1/30/06- 02469

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CARIBBEAN ENVIRONMENTAL PROTECTION DIVISION
CENTRO EUROPA BUILDING, SUITE 417
1492 PONCE DE LEON AVENUE, STOP 22
SAN JUAN, PR 00907-4127

January 30, 2006

Mr. Jeffrey Harlow
Western Vieques Remedial Project Manager
Commander Atlantic Division
Naval Facilities Engineering Command
6506 Hampton Boulevard
Norfolk, VA 23508-1278

Re: Review of the Draft Remedial Investigation Report Area of Concern (AOC) J at the Former US Naval Ammunition Support Detachment (NASD) Vieques Island, Puerto Rico

Dear Mr. Harlow:

The U.S. Environmental Protection Agency (EPA) and the Puerto Rico Environmental Quality Board (EQB) have completed the review of the Draft Remedial Investigation Report for Area of Concern (AOC) J dated April 2004. Enclosed you will find our comments.

If you have any questions or comments, please contact me at (787) 741-5201.

Sincerely yours,

Daniel Rodriguez
Remedial Project Manager
Enforcement and Superfund Branch

Enclosures (2)

cc: Yarissa Martinez, EQB, w/ encl.
Felix Lopez, FWS, w/ encl.
Oscar Díaz, FWS, w/ encl.
Brett Doerr, CH2M Hill, w/ encl.

EPA's Comments
Draft Remedial Investigation Report
for AOC J at the
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico
April 2004

General Comments:

1. It is not clear whether the soil sample locations were chosen using a random or judgmental approach. In order to be able to use the results of this sampling event and make statistically valid decisions affecting the entire site, a type of random sampling should be used. As stated in EPA QA/G-9, *Guidance for Data Quality Assessments: Practical Method for Data Analysis*, EPA/600/R-96/084, July 2000: "...This type of [judgmental] sampling should only be considered when the objectives of the investigation are not of a statistical nature, for example, when the objective of a study is to identify specific locations of leaks, or when the study is focused solely on the sampling locations themselves. Generally, conclusions drawn from authoritative samples apply only to the individual samples and aggregation may result in severe bias and lead to highly erroneous conclusions..." An explanation should be given detailing how these sampling locations can be used for determining the risk for the entire study area.

2. The data used to determine the potential risk posed by this site was collected in two separate sampling events, one taking place in 2000 and another in 2003. These results were then combined into one data set. The report should provide a discussion on the possible limitations using data collected with such a time lag, including an evaluation of the data sets to insure that the same level of Quality Control/Quality Assurance was used for both events.

3. The Data Quality Evaluation (DQE) provided in this report does not provide enough evidence that the data used to answer the project's principal question (which appears to be whether or not the site poses an unacceptable risk to Human Health and the Environment) was subjected to a thorough analysis to ensure that the question could be answered within an acceptable degree of error. The report does not address or define what degree of error is considered acceptable, does not provide the process that was used to determine that error, nor does it attempt to link the results of the sampling and analysis program to the Data Quality Objectives (DQOs) developed for this project. For example, although the stated goal is to determine the risk that the site poses to human health, it also provides Preliminary Remediation Goals (PRGs) that are described as risk based. However, although the calculated risk for many of the contaminants found at the site fall within EPA acceptable levels, some contaminants, such as Thalium, have been found that exceed the PRGs. In the case of Thalium in surface soil samples the mean, median and 95 % confidence limits all exceed the stated PRG. A complete Data Quality Assessment should be performed that

accomplishes the goals mentioned before. It is recommended that the guidance provided by EPA QA/G-9, be followed. This document can be found at http://www.epa.gov/quality1/qs-docs /g9-final.pdf.

4. It would be useful to include a map which shows the location of this AOC relative to any environmentally sensitive areas on the island. Information needs to be provided on drainage pathways from this site to wetlands and open water areas.

Specific Comments:

5. Page ES-1, Executive Summary: The description of AOC J includes reference to a "water-filled ditch" that extends through the east side of the Site. As noted in earlier reviews on Vieques Island documents, it is collectively recommended by the regulatory agencies that these ditches should be referred to as "ephemeral streams" not "water-filled ditches." The term "ditch" implies this area serves only as a drainage feature and does not provide suitable habitat for aquatic receptors at the Site. However, this is not necessarily true.

6. Page ES-1, Executive Summary: While the text states that the work plan for this effort was approved by the CTC, EPA's comments on the work plan were never fully resolved. On Page 2-6, the text specifically states that EPA's comments were incorporated, but this is not accurate. Most significantly, EPA commented that samples should be collected from areas where dumping actually occurred rather than from soils near the dumping. The Navy objected to this comment and went forward with the work without agreement. With this comment unaddressed, the work plan was enacted with no sampling from the actual areas most likely to be contaminated. As a result, the study does not definitively determine whether contamination is present at the AOC.

7. Page ES-2, Nature and Extent of Contamination: To minimize confusion, it would be helpful to indicate the source of data (i.e. was collected during the PA, RI, etc.) when discussing sampling results.

8. Page ES-3, Executive Summary: a) TCE and perchlorate are both noted as being detected in groundwater, then absent at resampling. With one detection and one non-detect, a third sample is needed to confirm whether the contaminant is likely to be present. b) The second paragraph notes a TCE detection, then the fourth paragraph states that VOCs and SVOCs are both absent. On the following page, in discussing the risk assessment, it is stated that 3 VOCs were detected, as well as one SVOC. This presentation is confusing. Please revise so as to consistently present what compounds were detected.

9. Page ES-3, Nature and Extent of Contamination: The discussion of sediment data indicates that barium exceeded background concentrations and ecological screening criteria; please indicate the source of the sediment screening values for barium. For previous AOCs (e.g. AOC H) contaminant specific sediment screening values for barium was lacking.

10. Page ES-3, Fate and Transport Summary: The document notes, "Surface runoff to the water-filled ditch is not a likely a pathway for AOC J, as the berm separating the Site and the ditch acts as a partial barrier; thus runoff contribution to the ditch is likely to be minimal." Figure 2-8 provides a picture of the view of the water-filled ditch from the top of the berm looking east; however, the berm itself is not shown. No further description of the "berm" is presented in the RI document. More information regarding surface runoff should be provided, as this Site is located only 50 feet south of Vieques Passage.

11. Page ES-5, Ecological Risk Assessment: The ERA discusses the comparison of average site inorganic values to background concentrations and notes that there are some exceedances of average concentrations when compared to screening values. It should be noted that during the screening level ecological risk assessment (SLERA), maximum detected concentrations should be compared to screening values and used in risk calculations rather than average detected values. This summary should note whether these conclusions are based on the BERA rather than the SLERA.

12. Page 2-2, Section 2.3.2, Topography: More information should be provided in this section on the berm that separates the Site from the ditch and the relationship of the berm to the debris piles.

13. Page 2-4, Section 2.3.5.1, Surface Water: As noted above, the relationship of the site to the ditch and the surface runoff pathways needs to be discussed. More information needs to be provided regarding how often the ditch might overflow, and whether or not there are periods of heavy rainfall where surface runoff may directly drain into the ditch. This information is needed to properly evaluate the migration pathways for contaminants from the Site to habitats that support aquatic receptors.

14. Page 2-4, Section 2.3.5.2, Groundwater: The referenced salinity results should be included in a table and presented on a figure so as to show their distribution.

15. Page 2-4, Section 2.3.5.2, Groundwater: The potential for the groundwater to discharge into the water-filled ditch should be discussed.

16. Page 2-4, Section 2.4, Wildlife: The RI fails to present any discussion of ecological receptors that are likely present in the "water-filled ditch" or those that are present in Vieques Passage. The mangroves present in the "ditch" are likely to be providing habitat for juvenile fish species. Any coral reef or rubble areas located in close proximity to the mouth of the stream (ditch) would support resident invertebrate and fish species that could potentially be impacted from contaminants migrating from the Site via the ditch.

17. Page 2-5, Section 2.6.3, Expanded PA/SI: The RI states that one upstream surface water and one upstream sediment sample were collected in the adjacent water-filled ditch during the PA/SI. It is unclear whether these samples can be considered "upstream" samples since

these samples may actually have been "downstream" of the Site during periods of ocean surging.

18. Page 2-6, Section 2.6.3, Expanded PA/SI: Figure 3-4 is referenced as showing the surface water and sediment sample locations collected during the PA/SI. Figure 3-4 only shows the surface water and sediment sample locations sampled during the RI. Three of the surface water and sediment samples from the PA/SI were resampled during the RI. Figure 3-4 should be revised to differentiate between the PA/SI and RI sample locations. From this figure it is unclear which sample was considered "upstream" as all samples appear to have been collected adjacent to the ditch. Further, surface water data should be compared to Puerto Rico Surface Water Values and surface soil data should be screened against values protective of ecological receptors, not Region 9 PRGs. As no "background" data were collected, the usefulness of comparing samples to one "upstream" sample is limited. Any media (sediment, surface water, surface soil) which contain contaminants in exceedance of media screening values (or for which no screening values exist) should be included in the SLERA.

19. Page 2-6, Section 2.6.3, Expanded PA/SI: Stating that compounds were either not detected or below criteria is not sufficient. Indicate which compounds were not detected, as well as all detections of anthropogenic compounds.

20. Figure 2-6: The stilling well shown on Figure 3-3 should be included on this figure, hopefully with a water level reading as collection of water levels was the primary purpose of installing it.

21. Page 3-2, Section 3.2.2, Surface and Subsurface Soil Samples and Analysis: Surface soil samples were collected from the top six inches. Typically, soil samples used for ecological risk assessment purposes are collected from the top 12 inches. This may under or over-estimate risk to ecological receptors, and should be noted in the uncertainty section.

22. Page 3-2, Section 3.3.1, Monitoring Well Installations: There appears to be a typographical era in the document regarding the purpose of NDAJMWO5; the purpose of the well should be to document groundwater migration moving in an easterly direction towards the drainage ditch, rather than *to the east* of the drainage ditch. This should be corrected.

23. Page 3-3, Section 3.3.1, Monitoring Well Installations: Please indicate how the drill cuttings were disposed of rather than simply stating that the IDW plan was followed. If samples were collected and analyzed, the results should be presented.

24. Page 3-5, Section 3.3.4, Monitoring Well Sampling and Analysis: The text indicates that sampling for VOCs was conducted with a bladder pump and that all other parameters were sampled for using a peristaltic pump. This appears to be problematic. It is presumed that the well was purged using low flow methods with the bladder pump. Then, after collecting VOC samples, the pump was pulled from the well and the peristaltic pump was used to

collect water for the other parameters. Low flow purging does not remove standing water from the well casing, but draws water from a small area proximal to the pump intake. Removing the bladder pump would have agitated water in the well, mixing the standing water in the well and perhaps increasing turbidity. Samples collected without further purging would therefore not be representative of the groundwater. If this was done, the sample results are not valid. Please give a detailed account of the method so that a determination can be made as to whether the results can be used.

25. Page 3-5, Section 3.4, Surface Water and Sediment Sampling: The text indicates that a Whale pump was used to collect surface water samples. This is not an acceptable environmental sampling pump and the results are therefore suspect.

26. Page 3-5, Section 3.4, Surface Water and Sediment Sampling: The discussion of those locations which were resampled is very confusing. Further, no information is provided for the sediment and surface water sample locations with the "A" and "B" notations. As noted above, Figure 3-4 should clearly illustrate those samples which were collected during the PA/SI and those which were collected as part of the RI. The location of the background surface water and sediment samples should also be included on this Figure. It is unclear whether these samples are in an acceptable background location.

27. Page 3-5, Section 3.5, Background Surface Water and Sediment Sampling: Sample location SW/SD-08 does not appear on any figure. Please show where this sample was collected.

28. Page 3-5, Section 3-6, Hydraulic Tidal Study: A significant conclusion of the tidal study is that the surface water is consistently higher than the groundwater in wells MW-1 and MW-4. In contrast, MW-3 has a consistently higher water level than in the surface water. This has implications for recharge from surface water in the northern portion of the site – which also helps to explain the increases in salinity.

29. Figure 3-4, Remedial Investigation Sediment and Surface Water Location Map: Though the legend shows surface water sample locations to be designated by a red triangle, no red triangles appear on the figure.

30. Section 3 and 4 Figures: The site needs to be depicted at a larger scale, with more details. Have the site map take up the majority of the page rather than less than 1/3 of it. All debris piles should be shown in relationship to sampling locations. The current presentation does not afford the reader with an understanding of where samples were collected in relationship to potential sources. Furthermore, the line demarking the "Interpreted Waste Boundary - Geophysics" does not match with that presented in the geophysical report (Appendix H).

31. Page 4-5, Section 4.1.3.2, Background Conditions: It should be clearly noted in the first paragraph that basewide background sediment and surface water samples were not collected.

32. Pages 4-5 and 4-6, Section 4.1.4, Regulatory, Health-Based, and Ecological Screening Levels: Soil screening for impact to groundwater should use the default DAF of 1. As stated in the SSL guidance, the use of a DAF 20 is generally not appropriate for sites where the water table is quite shallow. The DAF of 10 suggested for subsurface soils is suggested without any reasoning as to why this is appropriate. Site specific numbers other the DAF 20 and DAF 1 are sometimes calculated; this does not appear to have been done here to arrive at the DAF 10 which was suggested. In the future, the Navy and the agencies should agree beforehand what criteria will be used.

33. Page 4-8, Section 4.2, Analytical Results: As always, all detections of anthropogenic compounds should be noted in the text and presented in detection tables and on figures.

34. Page 4-9, Section 4.2.2, AOC J – Former Operations Area Disposal Site: The results of the sampling activities undertaken during the Expanded PA/SI and RI to determine the nature and extent of contamination in soil, groundwater, surface water, and sediment are jointly discussed in this section. These data should have been presented separately as the PA/SI data were collected in 2000 and the RI data were collected in 2003. Though Figures 4-1 through 4-6 differentiate between the dates the data were collected, the RI discussion presented does very little to clarify when exceedances of background levels or screening criteria were observed. This would have allowed for a determination of any changes in contaminant concentrations over time. All comments on the Tables are applicable to the sections where comparisons are drawn between the screening values and the data. These sections will need to be modified as appropriate.

35. Page 4-10, Section 4.2.2.1.1, Inorganic Analytes, Table 4-5, Chemicals Detected Above Criteria in Surface Soil and Table 4-9, Summary of Surface Soil Screening Exceedances: It is unclear why cadmium is listed in Table 4-9 and is not included in Table 4-5, or in the second paragraph of Section 4.2.2.1.1. This discrepancy should be corrected. See comments below regarding the referenced screening values for surface soil.

36. Page 4-34, Table 4-7, Chemicals Detected Above Criteria in Surface Water: The values noted are not consistent with guidance. A screening value of 1000 μg/l is provided for barium and a value of 0.068 μg/l (HH) is provided for beryllium (PR values).

37. Page 4-35, Table 4-8, Chemicals Detected Above Criteria in Sediment: Please provide a copy of the USEPA Region 4 memorandum which was used to identify sediment screening criteria.

38. Page 4-36, Table 4-9, Summary of Surface Soil Screening Criteria Exceedances: The units for the screening values should be provided. The "Ecological Screening Values" listed here are not consistent with those referenced. For example, the screening value for cadmium should be 4 ppm, rather than 0.4 ppm, no screening value for iron was identified in these references; the screening value for lead should be 40.5 ppm, the screening value for selenium should be 0.21 ppm and the screening value for zinc should be 8.5. These

discrepancies should be corrected. Further, soil data may also be screened against EPA's Ecological Soil Screening Levels (SSLs) (http://www.epa.gov/ecotox/ecossl/).

39. It should be noted that recommendations to revise Tables in Section 4 are applicable to Tables in Section 7.

40. Page 5-1, Section 5.1, Potential Sources of Contamination: An empty drum is mentioned here as being present at the site. This is the first mention in the report of this potential source of contamination. Please describe the drum, any markings to indicate what it might have held, and its condition. Its location should also be shown on a figure.

41. Page 5-2, Section 5.2, Conceptual Site Model: Differences in total and dissolved iron concentrations are not a valid means of determining if iron reduction is occurring. This statement should be removed.

42. Page 5-2, Section 5.3, Potential Routes of Migration: The first two sentences of the section contradict statements made on page ES-3.

43. Page 5-2, Section 5-3, Potential Routes of Migration and Page 5-3, Section 5.3.2, Surface Runoff Pathway: It is indicated in this section the "primary mechanism for contaminant transport from the source area to AOC J is surface runoff." This appears to be directly contrary to the information provided in the Executive Summary which indicated that the berm prevents surface runoff from entering the ditch (as noted above). Figure 5-2, Conceptual Site Model, also clearly shows that surface flow at the Site is towards the "ditch." This inconsistency should be addressed.

44. Page 5-3, Section 5.3.2, Surface Runoff Pathway: Surface water exceedances of bis(2-ethylhexyl)pthalate are mentioned in this section, but are not discussed in Section 4. Any exceedances of screening values should be discussed in Section 4. This is also valid for the discussion of mercury exceedances in surface water discussed in Section 5.5.1.1, Soil to Surface Water Migration (page 5-10).

45. Page 5-14, Tables 5-1, Summary of Salinity Measurements During Expanded PA/SI, and Page 515, Table 5-2, Summary of Field Sampling Data for Groundwater, 2003: Other field parameters, such as pH and temperature, should also be included on the tables.

46. Page 6-4, Section 6.5.1, COPC Selection for Human Health Risk Assessment, Bullet 1: Please update the Region 9 PRG table values.

47. Page 6-4, Section 6.5.1, COPC Selection for Human Health Risk Assessment, Bullet 3: Considering the depth to groundwater is 7 ft in some areas, it may not be appropriate to use a DAF of 10 when evaluating the potential of contaminants for migration to groundwater. Please consult with a hydrogeologist to identify the most appropriate DAF. See comment # 29.

48. Section 6.6.1, Potentially Exposed Populations: Please identify the age of the youth recreator.

49. Sections 6.6.1, Potentially Exposed Population and Section 6.6.2, Eposure Route Factors: Exposure parameter information is presented in both sections. This information is somewhat confusing. Please revise these sections to more clearly identify the exposure parameters for each population and pathway.

50. Page 6-7, Section 6.6.1.3, Industrial Workers: Please revise the soil ingestion rate for the industrial worker to 100 mg/day, which is the recommended value for workers who will be outside for a portion of their workday. The reference for this value is the "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" (OSWER 9355.4-24).

51. Page 6-10, Section 6.6.2.9, Surface and Subsurface Soil Inhalation: The PEF value used is the default value. Please calculate and use a site-specific PEF value that more closely represents the size of the site and the physical characteristics of the site. Also, please clarify if one PEF will be used for both surface soils and subsurface soils (for construction activities).

52. Page 6-11, Section 6.6.3.2, Exposure Point Concentration: Please use the latest version of the ProUCL tool which is available at: http://www.epa.gov/nerlesd1/tsc/form.htm

53. Page 6-11, Section 6.7, Toxicity Assessment: A list of chemicals for which toxicity values are not available from the IRIS database was sent to EPA ORD/NCEA for review. The following chemicals now have updated recommendations:
    a) Aluminum: The NCEA provisional value has been withdrawn pending further review; please address this chemical qualitatively.
    b) Iron: The NCEA provisional value has been withdrawn pending further review; please address this chemical qualitatively.
    c) Vanadium: Please use the chronic RfD recommended in the 1997 HEAST document.
    d) Benz[a]anthracene: Please use the same TEF scale for the inhalation unit risk values for b[a]a and benzo[a]pyrene as was used for the oral slope factor. The reference for this approach is NCEA.

54. Table 6.1, Chemicals of Potential Concern (COPCs) for Soil - HHRA: The calculated range and average for the contaminants found at the site are shown here, however, the standard deviation is not provided. The standard deviation is a very important statistic that provides information regarding the distribution of the data and can be used to quantify error, therefore, this number should be calculated and shown.

55. Tables 6-1, Chemicals of Potential Concern (COPCs) for Soil – HHRA, Table 6-2, Groundwater Chemical of Potential Concern – HHRA, and Table 6-3, Chemicals of

Potential Concern (CPOCs) for Sediment- HHRA: The repeated detections of Thallium at estimated concentrations suggests that a more sensitive analytical method should be considered. A more sensitive method would likely reduce the chance of false positives being reported.

56. Page 7-4 and 7-5, Section 7.3.2, Habitats and Biota: The RI presents the plant species and wildlife observed at AOC J and provides a listing of federally listed species occurring or potentially occurring at the NASD. It was noted that, "During the surveys, endangered brown pelicans were observed flying over the adjacent marine habitat, but not at AOC J. The brown pelican would most likely not occur at this fully terrestrial site." Due to the Site's location within 50 feet of Vieques Passage and the presence of an ephemeral stream intersecting the Site, the Site cannot be considered "fully terrestrial". More details need to be presented regarding the fauna that could be associated with the "water-filled ditch."

57. Page 7-8, Section7.3.2.4, Preliminary Conceptual Model, Receptors: The receptor species selected for the ecological risk assessment are wide ranging and not specifically associated to the site. More applicable receptors would be fiddler crabs, land crabs, and night herons; rather than rats, mongoose and thrashers.

58. Page 7-13, Section 7.3.4.1, Medium-Specific Screening Values: The sediment screening values cited as selected are Long and Morgan, 1990; Long et al., 1995 and MacDonald, 1994. The sediment screening values cited earlier in the RI on Page 4-6 were Long et al., 1995 and EPA, 2000. This discrepancy needs to be corrected.

59. Page 7-14, Section 7.3.5.1, Selection of Chemicals of Potential Concern (COPCs), Surface Soil: It is unclear why the inorganics discussed in this section (and Table 7-11) are not the same as those identified in Table 4-9, as surface soil concentrations are being screened against ecological screening values in both instances. Please clarify.

60. Page 7-15, Section 7.3.5.1, Selection of Chemicals of Potential Concern (COPCs), Surface Water: Similar to the concerns noted for surface soil, there appears to be an inconsistency in the COPCs selected for surface water in Section 7 (and Table 7-12) and Section 4 (and Table 4-7). This inconsistency needs to be addressed.

61. Page 7-15, Section 7.3.5.1, Selection of Chemicals of Potential Concern (COPCs), Sediment: As noted above, the criteria used in Section 4 (& Table 4-8) should be the same as that used in Section 7 (& Table 7-13) so that the same COPCs are identified. Any inconsistencies should be addressed.

62. Page 7-15, Section 7.3.5.1, Selection of Chemicals of Potential Concern (COPCs), Food Web Exposures: For transparency, all calculations should be clearly shown, including dietary intakes calculated, the NOAELS and LOAELS that were used in comparison along with the calculated HQ. Although this information is provided throughout the document, it would be more useful to have a comprehensive table(s) where the information is in one

location.

63. Page 7-16, Section 7.4.1, Refinement of Conservative Screening Assumptions: Please check the reference in the last bullet and note whether this guidance refers specifically to the protection of ecological receptors.

64. Pages 7-17 and 7-18, Section 7.4.2.3, Sediment: The alternate sediment screening values referenced here (AET from NOAA SQUIRT Table) should also be provided in Table 7-22, so the HQs can be clearly seen.

65. Pages 7-18 and 7-19, Section 7.4.3, Risk Evaluation: As noted above, please explain any discrepancies between those COC identified in Section 4 and in this Section. Although COPCs may be removed from consideration based on mean concentrations, the contaminants first identified in Section 4, should have been brought forward to Section 7 for further evaluation. It is unclear whether this was done.

66. Page 7-22, Section 7.6, Ecological Risk Assessment Conclusions: The RI concludes that sufficient data are available on which to base a conclusion that there is no unacceptable risk at AOC J. Because total organic carbon (TOC) and grain size analyses were not performed on the sediment samples, it is unclear whether depositional areas in the stream were actually sampled. No samples were collected at the mouth of the stream. Further, the RI could have done a better job identifying aquatic receptors that could potentially be impacted from contaminants migrating from the Site. Nonetheless, the data provided in the RI do not suggest that there is a consistent pattern of elevated contamination in soil, groundwater, surface water, or sediment and exceedances of screening criteria (and background levels) were sporadic. Should this Site need to be re-evaluated in the future as part of the pending National Priorities List (NPL) listing of sites on Vieques Island, future efforts should include the proper identifications of potential receptors.

67. Tables 7-16, Soil Bioconcentration and Bioaccumulation Factors For Plants, Soil Invertebrates, and Small Mammals – Step 3 and Table 7-17, Sediment Bioaccumulation Factors For Benthic Invertebrates, Fish, and Frogs: Please show the BAFs/BCFs used for the SLERA as comparison to that proposed for the BERA in these tables.

68. Appendix H: The text of the AOC J conclusions end mid sentence at the bottom of page 13. It appears that pages are missing.

69. Appendix J: The RAGS D Table 2 Series is missing. Please include this series of tables.

70. Appendix J, Table 3 Series: Please note that the latest version of the ProUCL tool.

EQB's Technical Comments
Draft Remedial Investigation Report
Area of Concern (AOC) J
Former Naval Ammunition Support Detachment
Vieques Island, Puerto Rico
April 2004

I. INTRODUCTION

TRC has reviewed and provides the attached comments to the Draft Remedial Investigation Report for Area of Concern (AOC) J, dated April 2004.

The RI Report presents the results of the Remedial Investigation (RI) conducted for AOC J of the former Naval Ammunition Support Detachment (NASD) in the western portion of Vieques Island, Puerto Rico. The RI activities were detailed in the Final Remedial Investigation/Feasilbility Study Work Plan for Solid Waste Management Unit (SWMU) 6, SWMU 7, Area of Concern (AOC) H, and AOC J, July 2003. TRC had provided to Puerto Rico Envionmental Quality Board (EQB), on April 15, 2003, technical comments on the Draft Remedial Investigation/Feasibility Study Work Plan for Solid Waste Management Unit (SWMU) 6, SWMU 7, Area of Concern (AOC) H, and AOC J, Former U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico, dated February 21, 2003. The comments were then provided by P.R. EQB to Naval Facilities Engineering Command on April 21, 2003 who finalized the RI Work Plan considering the comments.

The AOC J RI Report finds that the site conditions at AOC J do not pose an unacceptable risk to human health or ecological receptors. As a result, no remedial actions are recommended for the site.

This review presents significant issues identified in the RI Report, as well as requests to clarify cited issues.

General Comment

1. The conclusions of the HHRA rely on the assumptions that groundwater is not a potable source and chemicals that drive risk are within background concentrations. There should be a determination as to whether PREQB will accept that the groundwater is not potable. Also, supporting documentation should be provided concerning the background concentrations for the chemicals evaluated in this HHRA to ensure that site metals concentrations are indeed within an acceptable range of background concentrations. The final conclusion is that regardless of risk, chemicals are within the range of background concentrations. Therefore, changes made to the HHRA will not alter this conclusion. There are substantive errors and omissions in the HHRA that will affect the resulting cancer and non-cancer risks. These should be addressed in order to ensure that future risk assessments are done appropriately.

2. Even though the risk assessments determined that there is no unacceptable risks, the Navy will need to prepare an feasibility study (FS) that evaluates: (1) no action alternative; (2) onsite consolidation and covering; and, (3) removal to offsite landfill (possibly consolidate with debris from other similar sites). The site is a disposal area (trash/garbage) that must be addressed. Due to the absence of risk, a "focus" or "streamlined" FS would likely be acceptable.

3. Soil and groundwater samples must be re-collected and analyzed for Perchlorate. The current detection limit of 20 ug/L is 13-times greater than the lowest risk-based concentration currently enforced in the US (Mass, 1.5 ug/L). Section 4.2.2.3.7: The detection limit for the 2003 sample should be provided in the text. According to the data provided in Appendix I, the detection limit is 20 ug/L, which exceeds the detection limit achieved for the 2000 data set of either 4 or 8 ug/L. Considering that the screening criteria is 0.36 ug/L for perchlorate, the elevated detection limit should be provided and explained. Clarify the reason for the higher detection limits, since lower detection limits were achieved in 2000.

Page-Specific Comments

1. Page ES-2, Paragraph 9 –
   a. Clarify if the total (unfiltered) metals samples were collected using United States Environmental Protection Agency (EPA) Region II low stress/low flow sampling procedures.
   b. Clarify which nine metals were detected on a filtered (dissolved) basis.

2. Page ES-4, Paragraph 2 –
   a. Hem 1985 suggests that some of the manganese reported in data compiled for the *Study and Interpretation of the Chemical Characteristics of Natural Water, Third Edition* might be associated with particulate material that can pass through 0.45 um filter pores. While Hem also acknowledges that dissolved organic solutes may reduce manganese oxides and liberate Mn2+, it is possible that what has been observed is to some degree an artifact of sample filtration.
   b. Clarify to what degree, if known, that the manganese reduction in dependent on naturally occurring organic concentrations in soil. Discuss in the context of any actually organic carbon concentration data collected from site soil.

3. Page 2-1, Section 2.2 - The description of AOC J disposal area should be expanded to provide detail as to the estimated quantity and extent of waste. Details should be included such as the estimated thickness of the waste and how much of the wastes exists below grade and to what depth. Also, descriptions of efforts undertaken to confirm the lateral extent of waste (i.e., test pitting) should be provided. Based on the text and figures presented in the RI Report, it is not clear to the reader to what degree the extent of waste has been determined, and accordingly whether the coverage provided by the sampling program is sufficient.

4. Page 2-3 Section 2.3.4.2, Paragraph 2 - This paragraph states that the water-bearing zone is between 3 and 9 feet bgs. Section 2.3.5.2 states that groundwater was encountered at depths of 5 to 11 feet bgs. The reason for these differences should be explained in the text.

5. Page 2-4, Section 2.3.5.2, Paragraph 2 - Groundwater of the Commonwealth of Puerto Rico is required to meet the general water quality standards provided in Article 3, Section 3.1. Under this section, specific numerical water quality standards have been established for chemicals in groundwater. These regulatory standards should be met at AOC J.

6. Page 2-5 Section 2.6.3, Paragraph 1 - Clarify which EPA Region 9 screening criteria were used. Residential criteria are appropriate for evaluating direct contact for sites where no institutional controls will be placed on the property to limit future activities. EPA Region 9 also provides screening criteria for the protection of groundwater from contaminants migrating from overlying soils (i.e., the "migration to groundwater" transport pathway). Considering the same contaminants were detected in groundwater and soil and groundwater must meet PREQB water quality standards, soil should be screened using these criteria as well as to determine if soil is a on-going contaminant source to groundwater.

7. Page 2-6, Section 2.6.3, Paragraph 2 - Several metals identified in soils were identified in groundwater above MCLs. This data indicates that the migration of contaminants from soil to groundwater is a transport mechanism for this site.

8. Page 2-6, Paragraph 3 – Provide an explanation for why the mercury detection is considered to be a likely false positive.

9. Page 3-5, Paragraph 2 – Clarify if the procedure used to collect the groundwater samples was consistent with the United States Environmental Protection Agency, Region II *Ground Water Sampling Procedure – Low Stress (Low Flow) Purging and Sampling* (GW Sampling SOP, Final, March 16, 1998).

10. Page 3-5, Section 3.3.5 – Clarify if the bladder pump was used for the collection of volatile organic compound (VOC) samples and the peristaltic pump was used for non-VOC sample collection.

11. Page 3-5, Section 3.4 – The text does not include pesticides in the analyses to be performed. However, the corresponding table (Table 3-8) lists pesticides. Clarification is required on whether pesticide analysis will be performed.

12. Page 3-6, Section 3.5 - NDAJSW08 should be included on Figure 3-4.

13. Page 3-7, Paragraph 3 – Provide a hypothesis that explains why the monitoring well closest to ocean (MW-01) shows less response to tidal fluctuations compared to the monitoring wells furthest from the ocean (MW-03 and MW-04).

14. Page 3-7, Section 3.6, paragraph 5 - Two wells showed insignificant tidal-related fluctuations in water levels; therefore, a generalized statement that groundwater is being influenced by tidal action at AOC J is not accurate. The statement should read "...groundwater in the vicinity of NDAJMW034 and NDAJMW04 is being influenced by tidal action as observed..."

15. Table 3-3 - This table indicates that the well screen interval depth at NDAJMW05 and NDAJMW06 is from 12 to 22 feet bls. However, shallow groundwater is present from 5 to 11 feet bls per Section 2.3.5.2 or from 3 to 9 feet bgs per section 2.3.4.2. Clarify the placement of the well screens in relationship to the depth of the water table.

16. Figure 3-5 – Change the word "quebrada" to "Stilling Well 1J" in the 24 Hour AOC J graphic (and associated legend) to be consistent with the text describing the Hydraulic Tidal Study.

17. Page 4-3, Section 4.1.2, 3rd bullet – The definition of the "J" flag should not be limited to values detected below the reporting limit. Results are qualified as estimated (J) during validation for a variety of reasons.

18. Page 4-4, Section 4.1.3.1, 2nd bullet – The definition of Laboratory Method Blank should differentiate between water and soil method blanks. Currently, the definition states that all method blanks are an aqueous matrix but this is not true for method blanks associated with soil samples.

19. Page 4-5, Section 4.1.3.1, Paragraph 1 – The units presented for the concentrations of zinc detected in method blanks are incorrect (mh/kg). These units need to be corrected to mg/kg.

20. Page 4-5, Section 4.1.3.1, Paragraph 1 – The text states that blank contaminants must be detected in samples at 10 times the concentrations in the blanks in order to be considered specific to the site. However, this is only true for the common contaminants listed (acetone, methylene chloride, and diethylphthalate). In accordance with the validation guidelines, the other contaminants (toluene and zinc) must be detected in samples at five times the concentrations in the blanks in order to be considered specific to the site. The text should be revised to reflect the procedures used for data validation.

21. Page 4-5, Section 4.1.4, paragraph 1 - EPA Soil Screening Levels for surface and subsurface soils should be based on a dilution attenuation factor of 1, not 10 or 20 unless a site-specific demonstration is made that these DAFs are protective of groundwater. Furthermore, SSL criteria for metals are pH-dependent. Therefore, the pH of the soils should be sampled so that appropriate SSL criteria can be adjusted for pH, if required. Currently, analytical data for soil and groundwater indicates that migration of contaminants to groundwater in concentrations above PREQB water quality criteria is occurring.

22. Page 4-5, Section 4.1.4, 1st bullet – The text states that surface soil results are compared to the EPA Region 9 leachability criteria for soil based on a DAF of 20. However, Tables 4-5 and 4-9 show the data being compared to EPA Region 9 leachability criteria for soil based on a DAF of 10. Either the text or the tables must be revised, based on the criteria which are most appropriate.

23. Page 4-6, Bullet 2 – Clarify that the EPA Region 9 tap-water PRGs were adjusted to an HI of 0.1 for non-carcinogenic chemicals only consistent with the approach described for soil on Page 4-5.

24. Page 4-6, Section 4.1.4, Bullet 6 - This paragraph states that "The SSL for protection of groundwater provides soil concentrations that are generally considered to be protective of shallow groundwater. Soil concentrations above the SSL may pose a leaching hazard." Leaching of metals from soil to groundwater is occurring at this site as indicated by the presence of the same metals in soil and groundwater (i.e., aluminum, arsenic, iron, manganese and vanadium). The SSL criteria should be based on a DAF of 1 or a site-specific DAF. If a site-specific DAF is calculated, the DAF and supporting documentation showing the model, parameters and calculations should be provided for regulatory review. All data should be re-screened using the appropriate screening criteria.

25. Page 4-7, Section 4.1.5 – The text states that data validation reports are included in Appendix J. However, Appendix J contains the final Data Quality Evaluation performed on the validated data, copies of chains-of-custody, and tables of validated data. Data validation reports prepared by the validation subcontractor (Environmental Data Services) were not provided.

26. Page 4-8, Section 4.2.1.1 - Background concentrations used for screening purposes for surface and subsurface soil should be provided in this report. The conclusions of the HHRA indicate that although there are risks, concentrations of COPCs at the site are within the range of background concentrations. Therefore, the background concentrations for all metals detected in surface and subsurface soil should be included and discussed in this report. The following information that should be included in this report for background samples: soil characteristics, depth of samples, and proximity to contaminated areas (include a figure of sample locations) and similarity to wetland/intermittently flooded soils. Note that background soil samples should be collected from similar soil horizons for comparison to site soil data. Tables should be included that compares the average and maximum concentration for all detected metals to the background concentrations. These tables should be provided for regulatory review prior to finalizing this report.

27. Page 4-9, Section 4.2.1.5, Paragraph 2 - The essential nutrient analysis is not appropriate for eliminating chemicals from evaluation in the ecological risk assessment. This should be clarified in this paragraph.

28. Page 4-9, Section 4.2.2, Paragraph 2 - This paragraph states that Tables 4-5 through 4-8 present the detected chemicals in surface soil, groundwater, surface water and sediment, respectively. However the titles of these tables indicate that only chemicals above screening criteria are presented in the tables. Chemicals above screening criteria should not be excluded from these tables. A table showing chemicals detected in subsurface soil is not included. A table providing the data collected in subsurface soil (i.e., similar to Tables 4-5 through 4-8) and a table providing a summary of screening exceedances for subsurface soil (i.e., similar to Tables 4-9 through 4-12) should be included in the report.

29. Page 4-10, Section 4.2.2.1.1, Paragraph 4 – It is unclear why there is not a discussion on cadmium which also exceeds screening criteria according to Table 4-5.

30. Pages 4-10 to 4-11, Section 4.2.2.1.1 - Although EPA did not provide SSL criteria for several metals detected in surface soil at the site, site data indicates that leaching is occurring. This transport mechanism should be evaluated for all metals to ensure protection of the groundwater. SSL criteria should be calculated for these metals using the SSL equation at a DAF of 1 and soil-water partitioning coefficients (Kds) for the applicable pH of the soils.

31. Page 4-11, Section 4.2.2.1 – A discussion should be provided on the PCB Aroclors and explosives analyses performed on surface soils.

32. Page 4-12, Section 4.2.2.2.1 - Inappropriate SSL criteria were used to screen inorganics in subsurface soil. Furthermore, SSL criteria should be calculated for metals for which criteria are not available. Subsurface soil data should be re-screened using the appropriate criteria and appropriate tables included in the report (refer to comment on Section 4.2.2, paragraph 2).

33. Page 4-4-11 to 12, Section 4.2.2.2 - A discussion should be provided on the PCB Aroclors and explosives analyses performed on subsurface soils.

34. Pages 4-12 to 4-14, Section 4.2.2.3.1

    - The text states that nine metals were above the EPA Region 9 tap water PRGs in filtered samples. However, only seven metals exceeded these criteria; cadmium and thallium should not be listed as exceedances. Cadmium does not exceed the criteria in filtered groundwater. Thallium is not listed as exceeding criteria in unfiltered samples although paragraph 1 of the text implies this; thallium is above the criteria in filtered groundwater samples but this is not presented on Table 4-6 (this exceedance is noted on Table 4-10).
    - According to Table 4-6, there are no cadmium exceedances in filtered groundwater as indicated in the text on page 4-13. The 2003 filtered groundwater exceedance referenced in the text is not presented on this table.
    - The text lists incorrect background concentrations for iron in unfiltered and filtered samples. The background concentrations listed are reversed according to Table 4-10.

- Vanadium exceeds Region 9 tap water PRGs according to Tables 4-6, 4-10, and Figure 4-2. However, this section provides no discussion on vanadium.

35. Page 4-13, Paragraph 6 – Clarify the discrepancy between this paragraph and Table 4-1. This paragraph refers to an unfiltered background concentration for iron of 801 ug/L (from the background well), but Table 4-1 tabulates the 801ug/L concentration value in the "dissolved" column. Table 4-10 also presents the 801ug/L concentration as a dissolved phase concentrations.

36. Page 4-13, Paragraph 8, Sentence 3 - Typographic error. Delete the last "s" on the word "samples."

37. Page 4-14, Section 4.2.2.3.2 - The text refers to a Figure 4-3 which summarizes VOCs detected above screening criteria. This figure was not present. In addition, a Figure 6-3 was present in its place which summarized aluminum, arsenic, iron, and manganese detected in groundwater. The figure for VOCs needs to be provided and the additional figure (6-3) provided needs to be properly referenced in the text.

38. Page 4-15, Section 4.2.2.4.1, Paragraph 2 - The text states that barium was detected in all 5 filtered surface water samples. However, according to Table 4-11, barium was not detected in any of the 5 filtered surface water samples.

39. Page 4-15, Section 4.2.2.3.7 - The detection limit for the 2003 sample should be provided in the text. According to the data provided in Appendix I, the detection limit is 20 ug/L, which exceeds the detection limit achieved for the 2000 data set of either 4 or 8 ug/L. Considering that the screening criteria is 0.36 ug/L for perchlorate, the elevated detection limit should be provided and explained. Clarify the reason for the higher detection limits, since lower detection limits were achieved in 2000.

40. Table 4-1 –
    a. Explain why total iron in groundwater was non-detect at 83.5 micrograms per liter (ug/L) and filtered iron, presumably from the same sample, was detected at 801 ug/L. Note that on Page 4-13, Paragraph 6, the 801 ug/L concentration value is referred to as a total (unfiltered) iron concentration. Table 4-10 also presents the 801ug/L concentration as a dissolved phase concentrations and non-detect (83.5 U ug/L) for the total concentration.
    b. Explain the occurrence of chloroform at 5.7 ug/L in background groundwater.
    c. Typographic error. The footnote for "=" has an incorrect spelling for "indicates."
    d. The table has an incorrect spelling for Aroclor (the "h" should be deleted).

41. Table 4-2 –
    a. Explain the presence of carbon disulfide in the background surface water sample.
    b. Typographic error. The footnote for "=" has an incorrect spelling for "indicates."
    c. The table has an incorrect spelling for Aroclor (the "h" should be deleted).

42. Table 4-3 –
    a. Typographic error. The footnote for "=" has an incorrect spelling for "indicates."
    b. The table has an incorrect spelling for Aroclor (the "h" should be deleted).
    c. Section 4.1.4 states that surface soil results are compared to the EPA Region 9 leachability criteria for soil based on a DAF of 20. However, Table 4-5 shows the data being compared to EPA Region 9 leachability criteria for soil based on a DAF of 10. Either the text or the tables must be revised, based on the criteria which are most appropriate
    d. According to Table 4-9, cadmium was detected above the ecological screening criteria and background. It is unclear why cadmium is not presented in this table.

43. Table 4-5 –
    a. Typographic error. Correct the spelling of the word "factor" in footnote "3."
    b. Typographic error. The footnote for "=" has an incorrect spelling for "indicates."

44. Table 4-6 –
    a. Provide a rationale for why the dissolved (filtered) concentration of selenium in sample NDAJMW02 is nearly twice the concentration of the total (unfiltered) result.
    b. Typographic error. The footnote for "=" has an incorrect spelling for "indicates."

45. Table 4-7 - Typographic error. The footnote for "=" has an incorrect spelling for "indicates."

46. Page 4-36, Table 4-9 - Section 4.1.4 states that surface soil results are compared to the EPA Region 9 leachability criteria for soil based on a DAF of 20. However, Table 4-9 shows the data being compared to EPA Region 9 leachability criteria for soil based on a DAF of 10. Either the text or the tables must be revised, based on the criteria which are most appropriate.

47. Table 4-8 - Typographic error. The footnote for "=" has an incorrect spelling for "indicates."

48. Table 4-10 – See prior comment Table 4-1 which requires an explanation as to why total iron in groundwater was non-detect at 83.5 ug/L and filtered iron, presumably from the same sample, was detected at 801 ug/L and notes inconsistency with text on Page 4-13, Paragraph 6 where the 801 ug/L concentration value is referred to as a total (unfiltered) iron concentration.

49. Table 4-11 - Typographic error. The footnote for "=" has an incorrect spelling for "indicates." It is unclear why base-wide background was not presented in this table in addition to the site-specific background, as was done in Tables 4-10 and 4-12.

50. Page 4-39, Table 4-12 – Table 4-3 lists a background concentration for p,p'-DDT. Table 4-12 states that a background concentration for this compound is not available or not applicable. This discrepancy must be clarified.

51. Figure 4-5 – This figure summarizes inorganic chemicals above criteria in surface water. Therefore, bis(2-ethylhexyl)phthalate should not be presented on this table since this is an organic chemical and also does not exceed the criteria.

52. Figure 6-3 – Verify that the concentration presented for dissolved iron for sample NDAJMW08 is correct. See prior comments for Table 4-1 and 4-10 concerning discrepancies between the results for total and dissolved iron for this sample, and the inconsistency with text on Page 4-13, Paragraph 6, where the 801 ug/L concentration value is referred to as a total (unfiltered) iron concentration.

53. Page 5-2, Section 5.2, paragraph 4 - Refer to comment on Section 3.6, paragraph 5. Two of the four wells evaluated showed a 0.04-foot daily fluctuation, which is insignificant.

54. Page 5-6, Section 5.4.2.4, paragraph 1 - The detection limits achieved for the 2000 groundwater sampling event were either 4 or 8 ug/L. The detection limit achieved for the 2003 sampling event was 20 ug/L. The conclusion that the presence of this compound is questionable is based on the fact that perchlorate was not detected in the same well at higher detection limits. Considering that the screening criterion is 0.36 ug/L, the only conclusion that can be made is that the detection limits were too high to confirm the previous detection of perchlorate in groundwater. Revise the text accordingly.

55. Page 5-7, Section 5.4.2.4, paragraph 2 - The first sentence states that perchlorate has historically been used as an oxidant in missile and rocket propulsion systems. This statement supports that perchlorate is present in groundwater at the site, and a laboratory should be selected that can achieve sample quantitation limits that are as low as possible, considering that the screening criterion is 0.36 ug/L.

56. Page 5-7, Section 5.4.2.4, paragraph 3 - The last sentence of this paragraph states that "... It is important to note that perchlorate is found in several commonly used laboratory detergents..." A memo from STL is referenced. This memo indicates that disposable bottles and containers eliminates the potential for detection of perchlorate in laboratory blanks due to detergent residues. Considering that perchlorate is a chemical of concern for this site due to historic use of perchlorate in missile and rocket propulsion systems, a laboratory should be selected that uses disposal containers rather than containers that are washed to ensure that perchlorate is not inappropriately eliminated from evaluation in the risk assessment.

57. Page 5-3, Section 5.3 - Several metals identified in soils were also identified in groundwater at this site. Please clarify why leaching of contaminants from soil is considered "probably limited." It is not clear that this pathway is a limited migration pathway considering that the same metals were detected in groundwater and soil.

58. Page 5-4, Section 5.3.3 - This section does not fully describe this migration pathway. The relationship between contaminants in soil and contaminants in groundwater should be discussed. This section should be expanded upon once adequate screening is conducted using appropriate SSL criteria.

59. Page 5-6, Section 5.4.2.1, paragraph 3 - This paragraph should discuss whether these processes are occurring at AOC J. The last sentence states that "Considerable research has been done on the degradation mechanisms and pathways for CVOCs." It is unclear how this research applies to this site. Also, please clarify sentence 6.

60. Page 5-6, Paragraph 4 – The ATSDR references for 1997 in this paragraph appear to be in error because they do not match those provided in the references (Section 9). The reference section includes ASTDR references from a number of dates, including 1997a and 1997b, which refer to toxicological profiles for nickel and hexachloroethane, respectively. The ATSDR toxicological profiles for chloroform and trichloroethene is in fact both dated September 1997 (http://www.atsdr.cdc.gov/toxpro2.html), but the appropriate ATSDR profiles for these compounds are not listed in the reference section.

61. Page 5-6, Section 5.4.2.3 - Clarify whether these processes are occurring at AOC J.

62. Page 5-6 to 5-7, Section 5.4.2.4 - Clarify whether the processes are occurring at AOC J.

63. Page 5-7, Section 5.4.2.5, paragraph 1 - This paragraph should include a discussion of the migration to groundwater pathway and exceedances of the appropriate SSL criteria (at a DAF of 1). Also, Tables 2.1 and 2.2 of Appendix L show that no background concentrations are available for metals in surface and subsurface soil. Please clarify this apparent discrepancy with the statement made in this paragraph that only iron, lead, manganese, and thallium exceeded their respective background levels.

64. Page 5-7, Section 5.4.2.5, paragraph 3 - The first sentence should be revised. Exceedances of background concentrations by up to an order of magnitude indicates the presence of contamination unrelated to background, considering there is only one background sample and statistical comparisons cannot be conducted. The extent to which inorganics exceed background concentrations should be more accurately represented or the sentence should read that there were exceedances of background concentrations for inorganics in surface water. Those chemicals that exceed the background concentration should be identified.

65. Page 5-7 to 5-9, Section 5.4.2.6 - Clarify whether the processes discussed in this section are occurring at this site. Also, other metals were detected in soil and groundwater at this site (aluminum, arsenic and vanadium). These metals should be discussed in this section.

66. Pages 5-9 to 5-13, Section 5.5 - This section should be revised to include all appropriate chemicals once chemicals detected at the site are screened against appropriate SSL criteria (at a DAF of 1).

67. Pages 5-11 to 5-3, Section 5.5.2 – As indicated in comment to Pages 5-9 to 5-13, Section 5.5, this section should be revised to include all appropriate chemicals once chemicals detected at the site are screened against appropriate SSL criteria (at a DAF of 1). The conclusions of this section are not consistent with data which indicates migration of

metals from soil to groundwater. Include a discussion of those chemicals detected in soil and groundwater and the chemical and physical processes that are occurring site-specifically that may cause continued leaching of site contaminants from soil to groundwater.

68. Table 5-3 – Explain why total iron in groundwater was non-detect at 83.5 micrograms per liter (ug/L) and filtered iron, presumably from the same sample, was detected at 801 ug/L. Note that on Page 4-13, Paragraph 6, the 801 ug/L concentration value is referred to as a total (unfiltered) iron concentration. Tables 4-1 and 4-10 also presents the 801ug/L concentration as a dissolved phase concentrations and non-detect (83.5 U ug/L) for the total concentration.

69. Figure 5-1 - A construction worker may also be exposed to surface soil via ingestion, dermal contact and inhalation of particulates and volatiles. Add these exposure pathways and this receptor for surface soil. A construction worker may also be exposed to groundwater via ingestion and dermal contact. Add these exposure pathways and this receptor for groundwater. Exposure to surface water via ingestion and dermal contact by residents is a complete exposure pathway. Add these exposure pathways for the recreational receptors. A future residential exposure scenario is assumed for this site. Therefore, it is not questionable that ingestion, dermal contact and inhalation of surface soils are complete exposure pathways under this scenario. Replace question marks with "Xs." Revise Table 1 of Appendix L accordingly.

70. Page 6-3, Section 6.4, paragraph 1 - The PREQB Water Quality regulations require that groundwater meet numerical water quality criteria provided in Section 3.1.9. Salinity is not used as criteria for determining if groundwater is considered potable under PREQB regulations.

71. Page 6-4, Section 6.5.1, paragraph 2, second bullet - The use of industrial PRGs to screen detected chemicals for construction worker exposure is inappropriate, especially for noncarcinogenic compounds where higher contact rates result in higher potential risks. The use of screening criteria should not be used to eliminate chemicals from quantitative evaluation for the construction worker exposure scenario. For the construction worker exposure scenario, all chemicals should be evaluated quantitatively due to the lack of screening criteria.

72. Page 6-4, Section 6.5.1, paragraph 2, third bullet - PREQB's standard for total dissolved solids is 10,000 mg/l. Provide documentation that groundwater TDS exceeds this value; otherwise, groundwater is considered potable and the wording should be revised to indicate that here and throughout the document.

73. Page 6-5, Section 6.5.1, paragraph 3 - The first sentence states "A detected chemical without a screening criterion was qualitatively evaluated to determine whether it should be considered a COPC…" A list of those chemicals should be provided in this paragraph. Also, a reference to the section where this qualitative evaluation is discussed should be provided.

74. Page 6-5, Section 6.5.1, paragraph 4 - Tables 2.1 and 2.2 of Appendix L shows that background concentrations for metals in surface and subsurface soil are not available. Clarify the statement that "...all inorganic chemicals (aluminum, arsenic, iron, manganese, thallium, vanadium) identified as COCPS also occur commonly in the background." If no background concentrations are available for these metals, the statement should be revised accordingly. Chemicals detected in subsurface soil should be retained for quantitative evaluation for the construction worker exposure scenario. Refer to comment on Section 6.5.1, paragraph 2.

75. Page 6-6, Section 6.6.1, paragraph 2 - Exposure factors from RAGS Part E should be used to evaluate dermal exposure. Add this reference to the list of sources.

76. Page 6-7, Section 6.6.1.1 - Dermal exposure to groundwater may occur. A well may be installed to be used for watering or hand-washing. Therefore, dermal contact and incidental ingestion should be evaluated for the maintenance worker receptor. Otherwise, an institutional control should be placed on the property indicating that potable and non-potable use of groundwater is prohibited.

77. Page 6-7, Section 6.6.1.2 - Tidal influence on groundwater levels ranges from 0.04 to 0.2 feet (refer to Section 3.6 for further details). It is unclear how this minor groundwater fluctuation precludes future construction at this site. Please clarify the first sentence of this section. Refer to comment on Figure 5-1 for additional exposure pathways that should be evaluated for the construction worker. Refer to comment on Section 6.5.1, paragraph 2. All chemicals detected in subsurface soil should be retained for quantitative evaluation for the construction worker exposure scenario. Table 4.7 of Appendix L shows an exposure frequency of 52 days. This value should be changed to 125 days, as specified in this section.

78. Page 6-8, Section 6.6.1.4, paragraph 2 - This paragraph states that the exposure frequency is both days of the weekend, every weekend of the year, which equals 104 days. Table 4.7 states that the exposure frequency is 52 days per year. The combined exposure duration for the recreational receptor is 40 years, which is overly conservative. The adult recreational receptor exposure duration should be revised to 14 years. Table 4.7 and the risk assessment calculations should be corrected to 104 days per year for the adult, youth and child recreational receptors

79. Page 6-8, Section 6.6.1.5 - This paragraph states that occasional flooding occurs at the site. However, the site characterization presented in Section 2 does not mention flooding of the site, rather that the "ditch" opens to the ocean during heavy rain events. Clarify whether flooding occurs at this site and provide supporting documentation for regulatory review.

80. Page 6-9, Section 6.6.2.6 - Section 6.6.1 states that the RME levels from EPA guidance will be used to estimate exposures. The RME values for dermal exposure to groundwater

via bathing or showering are 0.58 hour and 1.0 hour for an adult and child, respectively. These values should be used in the risk assessment to represent the RME exposure.

81. Page 6-10, Section 6.6.2.9 - The default PEF is not appropriate for construction worker exposure. The EPA guidance referenced in this section provides a method for calculating a PEF for construction worker exposure.

82. Pages 6-12 to 6-3, Section 6.8 - The risks for each receptor should be revised to reflect the substantive changes requested. The addition of exposure pathways and corrected exposure parameters will affect the resulting cumulative risks for receptors.

83. Page 6-12, Section 6.8, paragraphs 2 and 3 - These paragraphs discussing or stating what risk management decisions should be are not appropriate. Remove these paragraphs. Information concerning uncertainty should be presented in an Uncertainty section of the HHRA. Statements of how regulatory agencies should make risk management decisions should be removed from the report as they are misleading and may misrepresent ultimate risk management decisions made at this site.

84. Page 6-13, Section 6.8, paragraph 6 - The equations and exposure parameters for this receptor need to be revised to reflect the appropriate exposure frequency, PEF and VF. Ingestion and dermal contact with groundwater need to be evaluated for this receptor.

85. Page 6-13, Section 6.8, paragraph 7 - The risks for the various ages should be combined to represent cumulative risks to a recreational receptor over 30 years. The exposure durations for all receptors should sum to 30 years. Currently, the exposure duration is 40 years.

86. Page 6-13, Section 6.8, paragraph 8 - The risk for the child and adult resident should be combined to represent overall risk to a residential receptor.

87. Pages 6-14 to 6-18, Section 6.10 - The report should provide a discussion of the appropriateness of the background surface and subsurface soil data used for comparison to site data as the conclusions of the HHRA rely on metals being within the range of background concentrations.

88. Page 6-15, Section 6.10.1 - Exposure to subsurface soil by a construction worker for all chemicals detected should be conducted. Industrial PRGs are not appropriate screening criteria for a construction worker exposure scenario.

89. Page 6-15, Section 6.10.1.1 - Clarify what is meant by "... the site background maximum level is less than the maximum iron level in the background..."

90. Page 6-15, Section 6.10.1.2 - According to the data provided in Appendix I, vanadium was also detected in subsurface soil. This data should be discussed in this section.

91. Page 8-7, Paragraph 4 – The continued presence of solid waste and debris is potentially hazardous to public safety through physical harm and may also impact public welfare. Allowing the debris to remain in place will require protective measures and is not a No Action alternative. Maintenance on limits to site access such as fencing or institutional controls in the foreseeable future to prevent risk of physical harm will be required for site closure if all potentially harmful debris and solid waste is not removed.

92. Page 8-7, Section 8.2 - While detected contamination associated with the AOC J disposal area may have been found to be limited during the one to two rounds of sample collection performed to date, this is not a sufficient data set upon which to determine no further action is warranted at the site. Due to the absence of detailed information as to disposal practices and potential contents of waste within AOC J, a long term monitoring program must be implemented to assess whether site conditions change. This program should include, as a minimum, quarterly or semiannual ground water sampling and analysis over a number of years.

    Although unacceptable elevated risks may not be identified based on the limited sampling and analysis conducted to date, given the nature of AOC J as a disposal area, consideration of certain remedial actions are warranted. As with any typical solid waste landfill, AOC J appears to be impacting local ground water quality, as indicated by low dissolved oxygen values and elevated concentrations of certain inorganics. Therefore, isolation of the waste material needs to be considered. A focused feasibility study is recommended to evaluate potential landfill covers and/or consolidation remedial actions.

93. Page 9-7, Citation 13 – Typographic Error. The author "Mem" should be "Hem."

94. Page J-2, Appendix J, Paragraph 5 – The text states that the data set were reviewed for dilution factors that might affect data usability. However, the evaluation provided in Appendix J has no discussion on this review element.

95. Page J-2, Appendix J, Paragraph 5 – Exhibits 3 and 4 which are referenced in the text were not provided.

96. Table 1, Appendix J - Replace the word "trespass" with "recreate" in the Rationale for Selection or Exclusion of Exposure Pathway column for recreational receptors. It is inappropriate to state that recreational users of a potential recreational or residential area are trespassing.

97. Table 4.7, Appendix L - The exposure duration for the construction worker should be 1 year and the exposure frequency should be 125 days/year to yield 125 days of exposure. As shown in this table, the exposure duration is 0.5 years and the exposure frequency is 52 days resulting in 26 days of total exposure. This is not protective of construction worker exposure. Also the particulate emission factor (PEF) and volatilization factor (VF) for a construction worker exposure scenario should be calculated in accordance with current EPA guidance (EPA, 2001). The dataset for the construction worker should be comprised of surface and subsurface soil.