertain. In addition, it seems that the use of this methodology would not account for the 'biomagnification' of such chemicals as DDT, PCBs and mercury at successive trophic levels.

Bioaccumulation and the resultant residue level in vertebrate are not only functions of contaminant dose but are also functions of the nature of the chemical, the efficiency of gastrointestinal absorption of that chemical, the metabolism and depuration of the compound, the lipid reserve in the tissue (for most nonpolar organics), and the growth of the animal - factors that cannot be adequately described by the approach taken herein. The difficulty in identifying an existing model that adequately describes the body burden determination is appreciated. As an option for the nonpolar organic compounds and some organometals, e.g. mercury, establishing a vertebrate body burden may be more appropriately performed by normalizing the uptake as a function of lipid content of the surrogate vertebrate, and assuming an exchange equilibrium between the circulatory system and the lipid complex. Unfortunately this will not be helpful for the non-organometals. Short of collecting actual tissue data, the uncertainty in this modeling analysis will be very high and the results questionable.

20. **Section 5.5, p. F-37, Dose Estimates.** It is not clear why in the estimation of the dose to the receptor (e.g. deer mouse), the trophic transfer coefficient is being applied to the soil ingestion term. Incidental soil ingestion represents a dose term independent of trophic transfer. If this was performed to adjust the intake to an absorbed dose, this is probably inappropriate since the TRVs are developed from studies of applied dose. Most of the toxicity studies are based on the feeding of the animal a known quantity of food with a known concentration of chemical. As a result, the dose-response curve is based on the administered or applied dose unless the study has normalized these data to an absorbed dose. If this is not the case, it is inappropriate to develop a hazard quotient where the numerator is an absorbed dose (net absorption) and the denominator is an administered dose. One could, however, if data were available, adjust the reference toxicity value to account for differences in gastrointestinal absorption between the vehicle of administration in the toxicity study (e.g. corn oil) and the media of ingestion assumed for exposure (i.e. soil).
21. **Section 6.0, p. F-39, paragraph 1.** The text states that no analogous criteria exist for sediment. There are draft federal sediment quality criteria for a few organics. However, these organics do not appear on the COPC list.

Consider altering the sentence to indicate that no analogous sediment criteria exist for these particular COPCs.

22. **Section 6.1, p. F-41, paragraph 1.** Please clarify the differences between a NEL and a NOAEL and an EL and a LOEL. If they are synonymous, please indicate as such and use one or the other consistently throughout the text and tables.
23. **Section 6.1, p. F-41, paragraph 2.** The criteria with which studies and which endpoints were selected from the various available studies was not entirely clear. For example, when given the option of selecting an NEL from a study for which a dose response curve could be generated or using a lower NEL for which no effects levels were observed, explain how this was reconciled. Also discuss how it was reconciled when a better designed study (e.g., well-defined dose-response curve) indicated a LOEL that would be higher than a LOEL reported for a study that was not as well designed (e.g., fewer concentrations tested). If professional judgment was used to select the study with which to develop a TRV, this should be stated.
24. **Section 6.6.2, p. F-50.** A definition of 'acute' exposure would be helpful to evaluate which studies were rejected because of this criterion. In addition, please define the time period of a subchronic study.

Regarding the definition of chronic exposure, please examine EPA's Great Lakes Water Initiative Wildlife Criteria (EPA, 1995). In this document, chronic exposure is defined as an exposure duration equivalent to at least 50 % of a species lifespan. Further, for mammalian species that equates to a exposure of at least 1 yr; and for avian species at least 10 weeks.

25. **Section 6.6.3, p. F-50.** It is implied that the premise for the body scaling from test organism to target receptor as proposed in Opresko et al. (1993) is based upon body weight. The doses are actually converted per body surface area, not body weight. "It has been shown that the best measure of differences in body size are those based on *body surface area*, which, for lack of direct measurements, can be *expressed in terms of body weight (bw) raised to the 2/3 power (bw^{2/3})*." (Opresko et al., 1991). Therefore, the wording of this section needs to be modified slightly. However, the *Toxicological Benchmarks for Wildlife: 1996 Revision* (Sample et al.) indicates that the surface area should be expressed as body weight raised to the $\frac{2}{3}$ power, subsequently changing the dose per body surface area scaling equation to:

$$d_a = d_b * \left(\frac{bw_b}{bw_a} \right)^{1/4}$$

It was also determined that the scaling factor for birds is 1; therefore reducing the equation as follows:

$$d_a = d_b * bw^0 = d_b$$

The updated equations should be used for dose scaling.

26. **Section 6.6.3, p. F51, paragraph 1.** The use of the quote by Lindstedt (1987) appears to argue against the need to normalize dose based on body weight. Its inclusion here is confusing.
27. **Section 6.6.4.2, p. F-53, Chronic Exposure Duration.** See comment regarding definition of chronic exposure (page F-50 Section 6.6.2).
28. **Section 6.6.4.3, p. F-54, top of page.** The reviewer assumes that the list of groups presented is not an all inclusive list and represents those groups assumed to be relevant only to the deer mouse. Obviously, mammalian toxicity data are also available for a number of other species including guinea pigs, dogs, rabbit, etc.
29. **Section 6.6.4.4, p. F-54.** A great deal of effort and a comprehensive attempt has been made to obtain data from studies of species that are taxonomically similar. Nevertheless, the paucity of data associated with specific endpoints suggests that the data sets may not be sufficiently robust to account for inter- as well as intraspecies variability. Faced with a significant level of uncertainty in making these taxonomic extrapolations, an Uncertainty Factor of 2 to 5 could be applied to interspecies extrapolation. Data that suggests that allometric conversions between a test organism and the proposed surrogate receptor accounts for chemical sensitivity may be available. Also note that the deer mouse only serves as a surrogate for the evaluation of risk to other similar small mammals. Consequently, the protection afforded by an RTV must accommodate a wider range of physiology and metabolism than just that of the deer mouse. A similar argument may also be advanced for avian species and the kestrel.
30. **Section 6.7.** Please indicate within this section that no avian toxicity data were available for antimony, barium, beryllium, cobalt, chlorobenzene, dibenzofuran and naphthalene, or mammalian data for dibenzofuran.

31. **Section 6.8.5, p. F-68.** Please provide justification for using DDT avian toxicity data as a surrogate for chlordane data.
32. **Table F.6-2.** Under "Dose" column, delete the superscript from the value 10.9.
33. **Table F.6-24.** Under "Dose" column, delete the superscript from the value 205.71.
34. **Pages F-106 through F-152, Toxicity Profiles.** Although the information provided in the toxicity profiles for the chemicals of potential concern is complete, unless the risk of chemical exposure to plants, invertebrates and reptiles and amphibians is being addressed as an assessment endpoint, these data seem to be extraneous and not wholly relevant to this assessment. Likewise, it is understood that the risk to aquatic life was evaluated in a separate report. Information regarding the toxicity of COPCs to aquatic life, while informative, is extraneous to the focus of this assessment.
35. **Section 7.1, p. F-152.** General Comment - The great difficulty in preparing a simplistic, straightforward presentation of results of a multi-layered analysis of risk is recognized. Nevertheless, the discussion of the quantitative analysis is quite confusing. The use of terminology such as "lower HQ and upper HQ" and their attendant definitions, e.g. *"the lower HQ uses the least conservative dose estimate and the least conservative TRV (the low dose estimate and high TRV) and represents the "best case" scenario,"* followed by the category designations of each of the HQs, where *"In Category 2, the lower HQ is less than unity, but the upper HQ is greater than unity"* appears to be hopelessly convoluted. For those folks having significant experience in risk assessment, such a discussion requires a concerted concentration and nimbleness of intellect just to follow the train of thought. Those readers who are only vaguely familiar with the process will have a very difficult time trying to understand this. EPA strongly recommends that the presentation of this information be improved. Specific examples in the text might be helpful.
36. **Section 7.1.1, p. F-153, paragraph 1.** Please explain why the least conservative approach represents the "best case" scenario. It is not clear what is meant by "best case." Is best case the most realistic? Please clarify.
37. **Table and Other Summary Tables in Section 7, p. F-156.** The huge range in Lower HQs and Upper HQs for the same chemical for both the deer mouse and the kestrel is problematic. While the intent of varying the exposure parameters and associated TRVs is to provide a window of risk with which to focus additional effort or to make prudent management decisions, the

range of as much as 10 orders of magnitude with an average range of about 5 orders makes any decision on these results difficult, unless of course there is significantly greater confidence in one of the numbers. Which begs the question - why do this in the first place?

The philosophy of taking a highly conservative approach in a screening analysis to avoid underestimating risks can be taken to the extreme. The approach implicitly assumes that resources and time will be available to conduct further, more detailed phases of the assessment, in which overestimation biases presumably will be uncovered.

38. **Section 8.0, p. F-236, paragraph 1.** Again, it is not clear why this assessment was limited to a food chain analysis. Given the ecological importance of the forage base that supports small mammals and birds, namely, the soil invertebrates and plants, why not evaluate the risk of their exposure to COPCs?
39. **Section 8.0, p. F-236, paragraph 1.** Please provide a definition of the term "best case."
40. **Section 8.1.2, p. F-238, paragraph 1.** It is not clear what the relevance of the first sentence (starting on the preceding page) is. It seems to have been written to diminish the significance of not having been able to evaluate dermal exposure. If so, the connection is unclear. Please clarify the point of explaining that dermal exposure may be an important route of exposure for invertebrates when the risk to these species was not evaluated in the assessment.
41. **Section 8.1.3.2, p. F-240, paragraph 2.** The intent of an ecological risk assessment is to evaluate the risk of chemical contamination to communities and populations of plants and organisms. On occasion, an endangered or threatened species warrants evaluation and protection at the organism level. The fact that a single deer mouse could meet its home range requirement within the confines of the parcel has limited meaning. The question should be whether that area is sufficiently large to sustain a population of small mammal species and whether that population is at risk. The use of home range and site use factors should not be removed from the context of what is to be evaluated. (See Table F.5-1 - where the assessment endpoint is stated as the 'protection of the population'.)
42. **Section 8.1.4.1, p. F-242, paragraph 2.** EPA believes that there are a number of other parameters that could be added to this list.
43. **Section 8.1.4.3, p. F-243, paragraph 1.** It is not clear that 'greater uncertainty would have resulted if default (sic)

soil-to-plant BTFs were not selected and plant uptake... had not been quantitatively evaluated. Based on what seems to be excessive conservatism in the 'high' BTFs for several of the organics coupled with the excessive conservatism in the rest of the assumptions used throughout the 'high or worst case' assessment, it seems probable that concern for ecological risk has been raised where there is none. If by "best case," 'most realistic' is intended, then the orders of magnitude difference between the best case HQ and the worst case HQ should raise questions regarding the reasonableness of doing the worst case analysis, and whether that analysis has reduced uncertainty.

44. **Section 8.1.5, p. F-247, paragraph 2.** The text seems to place too much emphasis on the relationship of gastrointestinal absorption and trophic transfer. As the text further points out, absorption is just one of a complex number of factors controlling food-chain transport of chemicals. See Comment 19.
45. **Sections 9.2 and 9.3, p. F-260.** EPA recommends that much of this discussion be moved forward into the Problem Formulation and Endpoint Selection sections of this assessment. The reader should not be left to speculate until Section 9 of the assessment why these were not evaluated. The placement of these sections suggests that these issues were afterthoughts. Nevertheless, EPA believes that there are adequate data available with which to shed some light on the potential risk of COPCs to terrestrial invertebrates and plants (Will and Suter, 1995).

Comments from Dr. Clarence Callahan

1. - Chemicals of potential ecological concern, and assessment receptors.

pF-9, The attributes listed for identifying chemicals of concern (COC) are generally acceptable, however, the frequency of detection should be used with caution, if at all. For all the COCs with a frequency less than 5% (usually the decision point), the observed concentrations should not be associated with a "hot spot" otherwise, the COC should be carried forward in the ERA. All COCs in Parcel E that have been eliminated because they were less than 10% should be reconsidered.

pF-14, "Total PCBs." How were total PCBs estimated? Were Aroclor 1254 and 1260 standards used for comparison to the sample data and then totalled for total PCB? Were congener specific analysis performed and then the results added for total PCBs?

pF-15, The final list of COCs should include the pesticides endrin aldehyde and MCPA because of the potential release due

to improper storage, usage, or handling during the "routine use for weed and insect suppression."

2. - Receptors. Although, the deer mouse and the American kestrel are representative species for small mammal and avian predators, nothing is presented for soil invertebrates or plants. Other species, routes of exposure i.e., pathways have to be considered. If the Navy is serious about the "Protection of the population..." as the target for this ERA, then population attributes must be evaluated. The unique structural and functional characteristics of populations must be evaluated by considering impacts to its distribution, either age or spatial and dynamics in terms of growth and survivorship.

Exposure. This is probably the weakest area of data input for the process. For example, when the list of "exposure parameters" are examined (COC soil concentration, daily incidental ingestion rate of soils, prey items with tissue concentrations, trophic transfer coefficients, site use factor and body weight) all of these are estimated rather than measured greatly increasing the possibilities for under or over estimating the exposure.

pF-31, Bio-transfer factors (BTFs). This is another piece of input datum that can be greatly abused as stated by the sentence on pF-31, just below the formula, "In several instances, the literature provided an extensive range of soil and tissue concentration data and the various BTFs that could be derived from the data range were too numerous to calculate." The Navy provided a protocol for selecting low and high BTFs, however, all of these steps involved modelling rather than measurements, again greatly increasing the probability for under or over estimates of BTFs. Except for differing by a factor of 10, what is the logic for selecting "default" values 0.1 and 1.0? BTFs for plants as derived by Baes et al (1984) is not appropriate.

pF-36, Trophic transfer factors (TTF). Justification for the use of a value of 10 percent is not provided, only a citation without explanation. Please provide the explanation that justifies 10% as a TTF.

3. - Literature to develop toxicity reference values (TRV). The TRV document has not been reviewed at this time, although, most of the "numbers" may be OK, there are some outstanding issues. When we were discussing the mercury number for birds, we were essentially agreeing to disagree. The mammal number for mercury is OK. The PCB numbers for birds and mammals does not consider environmental transformation i.e., co-planers. We had quite a bit of discussion of inter-species scaling and differences of opinion remain especially for birds when new information (Mineau citation) shows that allometric

conversions for birds is insufficient. Lastly, these TRVs were developed as "low risk" numbers not "no risk" numbers. If a no risk number is wanted, then we should follow the DTSC document to be consistent with the State.

The use of the hazard quotient approach without confirmation is limiting in that the hazard quotient does not provide the concentration of the stressor that can be associated with the response that is considered significant. Without a clear exposure - response relationship, the Navy cannot determine the level of the various stressors that produce a significant level of response in the site receptors or their surrogate test species. The measurement endpoints are not associated with the stressors in any direct manner.

4. - Characterizing the risk to terrestrial receptors at Parcel E IR sites.

ppF-152 -154, Terrestrial Risk Characterization. Risk characterization involves the integration of exposure analysis and the effects analysis to describe the significance of the effects. The interpretation of ecological significance places risk estimates in the context of the types and extent of anticipated effects. The significance of effects should be described in four ways: 1) the nature and magnitude of effects; 2) the spatial and temporal patterns of effects; 3) the duration of effects; and 4) the potential for the system or species to recover from the effects (Wentsel et al, 1996. *Tri-Services Procedural Guidelines for Ecological Risk Assessments*, U.S. Army Edgewood Research, Development and Engineering Center Aberdeen Proving Ground, MD 21010 p99). This risk characterization does not provide this information. It is especially lacking in items 3 and 4.

ppF-257, The risk characterization approach (method) does not justify the use of only small mammals and the kestrel for risk assessment. Please explain how the use of only two receptors will provide a satisfactory risk assessment for the terrestrial habitat in Parcel E.

The classification of the COCs into three categories as a summarization tool is generally acceptable, however, there is little offered by this approach for how the categories are used to determine the overall risk for the receptors. EPA agrees with the Navy that the HQs, "...permit only a relative ranking, or categorization, of the potential hazard associated with chemicals present at individual IR sites..." and "HQs greater than unity indicate that there is the potential for a toxic response, but the HQ cannot be used to gauge either the probability or magnitude of chemical toxicity."

The limitation of categorizing sites into these groups is that nothing can be said about which sites need remediation or not.

What is shown about sites with 1, 5, 10, 15, etc category 2 chemicals? What is the critical level for deciding to cleanup the site? With only small mammals and birds, would the potential risk be greater or less if evaluations were completed for invertebrates and plants?

This section is lacking a definitive statement about the level of impact to receptor species other than small mammals and birds and this is only a predictive assessment rather than one including validation efforts. This section does not provide overall evaluation of risk to assessment endpoints nor does it contain any suggestion of the response level that is indicative of the exposure that is critical i.e., concentration of the stressors.

EPA suggests that based on the data presented, all sites with category 2 contaminants should be cleaned up to an acceptable level of risk or to a category 1 level. Selected tissue samples and bioassays would add greatly to the predictive phase as presented in this document.

Appendix G

1. Please revise the title on the appendix cover page to reflect the fact that the appendix contains a description of many removal actions in Parcel E, not just the removal of the aboveground and underground storage tanks.
2. **Section 1.0, p G-1, first sentence.** The appendix contains the description of many removal actions. Perhaps the word "section" should be used instead of "appendix."
3. **Section 2.0.** Please revise this section to reflect the completion or current status of the storm drain sediment removal action.
4. **Section 4.0.** Please revise this section to reflect the completion of the exploratory excavations.
5. **Section 5.0.** Please include the estimated total volume of floating product removed from the water table. This is important because it is not clear whether 44 gallons were removed every 2 weeks or a total of 44 gallons was removed during the 6 months in 1991.

Appendix J

1. Some boring logs include "older Bay Deposits," which are not discussed in the text. Please explain the significance of "older Bay Deposits."

Appendix N: Comments from Dr. Dan Stralka

1. page N-1-3, top of the page. Please reference where the water and sediment results for the utility lines will be addressed.
2. page N-2-1 Section 2.1 Data Evaluation. Discuss how the use of filtered water samples will bias the results and what uncertainty it adds.
3. page N-2-3 first bullet. Please clarify that the regression analysis is based on the source material being elevated in manganese, chromium, nickel, and cobalt.
4. page N-3-19 last para. Comment on attachment N-D. Outlier analysis was not appropriate in parcel B for chromium VI and will not be here. Ratio for chromium VI should be 2%.
5. page N-5-8 last para. Ingestion of homegrown produce is not a complete pathway for current, industrial use. Please correct the text.
6. page N-5-9 second para. Same comment as #5.
7. page N-6-11 Please discuss the bias due to filtered groundwater.
8. Reference U.S.EPA 1994a should be the most current 1995. Correct here and in the tables.
9. Reference U.S. EPA 1994c should be the final document May 1996.
10. Reference U.S. EPA 1995b should be the most current August of 1996. Please correct here and in the tables.
11. Table N.5-2 footnote "*" should be residential soil PRGs.
12. page N-D-1 First sentence of section 2.1 is repeated.
13. page N-D-4 As is parcel C, to be health protective no analysis of outliers is to be preformed and a ratio of 2% should be used.
14. page N-D-6 last para. Add to the discussion for groundwater the preferred specie based on solubility.
15. page N-E-7 References see comments #9 and #10.

Appendix O

General Comment

Appendix O is an excellent general overview of general fate and transport properties of contaminants present at the Hunters Point Shipyard. The document would be even more useful if it were more focused on specific site conditions at Parcel E which may affect fate and transport, either in Appendix O or in Section where individual Units are described. For instance, a description of surface water runoff and storm drain pathways combined with analytical results from potential source areas and along these pathways would provide a clear indication if physical transport is significant. The use of site specific soil organic carbon concentrations could be used in conjunction with Koc values presented for organic chemicals of concern to calculate actual partition coefficients and, by incorporating soil density and porosity, retardation factors could be determined.

Specific Comments

1. **Section 3.2, Photolysis, p. O-8.** Indicate that photolysis is usually significant only in the uppermost water column.
2. **Section 3.4, Biodegradation, p. O-10.** The cis isomer for 1,2-dichloroethene should be specified since it is the major degradation intermediate on the pathway from trichloroethene to vinyl chloride.
3. **Section 4.1.6, Cadmium, p. O-17.** Typographical error, The listed neutral species CdCl should probably be CdCl_{2(aq)}.
4. **Section 4.1.12, Magnesium, p. O-22, paragraph 2.** Typographical error, the species listed as Co⁻² should probably be CO₃⁻².
5. **Section 4.1.16, Nickel, p. O-26, paragraph 3.** The sentence "In more organic-rich, polluted waters, little sorption of nickel takes place, which suggests that metal oxides attract nickel more strongly than does organic matter." appears to be reversed. It should be changed to state "... which suggests that metal oxides attract nickel less strongly ...".
6. **Section 4.2.1.1, Aliphatic Chlorinated VOCs, p. O-34, paragraph 2.** The cis isomer for 1,2-dichloroethene should be specified since it is the major degradation intermediate on the pathway from trichloroethene to vinyl chloride.
7. **Section 4.2.2.1, Dioxins and Furans, p. O-38.** Dioxins can have up to eight chlorines, not six.

8. **Section 4.2.2.1, Dioxins and Furans, p. O-39, paragraph 3.** Typographical error. The phrase "in mobile" should be replaced with the word "immobile."
9. **Section 4.2.2.4, Polycyclic Aromatic Hydrocarbons, p. O-44.** It is surprising that 3- and 6- member ring PAHs were not detected since they also naturally occur in petroleum products and as a result of incomplete combustion along with the other PAHs
10. **Tables O-2 and O-3, pages O-61 through O-64.** Provide reference citations for all physio-chemical parameters listed in Tables O-2 and O-3.

Appendix Q

General Comment

A schematic flow diagram should be provided for each parcel to document the steps in conducting the metals loading analysis. The flow diagram should be keyed to the various supporting tables so that the reader can understand the various steps in the analysis and where to find the supporting documents.

Specific Comments

1. **Section 1.1.1, p. Q-4, Facility-Wide Groundwater Quality Issues.** Average groundwater metal concentrations were calculated as arithmetic mean of metals concentrations but the HGALS were calculated as the 95th upper confidence level (UCL). Use of the arithmetic mean rather than 95th upper percentile does not seem conservative.
2. **Section 1.1.2, p. Q-9, Parcel-Specific Groundwater Quality Issues.** Average groundwater metal concentrations were calculated as arithmetic mean of metals concentrations but the HGALS were calculated as the 95th upper confidence level (UCL). Use of the arithmetic mean rather than 95th upper percentile does not seem conservative.
3. **Section 2.1, p. Q-26, Point 1, first sentence.** Delete the word naturally from the first sentence. Indirect groundwater discharge through leaky storm drains does not constitute natural discharge to the bay.
4. **Section 2.2, p. Q-26, Point 2.** The use of average metals concentrations is not conservative. See Comments 1 and 2 above.
5. **Section 5.2, p. Q-27, Point 3, third paragraph.** EPA disagrees that the estimation method produces "conservatively high" estimates of groundwater flow rates because of the density-driven pressure head at coastal regimes. In the first

sentence the phrase "conservatively high" should be replaced with "conservative" and "consequently high estimates of mass.." should be replaced with "consequently conservative estimates of mass.."

There is nothing obvious in the written text of the referenced paper by Ghazalie and Findikakis (1993) which supports the concept of a density-driven pressure head which affects groundwater flow rates at the shoreline. Please delete this reference as it doesn't seem to address this issue.

Provide a better explanation and justification for the influence of density-driven pressure head on groundwater flow rates at the shoreline. Since much of the groundwater is relatively saline there doesn't appear to be much of a density contrast between groundwater and bay water to impact groundwater discharge rates.

6. **Section 2.1.2, p. Q-30, first paragraph.** Please provide the hydraulic properties of non-soil media, e.g., for the seawall and sheetpiles.

Please provide additional justification why these assumed hydraulic properties are appropriate these non-soil media.

7. **Section 2.1.2, Q-31, Point 3.** The significance of Western Reach shoreline is not clear. Please clarify whether the Western Reach data was used in calculating groundwater flow at each IR site or whether it was only used for selected sites.

8. **Section 3.0, p. Q-35, Conservativeness of Mass Loading Estimates.** EPA disagrees that the estimation method produces "conservatively high" estimates of groundwater flow rates and mass loading rates. Please replace the phrase "conservatively high" with "conservative."

Natural dilution is not important in reducing mass loading to the bay. Please modify or delete reference to dilution, because the mass does not change.

It is not clear how biodegradation processes affect mass loading by metals.

In the fourth and sixth sentences replace the word "are" with "may be." With respect to "density-driven pressure head" see Comment 5.

9. **Section 3.0, p. Q-35, Post-Mass Loading Dilution and Biodegradation Effects.** This section should be deleted as it is not relevant to mass loading to the bay. S.F. Bay will dilute concentrations but does not reduce the mass. EPA also disagrees with the contention that groundwater flow will undergo nearly instantaneous dilution with bay water.

10. **Section 3.2.4. p. Q-52.** This section should be deleted as it is not relevant to mass loading to the bay. Mixing S.F. Bay water will dilute concentrations but does not reduce the mass.

Dilution does not provide protection for benthic organisms.

Bay dilution factors on the order of millions only occur if the assumption is made that complete mixing between groundwater and bay water takes place. This is unlikely due to temperature and density differences between the two types of water.

11. **Figures 3, 5, 7, 9, 11.** A note to the effect that groundwater flow direction is under current conditions should be added. Groundwater flow from the Bay to land is artificially controlled by sewer pumping. If pumping is halted the groundwater flow direction will most likely change to natural conditions.
12. **Table F1-4.** The basis for calculating the 25th, 50th and 75th percentile should be provided in this report or the most recent version of the hydrogeology description of Parcel E. Section 3.8 of the Parcel E RI Report (Hydrogeology) should include this information to support the metal loading analysis.

This comment also applies to the hydraulic gradient. The basis for calculating the average hydraulic gradient has not been adequately documented in this appendix or the main body of the Parcel E RI report.