UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

April 9, 1999

Mr. James Colter
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, PA 19113-2090

Dear Mr. Colter:

The purpose of this letter is to forward to you two sets of comments from the Environmental Protection Agency (EPA) on the Phase II Remedial Investigation (RI) Report for NASJRB Willow Grove. The enclosed comments are based upon a toxicological and ecological review of the report.

As I understand, the Phase II RI report will now be divided into four separate reports, one for each site investigated during the Phase II RI. Because Site 5, the Fire Training Area, is the highest priority for the Restoration Advisory Board (RAB) members due to its proximity to residential areas, this site will be addressed first. In order to expedite the balance of our review of the Phase II sites, I will be forwarding both hydrogeological comments and my comments to you on a site by site basis, beginning with Site 5. I would expect to have Site 5 comments to you by late April or early May.

One issue, however, that I would like to discuss that affects all four of the sites is the data quality problem that was brought to your attention by Darius Ostrauskas and Kathy Davies last Autumn. It is our position that EPA's low flow sampling procedures were not applied correctly and therefore the data from the wells sampled during the Phase II RI are suspect. It is EPA's opinion that these wells should be resampled either by following EPA's approved low flow sampling procedure or by using the standard purge method. As I'm sure you realize, without what EPA considers to be reliable data, we could not approve the Phase II RI for any of these four sites.

During our upcoming April 14 meeting regarding the hydrogeological presentation given at the RAB meeting, I would also hope to discuss the data quality issue mentioned above. Should you have any questions regarding my letter or the enclosed comments, please feel free to contact me at (215) 814-3355.

Sincerely,

Lorie A. Baker
Remedial Project Manager

Enclosure A - Toxicological comments
Enclosure B - Ecological comments

cc: April Flipse (PADEP)

ENCLOSURE A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION III

1650 Arch Street

Philadelphia, Pennsylvania 19103-2029

SUBJECT: Willow Grove Phase II RI **DATE:** 9/30/98

FROM: Barbara Okorn, Coordinator

Biological Technical Assistance Group (BTAG)

TO: Darius Ostrauskas, RPM

Federal Facilities Branch (3HS50)

The BTAG has reviewed the subject document and offers the following comments on behalf of FWS, NOAA, and EPA members.

The BTAG has identified several problems with the screening level Ecological Risk Assessment (ERA) contained in this RI. Basically, the report screens on-site data with the BTAG screening benchmarks to derive a list of media-specific potential contaminants of concern (PCOC), but then proceeds to eliminate virtually all of those PCOCs due to several "risk management" decisions. Such risk management decision criteria included the use of alternative (less stringent) criteria, frequency of detection, various statistical comparisons to background, qualitative interpretations, and spatial analysis of detections. The end result was that after using such controversial and flawed screening techniques, only a few isolated contaminants or areas were considered as posing risk to the environment. The BTAG does not agree with the methods used nor the conclusions of ecological risk contained in this RI.

According to the 1997 guidance for conducting ERAs, the screening level ERA is simply used to determine if there is sufficient information or level of contamination to proceed with the quantification of risk. Failing a screening level ERA (i.e., when the matrix-specific concentration of a particular contaminant exceeds the single, conservative effects-based concentration) simply means that potential risk exists and the risk assessment should proceed to the second tier for risk quantification. EPA guidance dictates that two results of the initial screen are possible: either information is adequate to determine little or no risk, and therefore little or no need for further ecological assessment or remediation; or, the information is not adequate to make a decision and the ERA should proceed to the next tier. The BTAG believes that since ecological receptors and complete pathways for exposure exist for the four sites addressed in this RI, and many contaminants failed the screen, the need for a higher tiered ERA is undisputable. The real question is which contaminants should be carried to the next level.

Additionally questionable, is the RI's conclusion of which specific media (i.e., soils, sediments, or surface water) will require remedial action based solely upon the results of this initial screening. Media-specific ERA screening can not be used to determine the remedial needs of an entire contaminated area. Furthermore, a decision not to remediate was prematurely reached for nearly all of the areas for which data were screened. The BTAG does not accept these conclusions based upon a screening level ERA. Another concern relates to the continual reference to "localized hot spots" that was used for any sample that grossly exceeded a screening benchmark. Most of these areas/samples were also inappropriately excused from further risk quantification and/or remedial action.

As an example of these biased and flawed methods and conclusions, consider the following examples. Nineteen sediment samples were collected for Site 2. Forty-four of 47 contaminants were retained as PCOCs (i.e., exceeded screening benchmarks). After "risk management" decisions only dieldrin was retained as a final COC. The risk management conclusion was that remediation of sediments at Site 2 was unnecessary. Notable maximum concentrations that were dismissed as a potential concern include lead, 687 ppm; zinc, 4390 ppm; total PAHs, 125 ppm. Another example of a problem risk management decision relates to the pond associated with Site 3. Although virtually all of the maximum sediment contaminant concentrations exceeded BTAG screening benchmarks and background values (the latter is not usually permitted for screening assessments), less than half were selected as final COCs. Of those selected as COCs, some extraordinarily high inorganic concentrations were evident (cadmium 24 ppm; cyanide 30,700 ppm; lead 3,690 ppm; mercury 30.2 ppm; vanadium 208 ppm; and zinc 2,460 ppm). PAHs and some pesticides were also highly elevated. The risk management decision was that an inorganic and PAH sediment "hot spot" exists in the pond, and food web modeling could be considered as a means of further assessing potential ecological impacts. Since the RI emphasized risk management decisions, the conclusion should have been that such high concentrations will show significant risk via food chain modeling, and remedial action should have been recommended. Based upon the experience of the BTAG in using food chain models, and the corresponding high sediment concentrations found in the pond, it is almost certain that any modeling assessment will

show significant ecological risk and some level of further assessment and / or remediation will be required. We make this point here just to illustrate that when given the opportunity to make a reasonable risk management conclusion, the RI once again trivialized the ecological significance of such gross contamination, and failed to recommend appropriate action.

The BTAG recommends that risk management issues be deleted from the subject RI. The BTAG recommends that the RI conclude that several COCs present risk and further evaluation of the exposure potential and quantification of those risks are warranted. Whether such risk quantification will involve site-specific toxicological work and/or food chain modeling will be decided upon after the BTAG visits each of the areas of concern to determine the potential for ecological receptor exposure, and we discuss those finding with you and the Navy. The BTAG requests that you set up a site visit and meeting in the near future.

Thank you for the opportunity to offer these comments. If you have any questions, please contact me at x3330.

ENCLOSURE B

Toxicological comments on the Phase II Remedial Investigation report for NASJRB Willow Grove are provided below. These comments are a compilation of comments from both the oversight contractor, Gannett Fleming, and the EPA toxicologist. They are organized in terms of general and specific comments. General comments pertain to the overall document. Specific comments concern issues that are location-specific within the report.

GENERAL COMMENTS

1. The decision criteria employed for determination whether a compound is above background and PCOC and CPOC selection should be further explained. As written, the most useful information concerning the selection of a compound as a CPOC, PCOC or significance above background is shown on individual tables which summarize the results of statistical testing. The footnotes should be expanded upon in Section 2.3 of the report and a logic flowchart presented to identify the yes/no result of each test.

2. Section 3.1.1.4 indicates that representative concentrations were calculated based on both 1997 and 1991 RI data. Data from these two sampling events were pooled, but there is no indication whether sampling populations from each event were comparable. The text should be revised and an analysis presented to ensure that pooling of data for each contaminant was appropriate.

3. Tables are included in the document that present the results of a comparison of surface water analytical data to applicable or relevant and appropriate requirements (ARARs) and to be considered (TBC) values.. There are no freshwater chronic ambient water quality criteria (AWQC) provided for aluminum, beryllium or iron (see, for example, Table 4-12). This is incorrect. The aluminum criterion is pH dependent and may be calculated based on site-specific or proxy pH values. The iron criterion is 1,000 micrograms per liter (μg/L). The beryllium value is 5.3 μg/L (lowest observed effect level). All tables should be updated using applicable freshwater chronic AWQC.

4. References for citations in the human health risk assessment portions of the RI report are not provided. References for all citations located throughout the RI report should be provided.

5. Section 3 presents a discussion of five potential receptors for the NASJRB Willow Grove sites. In addition, extensive risk calculations were prepared for each receptor for each site. However, the human health risk assessment conclusions for each site do not present the results for all five receptors and typically only discuss the results for one or two receptors (i.e., occupational workers and recreational child). It is unclear why the results for each receptor at each site are not discussed in the conclusions, especially when several receptors at each site usually meet EPA's acceptable risk criteria. The results of risk calculations performed for all receptors and all media at each site should be discussed in the conclusion sections for each site so that human health risks for all scenarios are clearly defined. If the results for all five receptor scenarios are not discussed because the scenarios are not applicable for each site (e.g., building residential homes on Site 2, Antenna Road Landfill, or Site 3, Ninth Street Landfill), then these receptors and scenarios should have been screened out in the exposure assessment (Section 3.1.3).

6. The evaluation of the sites includes data collected from various media in 1991 during the Phase I Remedial Investigation in addition to the Phase II data. The use of different temporal data sets should be discussed and the figures should be revised to clearly distinguish between samples collected during the two events.

7. In order to avoid potentially unnecessary institutional controls to limit excavation, subsurface soil risk evaluations to potential receptors, including future residents should be performed. Similarly, residential rather than industrial RBCs should be used to screen for COPCs. Otherwise, an institutional control may be necessary to ensure that the property remains industrial/commercial and is not used for residential development at any time in the future.

SPECIFIC COMMENTS

1. **Executive Summary, Site 1 - The Privet Road Compound, Page ES-1, Paragraph 2.**

This paragraph states that "Consistent with United States Environmental Protection Agency (EPA) guidelines, the 'reasonable anticipated future land use' exposure scenario is Occupational Worker." It is unclear what these guidelines are and how this land use was determined. The human health risk assessment analyses for Site 1, as detailed in Tables 4-24, 4-25, 4-26, and 4-27, indicate that the following scenarios have acceptable carcinogenic and noncarcinogenic risks associated with them: adult/child trespasser, recreational child, and excavation worker. Risks to the occupational worker just slightly exceed EPA's acceptable carcinogenic risk criteria. Cancer and noncancer risks to residents exceed EPA's risk criteria. The paragraph should be revised to accurately reflect the results of all human health and ecological risk assessment analyses. This comment also applies to Section 4.9.

This paragraph states that "human health risk assessment ... found that the site does not pose a threat to current or reasonably anticipated future human ... receptors." However, the human health risk assessment analyses indicated that the EPA's acceptable carcinogenic and noncarcinogenic risk criteria are exceeded for adult/child residents. In addition, the occupational worker just slightly exceeds EPA's acceptable carcinogenic risk value. This paragraph should be revised to clearly state the conclusions from the human health risk assessment. This comment also applies to Section 4.9.

2. Executive Summary, Site 2 - The Antenna Field Landfill, Page ES-2, Paragraph 6.

This paragraph states that "Consistent with EPA guidelines, the 'reasonable anticipated future land use' exposure scenario is Occupational Worker." It is unclear what these guidelines are and how this land use was determined. The human health risk assessment analyses for Site 2, as presented in Tables 5-25, 5-26, 5-27, and 5-28, indicate that the following scenarios have acceptable carcinogenic and noncarcinogenic risks associated with them: occupational worker, adult/child trespasser, recreational child, and excavation worker. Cancer and noncancer risks to residents exceed EPA's risk criteria. The paragraph should be revised to accurately reflect the results of all human health and ecological risk assessment analyses. This comment also applies to Section 5.9.

3. Executive Summary, Site 2 - The Antenna Field Landfill, Page ES-3, Paragraph 1.

This paragraph states that "human health risk assessment found that the site does not pose a threat to current or reasonably anticipated future human receptors." However, the human health risk assessment analyses indicate that EPA's acceptable carcinogenic and noncarcinogenic risk criteria are exceeded for adult/child residents. This paragraph

should be revised to clearly state the conclusions from the human health risk assessment. This comment also applies to Section 5.9.

4. **Executive Summary, Site 3 - Ninth Street Landfill, Page ES-3, Paragraph 2.**

This paragraph states that "Consistent with EPA guidelines, the 'reasonable anticipated future land use' exposure scenario is Occupational Worker and Recreational Child." It is unclear what these guidelines are and how these land uses were determined. The human health risk assessment analyses for Site 3, as detailed in Tables 6-23, 6-24, 6-25, and 6-26, indicate that the following scenarios have acceptable carcinogenic and noncarcinogenic risks associated with them: occupational worker, adult/child trespasser, recreational child, and excavation worker. However, the human health risk assessment analysis indicates that EPA's acceptable noncancer criteria is exceeded for adult/child residents. The paragraph should be revised to accurately reflect the results of all human health and ecological risk assessment analyses. This comment also applies to Section 6.9.

5. **Executive Summary, Site 3 - Ninth Street Landfill, Page ES-3, Paragraph 2.**

This paragraph states that the "human health risk assessment found that the site does not pose a threat to current or reasonably anticipated future human receptors." However, the human health risk assessment analyses indicated that EPA's acceptable noncarcinogenic risk criteria is exceeded for adult/child residents. This paragraph should be revised to clearly state the conclusions from the human health risk assessment. This comment also applies to Section 6.9.

6. **Executive Summary, Site 5 - The Fire Training Area, Page ES-4, Paragraph 7.**

This paragraph states that "Consistent with United States Environmental Protection Agency (EPA) guidelines, the 'reasonable anticipated future land use' exposure scenario is Occupational Worker". It is unclear what these guidelines are and how this land use was determined. The human health risk assessment analyses for Site 3, as detailed in Tables 7-23, 7-24, 7-25, and 7-26, indicate that the following scenarios have acceptable carcinogenic and noncarcinogenic risks associated with them: occupational worker, adult/child trespasser, and recreational child. However, the human health risk assessment analysis indicates that EPA's acceptable cancer and noncancer risk criteria are exceeded for adult/child residents. In addition, the EPA's noncancer criteria are exceeded for a future excavation worker. The paragraph should be revised to accurately reflect the results of all human health and ecological risk assessment analyses. This comment also applies to Section 7.9.

7. **Executive Summary, Site 5 - The Fire Training Area, Page ES-5, Paragraph 1.**

This paragraph states that "human health risk assessment found that the site does not pose a threat to current or reasonably anticipated future human. receptors." However, the human health risk assessment analyses indicated that EPA's acceptable carcinogenic and noncarcinogenic risk criteria are exceeded for adult/child residents. This paragraph should be revised to clearly state the conclusions from the human health risk assessment. This comment also applies to Section 7.9.

8. **Executive Summary, Human Health Risk Assessment, Site 1 - The Privet Road Compound, Page ES-19, Paragraph 5.**

This paragraph states that "the total cumulative carcinogenic risk for the current occupational worker is equal to EPA's target carcinogenic risk range at Site 1 for the RME scenario." However, Table 4-24 indicates that the calculated total risk is 1.20E-4 which marginally exceeds the EPA target carcinogenic risk range of 1.0E-4 to 1.0E-6. Consideration of site-specific conditions, as well as risk management factors, should dictate the need for action (or not) in this instance. In addition, the results for human health risk assessment analyses for all receptors should be included in this paragraph.

9. **Executive Summary, Human Health Risk Assessment, Site 2 - The Antenna Field Landfill, Page ES-21, Paragraph 5.**

This paragraph states that "noncarcinogenic HIs for the potential receptors at Site 2 are less than 1.0". However, Tables 5-27 and 5-28 indicate that the total cumulative RME and CTE noncarcinogenic risk for adult/child residents exceed the EPA's noncarcinogenic HI value. The text should be revised so that it is consistent with the summary data tables. In addition, the results for human health risk assessment analyses for all receptors should be included in this paragraph.

10. **Executive Summary, Human Health Risk Assessment, Site 3 - Ninth Street Landfill, Page ES-24, Paragraph 5.**

This paragraph states that "the total cumulative carcinogenic risk for the future residential receptor is 9E-05 under the RME" risk scenario. However, Table 6-23 indicates that the total cumulative carcinogenic risk for the future residential receptor is 4.54E-05 under the RME risk scenario. This paragraph also states that "the RME risk for groundwater consumption ... for a future residential receptor is 7E-05". However, Table 6-23 indicates that the carcinogenic risk for groundwater consumption for a future residential receptor is 1.51E-05. The text should be revised to correct these

inconsistencies. In addition, the results for human health risk assessment analyses for all receptors should be included in this paragraph.

This paragraph states that iron and barium in groundwater are main contributors to the RME and CTE noncarcinogenic risk at Site 3 for a future residential child and adult receptor. However, the results shown in Appendix J, Tables J-35 and J-36, appear to indicate that chromium and manganese are stronger contributors to risk in groundwater. In addition, this section also states that iron and dieldrin in surface soil are the main contributors to noncarcinogenic risk at Site 3. However, the individual contaminant results shown in Appendix J, Table J-5 and J-6 indicate that for a future residential child, the main contributor is iron followed by aluminum, manganese, and dieldrin. For a future residential adult, the main contributor is iron, followed by aluminum, dieldrin, and manganese. The text should be revised so that it is consistent with the data tables or an explanation as to how dieldrin was chosen as a main contributor should be included.

11. Section 2.0, Field Investigation, Page 2-1.

Field activities and collection of samples which were conducted during the Phase I Remedial Investigation, 1991, should be discussed in this section.

12. Section 2.3, Establishment of Background Concentrations, Page 2-31.

The limitations of using surface soil as a surrogate for subsurface background conditions should be discussed.

13. Section 2.3, Establishment of Background Concentrations, Page 2-31, Paragraph 2. This paragraph states that background sample analytical statistics for groundwater were not attempted. However, background sample analytical statistics for groundwater are presented for each site. The text and tables should be revised to correct this inconsistency. Also, note that in the specific comments for each site, as discussed below, that the groundwater background sample analytical statistic tables appear to be incorrect.

14. Table 2-13

Many of the calculated means are the same as 95th percent UTLs. Please explain. Also, when the 95th percent UTL for background exceeds the maximum detection for a given compound, was the maximum detect used as the default comparison value?

15. Section 3.1.1.3, Page 3-4

Contrary to the text on this page, it seems that background concentrations were considered for the screening of organics.

16. Section 3.1.1.3, Identification of Chemicals of Potential Concern (COPC), Page 3-6, Paragraph 5.

This paragraph explains the exceptions to the COPC selection for each medium described on Pages 3-4 to 3-6. However, due to the formatting of the text, it appears that these exceptions are only relevant to groundwater COPC selection. These exceptions should be moved to the beginning of Section 3.1.1.3, so that it is clear that they are relevant to COPC selection for all media.

In addition, the tables in Section 4, 5, 6, and 7 which illustrate the COPC selection for each site appear to indicate that chemicals that do not have an RBC will not be selected as a COPC. However, this approach is not discussed in the text. All criteria that were used to include or exclude a chemical as a COPC should be discussed in the text. Chemicals lacking RBCs should be retained as COPCs or evaluated using structurally similar surrogates.

Also, on pages 3-5 and 3-6, screening benchmarks for sediment and surface water are based on professional judgement. This should be clearly stated in the text.

17. Table 3-1, Page 3-12.

A number of discrepancies were found in a comparison between values presented in Table 3-1 and IRIS (on-line), HEAST (1997), Region III RBCs (April 1998), and Region III Oral ABS Values for Oral-to-Dermal Extrapolation (December 1996). Since no dates were provided in this Table 3-1 and no references were provided with the human health risk assessment, it was not possible to identify the source of the discrepancies. The following values obtained from the references listed above are different from those in Table 3-1.

A. Fraction of COPC Absorbed in the Gastrointestinal Tract N/A for carcinogenic PAHs.

0.89 for RfD; CSF see IRIS for PCBs.

0.02 for Vanadium.

0.025 for Zinc.

B. Oral RfD

2.0E-02 for 1,1,1-trichloroethane.

3E-02 for 1,2-dichloroethane.

3E-03 for benzene.

2E-03 for beryllium.

C. Dermal RfD and SFs

See following comment on Section 3.1.2.4., Page 3-14

D. Inhalation RfD

1.4E-03 for 1,2-dichloroethane

1.4E-01 for tetrachloroethene

5.7E-06 for beryllium

E. Inhalation SFs

1.4E-02 for Bis(2-ethylhexyl)phthalate

2.0E+00 for PCBs

18. Section 3.1.2 Toxicity Assessment, Adjustment of Dose-Response Parameters, Paragraph 5, Page 3-14 and Table 3-1, Page 3-12.

The equations for deriving dermal RfDs and SFs from oral RfDs and SFs are correct in the text. However, the dermal RfDs and SFs are calculated incorrectly as shown in Table 3-1. It appears that in the table, the oral RfDs were incorrectly divided by the

$ABSEFF_{oral}$ to derive the dermal RfDs, and the oral SFs were incorrectly multiplied by the $ABSEFF_{oral}$ to derive the dermal SFs. However, a spot check of the calculations in Appendix J indicates that the correct dermal RfDs and SFs were used.

19. Table 3-3, Page 3-17.

The absorption factors presented in Table 3-3 represent chemical-specific values to adjust site doses, not toxicity values. These factors apply only to soil and sediment and represent the "ABS" parameter for dermal pathway (e.g., in Table 3-12).

20. Section 3.1.3.2, Potential Receptors, Page 3-20, Paragraph 4.

This paragraph indicates that cancer and noncancer risks will be estimated separately for adolescent and adult trespassers. However, the summary tables for each individual site present the cancer risk results for adult/child trespassers combined. The text and tables should be revised to correct this inconsistency. Adult and adolescent trespassers should be evaluated separately.

21. Section 3.1.3.5.1, Exposure Estimates, Page 3-23, Paragraph 2.

The text states that the "CTE is only to be run at a particular site when the total cancer risk exceeds 1E-04 (considered the upper bound of EPA's acceptable risk range) or when the noncarcinogenic HI is greater than 1.0." This approach evaluates the results of the RME scenario first, then determines which site, medium, and receptors require CTE calculations. However in the RI report, the CTE was run for all sites, receptors, and media, although in many cases the RME risks and HI were below EPA acceptable risk criteria. The text should be revised to correspond to the procedures followed in the BRA.

22. Section 3.1.3.5.1, Surface and Subsurface Soil Exposure, Page 3-23, Paragraph 4.

This section cites EPA, 1989a as the source of the soil ingestion, dermal contact, and inhalation of fugitive dust equations. Since references are not provided, it has been assumed, based on other information presented in the RI report with the same citation, that the source is Risk Assessment Guidance on Superfund (RAGS). However, RAGS does not present the same equations as shown here. For example, the dermal contact equations in the RI report include a factor for EV (event frequency), which is not included in the equations found in RAGS. The correct references for each equation should be provided and if modifications to the referenced, standard equations are made,

the modifications should be described. This comment also applies to the surface water, sediment, and groundwater exposure equations.

23. Table 3-10, Page 3-32

According to this table, the RME exposure frequency for a recreational child is seven days per year. This is not very conservative. Please justify.

24. Table 3-14, Page 3-36

According to this table, the RME exposure frequency for an excavation worker is 30 days per year. The default value for this receptor is generally 250 days per year. Either the exposure frequency for this receptor should be replaced by a more realistic estimate, or strong justification should be provided.

25. Section 3.1.3.6, Page 3-61, Paragraph 2

According to this paragraph, an exposure frequency of 219 days per year was assumed in the adult lead model. Why wasn't the default of 250 days per year used?

26. Section 4-5, Nature and Extent of Contamination, Page 4-10.

Revise the text to correctly refer to Figures 4-21A through C.

27. Table 4-5, Page T-4-4.

A footnote should be included for the qualifier B. This comment pertains to similar tables in the report.

28. Section 4.6.1, Transport and Transformation of Detected Contaminants, Page 4-20. Revise text from "reference center" to "reference criteria".

29. Section 4.6.2, Conclusions, Page 4-22. A discussion should be presented on the compound arsenic in this section. Arsenic was identified as COPC in soils, subsurface

soils, sediments, and groundwater. It's presence in these media and elevated concentrations indicate that it is site related and future migration could occur.

30. Section 4.7.6, Conclusions, Page 4-31, Paragraph 4

The section states that other than a future residential child receptor, the noncarcinogenic HIs for the other potential receptors at Site 1 are less than 1.0. However, Tables 4-26 and 4-27 indicate that the RME and CTE noncarcinogenic HIs for a future adult receptor are 1.95 and 1.38 respectively, which exceed the EPA's target HI. The text should be revised to reflect the results presented in Tables 4-26 and 4-27.

31. Table 4-17, Page T-4-87.

This table presents background comparison test results for groundwater data for Site 1. The footnotes indicate that the overall decision for each groundwater pollutant is NA, if all individual background tests are NA. While the table indicates that all individual background tests are NA for each groundwater pollutant, the overall conclusion for each pollutant is not NA but evaluated as yes or no. This table should be revised so that either the correct overall conclusion for each pollutant is shown or the correct result for each individual background test is shown.

32. Tables 4-19 to 4-23, page T-4-105 to T-4-114.

These tables present the COPC selection for each contaminant in each medium at Site 1. However, the footnotes which explain the criteria for COPC selection are not complete. Since the criteria for COPC selection are already described in Section 3, the footnotes should be deleted and a reference to Section 3 should be added. In addition, a final column should be added to the table which describes the reason the contaminant was included as a COPC (i.e., exceeded RBC and background, exceeded RBC, chemical is break-down product of a COPC, etc.) so that it is clear why the chemical was selected as a COPC.

Tables 4-19 to 4-22 include the background results. However, Table 4-23 does not include background results. The format of Tables 4-19 to 4-23 should be consistent and background results should be added to Table 4-23.

33. Table 4-23, page T-4-112.

This table presents the selection of sediment COPCs for Site 1. However, Table 4-21 on page T-4-109 presents the same information. In addition, there is a second Table 4-23 on page T-4-113 that presents groundwater COPCs for Site 1. Table 4-23 on page T-4-112 should be removed from the report.

34. Table 4-23, page T-4-113.

This table presents the selection of COPCs in groundwater at Site 1. However, some the data listed for the organic contaminants appear to be incorrect. The representative concentration listed for 1,2-dichloroethene (total) is 5. However, Table 4-16 lists the representative concentration as 4.35. The representative concentration listed for tetrachloroethene is 7.49. However, Table 4-16 lists the representative concentration as 9.2. The representative concentration listed for trichloroethene is 11. However, Table 4-16 lists the representative concentration as 12. In addition, Table 4-16 includes 1,1,1-trichloroethane, 1,1-dichloroethane, carbon tetrachloroethene, and toluene. However, these pollutants are not included in Table 4-23. The tables should be revised so that they are consistent.

35. Section 5.6.2 Conclusions, Page 5-12.

A discussion should be presented on the potential for arsenic and dieldrin to migrate from the site. Arsenic and dieldrin were selected as a COPC in soils, subsurface soils, surface water, sediment, and groundwater and detected in seep samples. Erosion of soils was identified as a significant process at the site.

36. Section 5.7.6, Conclusions, Page 5-22, Paragraph 1.

The section states that other than a future residential child receptor, the noncarcinogenic HIs for the other potential receptors at Site 2 are less than 1.0 However, Tables 5-27 and 5-28 indicate that the RME and CTE noncarcinogenic HIs for a future residential adult receptor are 1.56 and 1.27, which exceed the EPA's target HI. The text should be revised to reflect the results presented in Table 5-27 and 5-28. In addition an HI of 1.56 would round to a value of 2. This discrepancy should be corrected.

37. Table 5-18, Page T-5-66.

This table presents background comparison test results for groundwater data for Site 2. The footnotes indicate that the overall decision for each groundwater pollutant is NA if all individual background tests are NA. While the table indicates that all individual background tests are NA for each groundwater pollutant, the overall conclusion for each pollutant is not NA but evaluated as yes or no. This table should be revised so that either the correct overall conclusion for each pollutant is shown or the correct result for each individual background test is shown.

38. Tables 5-20 to 5-24, page T-5-72 to T-5-83.

These tables present the COPC selection for each contaminant in each medium at Site 2. A final column should be added to the table which describes the reason the contaminant was included as a COPC (i.e., exceeded RBC and background, exceeded RBC, chemical is break-down product of a COPC, etc.), so that it is clear why the chemical was selected as a COPC.

Tables 5-20 to 5-23 include the background results. However, Table 5-24 does not include background results. The format of Tables 5-20 to 5-24 should be consistent and Table 5-24 should include background results.

39. Table 5-25, page T-5-84.

The sum of the inhalation RME cancer risks for each medium for a future resident is incorrectly stated at 3.10E-07. The correct value is 4.85E-07. The table should be revised so that the correct sum is shown.

40. Section 5.5.1.2, Page 5-5.

The document states that TCDD-TEQs exceeded reference criteria in the two surface soil samples that were analyzed for dioxins. However, Table 5-5, which presents a comparison of detected compounds to ARARs and TBCs, does not present the results of the dioxin analyses. Further, it appears that the nature and extent of dioxin contamination may remain undefined. It is not clear that dioxin in surface water, seeps or sediments would have been identified in this evaluation. Therefore, the uncertainty associated with potential dioxin contamination should, at a minimum, be evaluated as part of the site-specific uncertainty analysis.

41. Section 6.5, Nature and Extent of Contamination.

Revise the text to correctly reference Figure 6-11 A through E.

42. Section 6.5, Nature and Extent of Contamination.

According to the text, detections in surface and sediment at this site were determined to be statistically unrelated to the site. The methodology and tests employed to reach this conclusion should be discussed.

43. Table 6-16, Page T-6-68.

This table presents background comparison test results for groundwater data for Site 3. The footnotes indicate that the overall decision for each groundwater pollutant is NA, if all individual background tests are NA. While the table indicates that individual background tests are NA for each groundwater pollutant, the overall conclusion for each pollutant is not NA. This table should be revised so that either the correct overall conclusion for each pollutant is shown or the correct result for each individual background test is shown.

44. Tables 6-18 to 6-22, page T-6-81 to T-6-92.

These tables present the COPC selection for each contaminant in each medium at Site 3. A final column should be added to the table which describes the reason the contaminant was included as a COPC (i.e., exceeded RBC and background, exceeded RBC, chemical is break-down product of a COPC, etc.), so that it is clear why the chemical was selected as a COPC.

Tables 6-18 to 6-21 include the background results. However, Table 6-22 does not include background results. The format of Tables 6-18 to 6-22 should be consistent and background results should be added to Table 6-22.

45. Section 6.7.6, Conclusions, Page 6-24, Paragraph 4.

This section indicates that the total cumulative RME carcinogenic risk for a future residential receptor is 9E-05 and the RME carcinogenic risk for groundwater consumption for a future residential receptor is 7E-05. However, Table 6-23 indicates

the results are 4.54E-05 and 2.35E-05, respectively. The text and table should be revised so that they are consistent.

This section states that iron and barium in groundwater are main contributors to the RME and CTE noncarcinogenic risk at Site 3 for a future residential child and adult receptor. However, the results shown in Appendix J, Tables J-35 and J-36, appear to indicate that chromium and manganese are stronger contributors in groundwater. In addition, this section also states that iron and dieldrin in surface soil are the main contributors to noncarcinogenic risk at Site 3. However, the individual contaminant results shown in Appendix J, Tables J-5 and J-6 indicate that for a future residential child, the main contributor is iron followed by aluminum, manganese, and dieldrin and for a future residential adult, the main contributor is iron, followed by aluminum, dieldrin, and manganese. The text should be revised so that it is consistent with the data tables or an explanation as to how dieldrin was chosen as a main contributor should be included.

46. Section 7.5, Nature and Extent of Contamination, Page 7-4.

Revise the text to correctly reference Figure 7-9 A through D.

47. Section 7.6.2, Conclusions

Examination of figures 7-9A and 7-9B shows soils contaminated with SVOCs and groundwater contaminated primarily with VOCs. The conclusion that "residual soil contamination is a continuing source of VOCs to groundwater" appears unfounded. The text should be revised.

48. Section 7.7.1, Data Evaluation, Surface Soils, Page 7-11, Paragraph 3.

This section lists the organic and inorganic COPCs as presented in Table 7-18. However, dibenzofuran is listed as a COPC in Table 7-18, but is not included on the list. The text should be revised so that it is consistent with the results in Table 7-18.

49. Section 7.7.6, Conclusions, Page 7-21, Paragraph 1.

The section states that other than a future residential child receptor, the noncarcinogenic HIs for the other potential receptors at Site 5 are less than 1.0. However, Table 7-25 indicates that the RME noncarcinogenic HI for a future adult receptor is 2.24 and Table 7-26 indicates that the CTE noncarcinogenic HI for a future adult receptor is 1.76 and for a future excavation worker is 62.1. The text should be revised to reflect the results presented in Tables 7-25 and 7-26.

50. Table 7-16, Page T-7-62.

This table presents background comparison test results for groundwater data for Site 5. The footnotes indicate that the overall decision for each groundwater pollutant is NA if all individual background tests are NA but evaluated as yes or no. While the table indicates that individual background tests are NA for each groundwater pollutant, the overall conclusion for each pollutant is not NA. This table should be revised so that either the correct overall conclusion for each pollutant is shown or the correct results for each individual background test is shown.

51. Tables 7-18 to 7-22, page T-7-73 to T-7-83.

These tables present the COPC selection for each contaminant in each medium at Site 5. A final column should be added to the table which describes the reason the contaminant was included as a COPC (i.e., exceeded RBC and background, exceeded RBC, chemical is break-down product of a COPC, etc.) so that it is clear why the chemical was selected as a COPC.

Tables 7-18 to 7-21 include the background results. However, Table 7-22 does not include background results. The format of Tables 7-18 to 7-22 should be consistent and background results should be added to Table 7-22.

52. Table 7-24, page T-7-85.

This table lists values for the estimated CTE total cancer risk for ingestion, dermal contact, and inhalation of subsurface soil for a future excavation worker at Site 5. However, Table J-16, which contains the backup calculations of estimated CTE cancer risks and noncarcinogenic hazard indices for a future excavation worker from subsurface soil exposure at Site 5, lists all the values as NA. The tables should be revised so that they are consistent.

53. Appendix J, Human Health Risk Assessment Documentation.

Appendix J does not contain page numbers. Page numbers should be included throughout the report, including in Appendix J.

The equation for Surface Soil Exposure, Dermal Contact defines "ABS" as fraction from contaminated source for arsenic. "ABS" should be defined as the chemical-specific absorption factor for dermal contact.

The inhalation equation in Appendix J states R_{10} is equal to E_{10}/A. However, Section 3.1.3.5.1 presents R_{10} as equal to $E_{10} * A$. The inhalation equations should be revised to show the correct relationship between the variables and should be consistent throughout the RI report.

The equations presented in Section 3.1.3.5 and in Appendix J are not consistent. For example, the ingestion equation on Page 3-25 uses different units and includes a 365 days/yr conversion factor. The surface/subsurface soil lung inhalation equation on page 3-25 uses the variable X and IF_R; however these variables are not included in the inhalation equation in Appendix J. Instead, the inhalation equation in Appendix J uses the variables CA and FR-I. CA was previously defined as carcinogenic risk; however in this equation, it represents contaminant concentration. The sediment dermal intake equation on page 3-40 uses the variables BW, SA, ED; and EV; however, these variables are not used in the sediment dermal intake equations in Appendix J. Instead, the sediment dermal intake equation in Appendix J uses the variable AGE. Equations with consistent nomenclature should be used throughout the RI report and should be consistent with those equations found in EPA reference documents.