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COMMONWEALTH OF PUERTO RICO
OFFICE OF THE GOVERNOR
ENVIRONMENTAL QUALITY BOARD

August 4, 2004

Mr. Christopher T. Penny P.E.
Navfac Atlantic
Installation Restoration Section
Code EV23: Attn: Christopher T. Penny P.E.
6506 Hampton Blvd
Norfolk, Va 23508-1276

Dear Mr. Penny:

The Puerto Rico Environmental Quality Board (EQB) submits to the U.S. Department of the Navy the comments contained herein regarding "***Draft Remedial Investigation Report Solid Waste Management Unit (SWMU) 7, Former Naval Ammunition Support Detachment***" for the West Side of the Vieques Island.

Also, enclosed are comments on the March 2004 "Draft Remedial Investigation Report SWMU 7" prepared by EPA.

Some of our arguments are:

1- Many of our comments could have been avoided with a more careful proof reading, since they are just typographical or editing mistakes.
2- Perchlorate is a very serious topic and close attention should be given to any detection. If there is any doubt, a more careful evaluation should be given to this contaminant.
3- Once again, the soil sampling depth is being questions. This should be addressed in a site-specific base, especially if we are dealing with a sensitive ecosystem or with bodies of water.

If you have any questions or comments, do not hesitate to contact me at 787-365-8573.

Cordially,

Yarissa Martínez
Vieques and Culebra Affairs Coordinator
Cc/ Susan Silander, Fish & Wildlife Services
Daniel Rodríguez, CEPD

Enclosure

EQB Technical Comments
Draft Remedial Investigation Report
Solid Waste Management Unit (SWMU) 7
Former Naval Ammunition Support Detachment
Vieques Island, Puerto Rico
March 2004

I. INTRODUCTION

EQB has reviewed and provides the attached comments to the Draft Remedial Investigation Report for Solid Waste Management Unit (SWMU) 7, dated March 2004.

The RI Report presents the results of the Remedial Investigation (RI) conducted for SWMU 7 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/Feasibility Study Work Plan for Solid Waste Management Unit (SWMU) 6, SWMU 7, Area of Concern (AOC) H, and AOC J, July 2003. EQB provided 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 to Naval Facilities Engineering Command on April 21, 2003 who finalized the RI Work Plan considering the comments.

The SWMU 7 RI Report finds that the site conditions at SWMU 7 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. Screening was conducted on subsurface soil using industrial PRGs, yet the risk assessment evaluated subsurface soil for residential exposure. Less conservative screening criteria should not be used to eliminate chemicals from consideration for environmental media that are evaluated for residential exposure in the risk assessment. Subsurface soil should be screened using residential PRGs, and the risk assessment revised to include any chemicals that exceed the residential PRGs in subsurface soil.

2. The risk assessment relies on soil data collected from discreet depths (0 to 6 inches) and 4 to 6 feet below ground surface (bgs) to characterize risks to current and future receptors to soil from zero to 10 feet below ground surface. No rationale is provided for the selecting of the subsurface soil sample depths. The depths should coincide with the highest contaminant concentrations. There is also a data gap for surface soil: surface soil is characterized as 0 to 2 feet, yet no data exists for soils from 6 inches to 2 feet bgs. This is of greatest concern for volatile chemicals, which volatilize from superficial soils, yet may be present in soils deeper than 6 inches bgs.

3. The risk assessment text and RAGS Part D tables are not consistent and present two different risk assessments for the residential receptors. The text states that residential receptors are assumed to be exposed to surface soil, yet the RAGS Part D tables show that residential receptor exposure to subsurface soil was evaluated. The text should be revised to reflect the actual risk assessment that was conducted. The revised risk assessment should be provided to the regulatory agencies for review and approval.

4. Perchlorate detection limits are potentially not low enough to conclude that perchlorate is not present at the site. Residential risks from exposure to groundwater are elevated (HI=8.8), in part

due to perchlorate at an estimated concentration of 2.4 ug/L. Based on the detection limits for other sites, it is likely that the detection limits for this site is 20 ug/l. The appendices should be reviewed to determine the detection limit for perchlorate.

5. According to EPA guidance (1989), "...background samples are collected at or near the site in areas not influenced by site contamination but in areas that do have the same basic characteristics as the medium of concern..." The data used to characterize background soil conditions at a particular site should be collected from soil having the same basic characteristics. Documentation should be provided that shows that the soils from which the background soil samples selected for comparison to site soil data have the same characteristics as the soil from which samples were collected at this site. Note that background surface soil sample data should not be combined with subsurface background soil sample data.

Page-Specific Comments

1. Page ES-2, Paragraphs 4 and 5 – Clarify the discrepancy between paragraphs 4 and 5 regarding pesticides. Paragraph 4 states "Pesticides...were not detected above their applicable screening criteria is soil" whereas paragraph 5 identified DDE and DDT in excess of screening criteria in soil

2. Page ES-3, Paragraph 6 – Clarify why only one PAH in soil is considered a COPC when on page ES-2 (paragraph 5) two PAHs (benzo(a)pyrene and pyrene) were identified in excess of screening criteria in soil.

3. Page 2-1, Paragraph 4 – A significant risk to safety exists at a site if a release condition poses a threat of physical harm or bodily injury to people. Furthermore, conditions at a site that preclude the full use of a resource should be evaluated as posing a risk to public welfare. The continued presence of scrap metal and debris at SMWU-7 may present such risks.

4. Page 2-1, Section 2.2.1 – The report indicates that used batteries were identified in the waste yet in the next sentence indicates that no known hazardous material or waste disposal occurred at the site. These descriptions do not appear consistent as batteries often contain hazardous materials.

   The description of the waste is inadequate. The authors should attempt to describe the volume of waste present in cubic yards disposed and describe whether the waste is mostly surface disposed or buried. The authors should also identify the types of batteries disposed (e.g., mercury, nickel cadmium, alkaline, lead-acid etc) and quantity of batteries observed. The authors should also identify if there are other hazardous materials present such as light bulbs, electrical transformers and capacitors and other kinds of materials typical of Navy operations.

5. Page 2-3, Section 2.3.4 – There is no discussion of the silty gravel with sand (SGS) layer encountered in the well borings.

6. Page 2-4, Section 2.3.5 - The discussion of site hydrology is too limited. There is no discussion of vertical groundwater gradients, potential for perched water bearing units, hydraulic gradient calculations, effective porosity, hydraulic conductivity, ultimate discharge points, recharge rates, interactions between aquifer and surface water features, groundwater divides or basins, or discussion of the water quality classification for the underlying aquifer and its implications.

7. Page 2-5, Section 2.6.1 – Whenever new acronyms are first used the authors should identify the acronyms meaning. For example Confirmation Study (CS). When so many different acronyms are used repeatedly in reports like these it might make sense to have a summary page defining all the acronyms used in the report upfront.

   The CS description paragraph does not refer to the detection of perchlorate

8. Page 2-5, Section 2.6.2 – Include the depths of surface and subsurface soil samples collected

during the Expanded PA/SI since these samples were evaluated in the HHRA.

9. Page 2-5, Section 2.6.2 – Describe whether the replacement wells were placed near the original position of the lost well or whether they were placed at a different locations.

10. Page 2-5, Paragraph 6 and Page 2-6, Paragraph 1 – Correct the reference to the Region 3 RBCs in these paragraphs because it is inconsistent with the overall discussion of the nature and extent of contamination, which compares sampling data to Region 9 PRGs (where appropriate). The nature and extent of contamination discussion in Section 4 does not discuss the Region 3 RBCs.

11. Page 2-6, Paragraph 4 – See comment to Page 2-1 regarding the potentially significant risk to safety posed by scrap metal and other solid waste and potential risk to public welfare.

12. Page 2-6, Paragraph 7 - Clarify the discrepancy between the cited reference (ESE, 1988) and the 1986 date on the Environmental Science and Engineering, Inc. citation in Section 9 (References).

13. Figure 2-2 – Typographic Error. Correct the spelling of "Puerto Rico Conservation Trust" in the legend of this figure.

14. Figure 2-4 – The arrow pointing to the outline of SWMU 7 should indicate that it is the "restricted access boundary for SWMU 7 "rather than "SWMU 7" for consistency. The legend refers to SWMU –6 instead of SWMU-7.

15. Figure 2-5 - Well MW-08 appears to be screened below the saprolite instead of across the saprolite as the other down gradient wells were constructed. This may indicate that MW-08 is not a representative background well. Some wells penetrated a silty gravel with sand layer. Was a potentially perched water unit encountered in this unit?

16. Page 3-2, Section 3.2.2, Paragraph 4 – The text states that subsurface soil samples were analyzed for PCBs. There was no PCB results presented for subsurface soil samples in Appendix I. The text should be modified to include only the analyses, which were performed, or Appendix I should be modified to include the PCB results of these samples.

17. Page 3-5, Paragraph 6 – Note that the range of purging rate exceeds the upper end of the flow rate recommended in the EPA Region II Groundwater Sampling Procedure, Low Stress (Low Flow) Purging and Sampling (GW Sampling SOP Final March 16, 1998).

18. Page 3-6, Section 3.4.1, Paragraph 2 – The text states that the two new sediment samples were collected for VOC and SVOCs. There were no VOC or SVOC results presented for sediment samples collected in 2003 in Appendix I. The text should be modified to include only the analyses performed or Appendix I should be modified to include the VOC and SVOC results of these samples.

19. Page 3-7, Section 3.6 – Provide a figure illustrating the extent of the geophysical survey and any associated anomalies overlaid with surface and subsurface soil sampling locations and groundwater monitoring locations.

20. Figure 3-1 – The figure shows two samples with the same identification (NDW07SD03). The location with this identification at the southern portion of the figure should be changed to NDW07SD01, according to Figure 4-1.

21. Page 4-2, Paragraph 1 - Typographic Error. Correct the reference "EPA, 1999" to read "EPA, 1999a" to be consistent with the reference citation in Section 9 (References).

22. Page 4-4, Bullet 1 - Typographic Error. Correct the reference "EPA (2002)" to read "EPA (2002d)" to be consistent with the reference citation in Section 9 (References).

23. Page 4-5, Bullet 1 - Typographic Error. Correct the reference "EPA (1991)" to read "EPA (1991a)" to be consistent with the reference citation in Section 9 (References).

24. Page 4-4 to 4-6, Section 4.1.3 - Industrial PRGs are not as protective of children or residents as residential PRGs. Since screening is conducted to eliminate chemicals from evaluation in the human health risk assessment, the most conservative screening criteria should be used at this stage. The only impact to the Navy is that additional chemicals may be carried through the risk assessment; however it ensures that cumulative risks are not underestimated. Since the risk assessment evaluated subsurface soil for residential exposure, which is appropriate, the screening of chemicals to evaluate in the risk assessment should be consistent with the risk assessment. Industrial PRGs should not be used for screening media that are then evaluated under a residential exposure scenario. Therefore, residential PRGs should be used to screen subsurface soil. Also, construction activities may bring soil to the surface where they may be spread around the site. The maximum detected concentration or maximum sample quantitation limit for those chemicals that were not detected should be screened against Residential PRGs. Nondetect data should be screened to ensure that the detection limits are below screening levels of concern. The risk assessment should be revised to include chemicals in subsurface soil that were screened out due to the use of less conservative industrial PRGs.

    Provide supporting documentation that shows that using a dilution attenuation factor of 20 is protective for this site. The supporting documentation should include calculations using the equation provided by EPA in the Soil Screening User's Guide (EPA, 1996) that show that a dilution/attenuation factor of 20 is representative of the migration to groundwater pathway for this site.

25. Page 4-6, Section 4.1.4 – The text states that data validation reports were included in Appendix J. However, these reports were not included and should be provided.
    Previous RI reports reviewed provided a discussion in the text of Section 4 on the data usability, which summarized the number of data points rejected, and reasons for the rejection. This discussion should also be included in the SWMU 7 report.

26. Page 4-7, Section 4.2.1.1 - According to EPA guidance (1989), "...background samples are collected at or near the site in areas not influenced by site contamination but in areas that do have the same basic characteristics as the medium of concern..." The data used to characterize background soil conditions at a particular site should be collected from soil having the same basic characteristics. Documentation should be provided that shows that the soils from which the background soil samples selected for comparison to site soil data have the same characteristics as the soil from which samples were collected at this site. Note that background surface soil sample data should not be combined with subsurface background soil sample data.
27. Page 4-7, Paragraph 3 – Typographic Error. Correct the reference "(EPA, 1989)" to read "(EPA, 1989b)" to be consistent with the reference citation in Section 9 (References).

28. Page 4-8 to 4-25 - SSLs should be calculated for those chemicals for which SSLs are not available using the equations provided in EPA guidance (1996).

29. Page 4-8, Paragraph 4 – Typographic Error. Correct the reference "(EPA, 1989)" to read "(EPA, 1989b)" to be consistent with the reference citation in Section 9 (References).

30. Page 4-8 to 4-10, Section 4.2.2.1 – Provide further discussion on the selection of soil sampling depths. Surface soil samples were collected from zero to 6" below ground surface (bgs), and subsurface soil samples were collected from 4 to 6 feet bgs. It is unclear that these sample depths are representative of soils that would likely have the highest contaminant concentrations. A discussion on volatilization of contaminants from surface soil should be included in the discussion along with the applicability of field screening procedures to metals, SVOCs, pesticides, and PCBs.

31. Page 4-9, Paragraph 5 –
    a. Typographic Error. Correct the reference "EPA (1996)" to cite the correct EPA 1996

reference (a, b, c, d, or e) from Section 9 (References).

b. Compare total chromium results to the residential soil PRG for hexavalent chromium as a conservative screening step since speciation data for chromium is not available or presented. This is consistent with the groundwater screening, which also compared sampling results to the hexavalent chromium PRG.

32. Page 4-10, Section 4.2.2.2 – According to pages 3-2 and 4-8, surface soil samples were also analyzed for PCBs and perchlorate. It should be noted that there were no PCB results presented for surface soil samples in Appendix I. The text should be modified to include only the analyses, which were performed, or Appendix I should be modified to include the PCB results. In addition, Section 4.2.2.1 should include a discussion on the perchlorate results.

33. Page 4-11, Section 4.2.2.2 – According to pages 3-2 and 4-11, subsurface soil samples were also analyzed for explosives. Section 4.2.2.2 should include a discussion on the explosives results. Perchlorate detection limits are potentially not low enough to conclude that perchlorate is not present at the site. Based on the detection limits for other sites, it is likely that the detection limits for this site is 20 ug/l. The tap water PRG for perchlorate is 0.365 ug/L. The appendices should be reviewed to determine the detection limit for perchlorate. Perchlorate is a risk driver for this site; therefore, the detection limits for groundwater should be adequate. Proper laboratory procedures and the use of appropriate laboratory containers can eliminate issues associated with laboratory contamination of groundwater samples. Additional sampling should be conducted and analysis performed by a laboratory that can achieve detection limits at or below 4 ug/L.

34. Page 4-13, Section 4.2.2.3 – The text states that a screening criterion was not available for perchlorate. However, an EPA Region IX tap water PRG exists (0.365 ug/L) and was used in Table 4-9. This statement should be eliminated from the text and the text should be modified to discuss the exceedance of the PRG in sample NDW07MW03R from June 2000.

35. Page 4-17, Table 4-3 – The listed Region IX PRG for lead should be changed to 40 (based on a hazard index of 0.1 for non-carcinogens). The two additional samples (NDW07SS03 and NDW07SS04), which exceed the revised PRG, should be added to this table.

36. Page 4-19, Table 4-4 –
    - The table should be modified to also include exceedances of the EPA Region IX Industrial PRGs, as mentioned in Section 4.1.3 for subsurface soils.
    - A row for VOCs should also be added to the table.

37. Page 4-20, Table 4-5 – The table should include the exceedance of perchlorate in sample NDW07MW03R from June 2000.

38. Page 4-22, Table 4-7 - The listed Region IX PRG for lead should be changed to 40 (based on a hazard index of 0.1 for non-carcinogens).

39. Page 4-23, Table 4-8 - The table should be modified to also include the EPA Region IX Industrial PRGs, as mentioned in Section 4.1.3 for subsurface soils.

40. Page 4-24, Table 4-9 –
    - The table should be modified to include dissolved chromium results since dissolved chromium was detected in seven of nine filtered samples above background concentrations, according to Section 4.2.2.3.
    - The background concentrations for dissolved and total manganese should be reversed, according to Table 4-1.

41. Table 4-3 –
    a. Correct the date for the EPA Region 9 PRG references from "2002" to "2002d" to be consistent with the citation in Section 9 (References).
    b. Compare total chromium results to the residential soil PRG for hexavalent chromium as a

conservative screening step since speciation data for chromium is not available or presented.

42. Table 4-4 –
    a. Correct the date for the EPA Region 9 PRG reference from "2002" to "2002d" to be consistent with the citation in Section 9 (References).
    b. Since the conceptual model presented in Figure 5-1 contemplates direct contact with subsurface soil by the construction worker as a potential receptor and indicates that the residential receptor will be included in the risk assessment, subsurface soils should also be screened against the residential soil PRG.

43. Table 4-5 – Correct the date for the EPA Region 9 PRG reference from "2002" to "2002d" to be consistent with the citation in Section 9 (References).

44. Table 4-6 –
    a. The citation "Long, 1995" should be "Long et.al. 1995" to be consistent with the citation in Section 9 (References).
    b. The citation "EPA, 2000" should be "EPA, 2000a" to be consistent with the citation in Section 9 (References).

45. Table 4-7 –
    a. Correct the date for the EPA Region 9 PRG reference from "2002" to "2002d" to be consistent with the citation in Section 9 (References).
    b. Clarify why the value of the residential soil PRG for lead is shaded when none of the lead concentrations shown on the table exceed the PRG.

46. Table 4-8 - Correct the date for the EPA Region 9 PRG reference from "2002" to "2002d" to be consistent with the citation in Section 9 (References).

47. Table 4-9 - Correct the date for the EPA Region 9 PRG reference from "2002" to "2002d" to be consistent with the citation in Section 9 (References).

48. Table 4-10 –
    a. The citation "Long, 1995" should be "Long et.al. 1995" to be consistent with the citation in Section 9 (References).
    b. The citation "EPA, 2000" should be "EPA, 2000a" to be consistent with the citation in Section 9 (References).

49. Figure 4-5 – The exceedance of benzo(a)pyrene at NDW07SS04 should also be presented on this figure.

50. Figure 4-7 – The exceedance of lead at NDW07MW06 should also be presented on this figure.

51. Page 5-2, Section 5.2 – It is more common to use either aerobic or anaerobic to describe the oxygen content of groundwater, please restate as appropriate.

52. Page 5-2, Section 5.2 – The conceptual model should consider physical hazards from the exposed waste such as cuts from exposed metals, cave-ins due to collapsed waste, acid burns or ingestion of exposed waste, spontaneous combustion that may be present from the waste as well as comment on the aesthetic impact of the waste piles and attractive nuisance aspects that might attract visitors/scavengers to the area.

53. Page 5-2, Section 5.2 – The authors should consider outright removal of the waste as one potential solution. Parameters necessary to consider this outcome should be considered.

54. Page 5-2, Paragraph 4 – The attribution of oxic groundwater conditions to sampling technique (i.e., aeration during sample collection) is consistent with the observation that the range of

groundwater monitoring well purging rates exceeds the upper end of the flow rate recommended in the EPA Region II Groundwater Sampling Procedure, Low Stress (Low Flow) Purging and Sampling (GW Sampling SOP Final March 16, 1998. Aeration of the samples could bias parameters such as VOCs, which can be stripped from groundwater samples that are aerated, and metals, which can change valence under oxygen rich conditions and precipitate from solution.

55. Page 5-2, Section 5.3 - Whether current media concentrations exceed risk-based screening criteria is irrelevant to determining if a migration pathway exists that may continue to transport contaminants from one media to another. An evaluation of migration pathways should be done for the purpose of determining what media are likely to be impacted and if future concentrations of contaminants in the receiving media may increase due to on-going migration of contamination. Address these issues in this section.

56. Page 5-2 to 5-3, Section 5.3.1 - The last sentence states that VOCs did no exceed screening criteria in surface or subsurface soil. However, the statement does not clarify which screening criteria were used. Screening against SSLs were done in Section 4, and screening against industrial PRGs is conducted in Section 6. Include a reference to the type of screening to which this section refers.

57. Page 5-4, Section 5.4.1.1 - Kd is pH-dependent for metals and ionizing organics. Therefore, this section should include a discussion of Kd for metals and the effect pH has on the mobility of metals.

58. Page 5-6, Paragraph 3 – The citation "Howard, 1991" should be "Howard et.al., 1991" to be consistent with the citation in Section 9 (References).

59. Page 5-6, Paragraph 4 – Provide references, where appropriate, for the information concerning PAH metabolism, etc., in this paragraph.

60. Page 5-6, Paragraphs 5 and 6, and Page 5-7, Paragraph 1 – Provide references, where appropriate, for the information concerning the fate and transport characteristics of chlorinated pesticides.

61. Page 5-7, Paragraph 3 – Provide references, where appropriate, for the information concerning metals mobility, complexes, hard and soft electron fields, etc. in this paragraph.

62. Page 5-8, Paragraph 5 – Provide references, where appropriate, for the information concerning the bioaccumulation of aluminum and barium.

63. Page 5-8, Paragraph 7 – Provide references, where appropriate, for the information concerning lead mobility and removal from solution.

64. Page 5-9, Paragraph 1 – Provide references, where appropriate, for the information concerning the bioaccumulation of cadmium, lead, zinc, nickel and cobalt.

65. Page 5-9, Paragraph 2 and 3 – Provide references, where appropriate, for the information concerning the fate and transport of iron and manganese.

66. Page 5-9, Paragraph 4 – Correct the third sentence to singular tense. The paragraph discusses only one metal (copper).

67. Page 5-9, Paragraph 5 – Provide references, where appropriate, for the information concerning the fate and transport of thallium.

68. Page 5-9, Paragraphs 7 and 8; Page 5-10, Paragraphs 1 and 2 – Provide references, where appropriate, for the information concerning the fate and transport of arsenic, chromium and vanadium.

69. Page 5-10, Section 5.5, paragraph 1 - Clarify which screening criteria are being referred to in this

paragraph and throughout the report, since two different screening approaches are presented, one for the migration to groundwater migration pathway and one that uses risk-based criteria.

70. Page 5-11, Paragraph 1 – Present specific information substantiating the presence of turbidity in the unfiltered samples. The well development and groundwater sampling logs do not indicate the presence of excessive turbidity. Turbidity values at the end of purging ranged from 0.97 to 7.39 NTUs. The median turbidity value reported at the end of purging was 4.4 NTU.

71. Page 5-11, Paragraph 3 – Provide a reference that documents how manganese in soil is by native soil bacteria as a terminal electron acceptor and the role of microbiological processes in elevating dissolved manganese concentrations in groundwater.

72. Table 5-1 – Typographic Error. The reference "Mem, 1985" in the table footnote should be spelled "Hem, 1985." This needs to be corrected in this table as well as in Section 9 (References).

73. Table 5-2 –
    a. Correct note "2" to replace "Kow" with "Koc." Kow values are not presented in the table.
    b. Note "2" should be corrected to note the exception of providing a Henry's Law constant (H) for mercury.
    c. Note "3" regarding perchlorate chemical properties is not required and should be deleted.
    d. The sources "d" (Spectrum Laboratory) and "e" (Mackay et al., 2000) are not used in this table and should be deleted.
    e. The acronym "SVOC" should be spelled out in the footnotes.

74. Figure 5-1: All exposure pathways are complete exposure pathways for residential receptors. Remove all "?" for the residential receptors and change to "X" to indicate a complete exposure pathway for surface and subsurface soil, including root uptake. Humans and animals both ingest plants, and the evaluation of homegrown produce is appropriate for a residential exposure scenario. The conceptual site model is used to identify exposure pathways that should be evaluated in the risk assessments. Unless it can be determined that future residential use will not occur, residential land use is a future use and is not a "questionable scenario for comparison purposes only." Remove the "?" symbol from the legend along with its definition. This conceptual site model should be consistent with the RAGS Part D conceptual site model provided in Appendix L that shows the appropriate exposure pathways being quantified.

    The construction worker is exposed to surface as well as subsurface soil for all exposure pathways except for root uptake as he or she does not spend all their time in an excavation. Add "Xs" to all surface soil exposure pathways for the construction worker except for root uptake. Exposure to surface soil for the construction worker should be evaluated in the risk assessment. Revise the risk assessment accordingly and resubmit to the regulatory agencies for review.

    Supporting documentation should be provided that shows that no ecological receptors will be exposed to soil greater than 6 inches bgs. If burrowing animals are present or have the potential to be present at the site, then additional site characterization is needed to characterize soil from 6 inches bgs to burrowing depths.

    Future dermal and ingestion exposure to groundwater should be assumed for an industrial worker and maintenance worker. Put "Xs" in these boxes.

    The risk assessments should be revised to evaluate all relevant exposure pathways and exposure media as discussed in the above comments.
    The risk assessment text and this table are not consistent with the risk assessment presented in the RAGS Part D tables. The text should be revised to reflect the actual risk assessment that was conducted. Exposure pathways and media were evaluated in the RAGS Part D tables that are stated as being excluded from evaluation in the text. The revised risk assessment should be provided to the regulatory agencies for review and approval.

75. Pages 6-2 to 6-3, Section 6.2 - Refer to comments on Figure 5-1. Also, revise the sixth sentence to state that residents and recreational users are potential receptors.

76. Page 6-4, Section 6.5, paragraph 2 - The depth at which samples were collected is important for the purpose of determining appropriate exposure point concentrations. Provide a summary of the depths at which surface and subsurface soil samples were collected and a reference to the table or appendix where specific information on sample depths is provided. Section 3 states that surface soil samples were collected from the surface to 6 inches below ground surface, yet surface soil is characterized as extending to 2 feet below ground surface for the risk assessment. There is a data gap from 6 inches to 2 feet and conclusions about the risk associated to this depth cannot be made if soil has not been characterized to this depth. This is especially true for volatile chemicals, which do not remain in shallow surface soil. For subsurface soil, Section 3 only states that "...a hole was advanced to a depth of up to 4 feet bls...a 3 inch diameter split spoon was driven an additional 2 feet from the bottom of the boring..." Therefore, it appears that subsurface soil samples represent soils from 4 to 6 feet bgs, as far as can be determined from the report. If this is true, there is a data gap from 6 inches to 4 feet below ground surface. Additional documentation that the highest concentrations of subsurface contamination are present at 4 to 6 feet below ground surface should be provided to ensure that the conclusions of the risk assessment apply to subsurface soil in general, rather than just soil located at 4 to 6 feet bgs.

77. Page 6-5, Section 6.5.1, paragraph 1 - The screening criteria used in Section 4 for comparison to subsurface soil were the migration to groundwater screening criteria. Clarify this in the first sentence. Also, residents may be exposed to subsurface soil. Therefore, subsurface soil should be screened using Residential PRGs, and exposure point concentrations for soil should be representative of surface and subsurface soil concentrations. The risk assessment text should be revised to include subsurface soil as an exposure medium for residential receptors.

78. Page 6-6, Paragraph 2 - – Explain why lead was not selected as a groundwater COPC. Page 4-12, paragraph 7 of the text notes the lack of Region 9 tap water PRG, but substitutes the drinking water treatment technique action limit (TTAL) for lead as a screening criterion. Lead detected in groundwater exceeded the TTAL and therefore should have been carried forward as a COPC.

79. Page 6-7, Section 6.6.1, paragraph 4 - Dermal exposure should be evaluated in accordance with EPA's Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim, dated September 2001. Construction worker exposure should be evaluated in accordance with EPA's Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, dated March 2001. Add these to the list of guidance documents in this section.

80. Page 6-9, Section 6.6.1.5 - Residential receptors may be exposed to subsurface soil that is brought to the surface during construction activities. This will result in surface soil contaminant concentrations that are impacted by subsurface soil. Subsurface soil may also be disposed of off-site in areas where children may be exposed. Therefore, the risk assessment text should be revised to include an evaluation of exposure to subsurface soil by residential receptors to ensure that the risk management decisions made are protective of human health for future potential exposures. Table 1 in Appendix L shows an evaluation of subsurface soil for residential receptors. The text and risk assessment should be consistent with the RAGS Part D table.

81. Page 6-10. Section 6.6.2.4 - The risk assessment should evaluate the reasonable maximum exposure (RME). Therefore, the RME exposure duration should be consistent with RAGS Part E RME values (1.0 and 0.58 hours for a child and an adult), not central tendency values (0.45 and 0.25 for a child and adult). Revise the risk assessment accordingly.

82. Page 6-10, Section 6.6.2.5 - The inhalation rate for a construction worker should be provided in the text. The PEF for construction workers is different and should be calculated in accordance with the EPA's Supplemental Soil Screening guidance.

83. Pages 6-16 and 6-17, Section 6.10.1.1 - Based on comparison to background, iron appears to be a site related contaminant. A lack of distinct pattern of distribution and apparent lack of correlation between know debris disposal and soil sampling results could be attributable to several factors. Sampling bias and the randomness of waste disposal, both spatially and in time, could result in an apparent lack of spatial pattern to the contamination. The complete decay of metallic debris deposited at the site 30 to 40 years ago, especially smaller articles, could explain the apparent lack of correlation between the analytical results and "visible" debris disposal. Also, the articles disposed at the site are likely to have variable potential to decay depending upon the type or grade of iron/steel and the relative effectiveness of anti-corrosion agents or paints. In addition, contaminated soil migration via the surface runoff pathway, which is acknowledged as a potential route of migration in Section 5.3.2 of the document, could influence the spatial pattern of contamination and explain why high concentrations of iron were found outside the waste boundary.

84. Page 6-22, Paragraph 1 – Due to elevated perchlorate detection limits in groundwater, the presence or absence of perchlorate above levels of human health concern cannot be determined with certainty. Additional perchlorate analyses should be performed at an appropriate detection limit to determine the presence or absence of perchlorate at concentrations of concern.

85. Page 7-11, Section 7.3.4.1, paragraph 1 - EPA has developed ecological soil screening guidance and levels (Eco SSLs) that should be used to screen soils. The latest publication is a memo from the Office of Solid Waste and Emergency Response dated December 23, 2003 on the "*Release of Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs) and Eco-SSLs for Nine Contaminants*." This resource should be consulted first, followed by the resources identified in this section.

86. Page 7-12, Section 7.3.4.2, paragraph 2 - Several of the laboratory studies upon which NOAELs were derived are subchronic studies. Provide additional detail on what was done to convert NOAELs based on subchronic studies to chronic NOAELs. An additional uncertainty factor of 10 should be used to convert subchronic toxicity criteria to chronic criteria. The NOAELs should be reviewed to ensure that this uncertainty factor is included in the NOAELs presented in Tables 9 and 10. If an additional uncertainty factor should be incorporated into the NOAEL, the screening level assessment and the baseline ERA should be evaluated to determine if the application of the uncertainty factor to subchronic studies results in unacceptable risks to the identified assessment endpoints.

87. Page 7-15, Section 7.4.3.1, paragraph 4 - Clarify whether other soil samples were collected in the ditch in the vicinity of the sample with the maximum copper concentration that demonstrate that this concentration is an isolated, elevated concentration and not indicative of a hotspot.

88. Page 7-17, Section 7.5, Ingestion Screening Values, Bullet 4 - As discussed previously, clarify whether subchronic NOAELs were used as chronic values, thereby likely underestimated risk.

89. Page 7-30, Table 7-8 - Provide references for the dietary composition percent distributions among terrestrial plants, soil invertebrates and small mammals.

90. Page 8-4, Section 8.1.2.3 – There is a correction mark in the margin.

91. Appendix L, Table 4.6 - The PEF should be calculated for the construction worker as commented in the comment on Section 6.6.2.5.

EPA's Comments
Draft Remedial Investigation Report
Solid Waste Management Unit (SWMU) 7
Former Naval Ammunition Support Detachment
Vieques Island, Puerto Rico

General Comments:

1) The exposure pathways evaluated in the ERA included direct exposure of wildlife to contaminants in the soil, as well as soil contaminants potentially accumulating in the onsite food web. The Step 3 refinement process indicated that there were low risk estimates for site-related chemicals and therefore no additional ecological studies or sampling are recommended for SWMU 7. While we do not disagree with these conclusions, it is our recommendation that if the final RI concludes there are questions or concerns regarding the future stability of that material, it should be removed and properly disposed.

2) It appears that the soil sample locations were chosen using a judgmental approach, concentrating on the perimeter of the dumping area. Since the results of this sampling event were used to make decisions affecting the entire site, it should be noted that this approach is not statistically valid. As stated in EPA QA/G-9, *Guidance for Data Quality Assessments: Practical Method for Data Analysis*, EPA/600/R-96/084, July 2000: A...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.

3) It is mentioned in the report that 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.

4) The Data Quality Assessment (DQA) 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, nor does it provide the process that was used to determine that error. 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.

Specific Comments:

5) Page ES-2: Paragraph 1 states that pesticides, PCBs, and explosives were not detected above their applicable screening criteria in soil. However, Paragraph 2 states that 2 pesticides (DDT and DDE) were identified in surface soil exceeding the screening criteria. Please correct this inconsistency.

6) PageES-2: Paragraph 3 sentence 1 - states several inorganic chemicals were detected in unfiltered samples. Sentence 2 proceeds to list metals found above MCLs and/or RBCs in filtered samples. The metals found in unfiltered samples should also be listed and a brief explanation as to how metal results compare to one another (filtered vs. unfiltered).

7) Page ES-3: In the first paragraph, the text discusses the results of the first round of perchlorate sampling. When discussing the most recent round of sampling, the text states that the sampling "did not indicate the presence of perchlorate... it can be concluded that perchlorate's presence in site media is questionable." How can this be said, when two rounds of data exist that contradict each other? The well should be resampled and reanalyzed using appropriate methods, and a downgradient well should also be sampled to see if perhaps the previous detection was the result of a "slug" of contamination that has moved past the original sampling location.

8) Page ES-4: Paragraph 2 states that the HI for soils was above the target risk range for a residential Adult and Child; list what the target risk range is.

9) Page 1-1: Please note that there are only two objectives not three.

10) Figure 2-5: A number of aspects of the cross-section are not clear. The area marked with blue stippling is noted as the saturated thickness, but the dashed blue line appears to be the water table. Is the stippling noting a change in lithology? It is not clear from the drilling logs in the appendix. However, if this is the case, then MW-08 is in a separate unit and the water level is not comparable to the other wells. In fact, without split spoons or cores profiling the stratigraphy, it is difficult to definitively rule out that this is not tapping a different hydrogeologic horizon. Note also that if it is in a different unit, it is a poor background well for looking at concentrations in the more shallow unit.

11) Page 2-6: The text adopts an approach of stating that contaminants were Aeither not detected or detected below their applicable screening criteria.@ This leaves the issue ambiguous and is not appropriate. Please distinguish between

compounds which were not detected and those that were detected below criteria. This comment has been offered on previous reports; please do not continue to present information in this way.

12) Figure 2-6: Leaving out well MW-08 which may be in a different unit, the groundwater elevation data show that the flow gradient is north to south, away from the shore. This is surprising and may be a transient feature, but should be noted in the text and on the figure.

13) Page 3-1: The section on MEC should be expanded to include some additional information, or note that such information is not available. Specifics on what materials or contaminants might be associated with the detected ORS items should be provided. Also, the text in Appendix A indicates that MEC avoidance was performed only in sampling and work areas. It further notes that 4 sampling locations were adjusted based on indications of metallic materials in the subsurface. Given the presence of ORS in some locations at the site and the necessity to relocate sampling points, there is a real possibility that additional ORS or MEC is present at the site. Subsequently, follow up work should be conducted to clear the area of all such materials.

14) Page 3-2, Section 3.2.2: The text states that perchlorate in soils was analyzed using the method for perchlorate in water. Please verify this method and QA/QC protocol with Region 2's Hazardous Waste Support Section for review and acceptability. The information that should be submitted for review would include the sensitivity, selectivity, precision, and accuracy of the modified method.

15) Page 3-2: Please note that future surface soil sampling should encompass the top 12" rather than the top 6". Data representing the top 0-6" may under- or overestimate actual risk to ecological receptors.

16) Page 3-5: No water level was collected from well MW-06A. Even though it is from a different depth horizon, the level should have been collected. It would provide valuable information on vertical flow and in the interpretation of water levels from MW-08. MW-08 was set deeper than other wells and has a significantly higher potentiometric surface. It seems quite possible that a more shallow well at MW-08 would have a potentiometric surface more in line with the other wells which were installed. While this comment does not require any amendment to the report, please be sure that in the future all wells at a site are always gauged.

17) Page 3-4: Please indicate how the drill cuttings were disposed of, rather than only stating that the method was determined based on the IDW plan.

18) Page 3-5: Please indicate what model of Whaler Pump was used in MW-06 in order to demonstrate that it is appropriate for environmental sampling.

19) Figure 3-1: Please note that there are two sample locations indicated as NDW07SD03. The proper sample nomenclature should be noted.

20) Section 3.6 and Appendix H: Reading these portions of the report do not make the results and implications of the geophysics work very clear. A number of questions should be more directly addressed including: whether there appears to be material of concern or fill from dumping in the subsurface - or if surface materials appear to be the only concern; and what is the significance of the waste boundary which is shown extending northeast of the drainage feature and under the road? If the data is suggesting that there is an area of fill here, then this may require further investigation.

21) Section 4.1.4: As has been discussed in the past, all detections of anthropogenic contaminants should be included in summary tables and figures. This was agreed upon just after the document was submitted and should be incorporated in the final draft. Some of the specific comments below note this issue, but it applies to all sampling.

22) Page 4-4: It is unclear whether the drainage ditch is representative of a fresh water environment or a marine environment. If it is a fresh water environment than it is recommended that sediment samples should be screened against values provided in the Ontario Ministry of Environment 1993. *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario* and Smith, S. L., D. D. MacDonald, K. A. Keenleyside, C. G. Ingersoll, and L. J. Field 1996. AA Preliminary Evaluation of Sediment Quality Assessment Values for Freshwater Ecosystems,@ *J. Great Lakes Res.* 22(3):624B638.

23) Page 4-7, Section 4.2.1.3: The document presents a methodology for reducing the number of COPCs by identifying those inorganics that are essential dietary nutrients. The only essential dietary nutrients that Region 2 recommends not be retained for the quantitative risk assessment are calcium, magnesium, potassium, and sodium. This method is not appropriate and should be removed.

24) Page 4-8, Section 4.2.2.1: This section states that leachability criteria were not available for 12 metals (aluminum, calcium, cobalt, copper, iron, lead, manganese, mercury, potassium, sodium, and thallium). Could site-specific leachability criteria be developed for these metals?

25) Page 4-10: The text states that 5 VOCs were detected in 13 surface soil samples and references Table 4-3. As per the previous comment, please indicate what VOCs were detected, as well as the attendant locations and concentrations.

26) Page 4-10: The section which describes SVOCs states that 16 SVOCs were detected, and that there were 12 PAHs and 3 phthalates. This adds up to 15 SVOCs. Please verify the number that were detected.

27) Results for explosives and perchlorate analyses in surface soils are not included in the discussion of results. A review of Appendix I shows that all samples were non-detect for these parameters. Please include this information in the text. For subsurface soils, please discuss the explosives results and provide the location and concentration of the perchlorate detection, as well as full details on the organic detections, giving contaminants, concentrations, and showing locations.

28) Page 4-11, Section 4.2.2.3: The text states that six monitoring wells were installed but only five were sampled. Please explain why all six were not sampled.

29) Page 4-12: The second paragraph states that screening criteria are not available for chromium and lead. Results are then screened against the chromium PRG and the action level for lead. Please amend and clarify.

30) Page 4-13: In the section that describes VOCs, the text states that no VOCs were detected above screening criteria in the groundwater. However, on Page 4-11, the text states that groundwater samples were not sampled for VOCs. Please clarify what chemicals were analyzed in the groundwater.

31) Chapter 4 Figures: It would have been useful to include separate figures for ecological exceedances and human health exceedances.

32) Table 4-5 - indicate MCL values/exceedances as well.

33) Table 4-7 - 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.

34) The executive summary and Section 5.1 note that drums and used batteries were disposed of at the site. Materials such as these could represent a potential for future releases and their removal and proper disposal needs to be considered. This comment is also relevant to Section 8.1.8.

35) Table 5-1 and the attendant text belong in Section 4. Please include ORP, pH, and temperature in the table.

36) Page 5-4: The text notes that high turbidity of unfiltered groundwater may have effected metals results. According to Table 5-1, all samples had quite low turbidity. If turbidity is thought to be influencing results, the data must be presented which proves the case. Show that the more turbid samples have a greater difference between total and dissolved concentrations. Based on the range of turbidities (1-7.4 NTUs), it seems unlikely that this is a valid conclusion.

37) Page 5-6: Please explain the purpose of the last paragraph in Section 5.4.2.2.

38) Page 5-10: It would have been useful to compare surface soil inorganic concentrations to screening values rather than just background concentrations. A discussion of the most downgradient sediment samples should be incorporated. It is noted that chemicals in the site soil may be transported by stormwater runoff to surface soil in the drainage ditch (**Section 5.3.2 Surface Runoff Pathway**, page 5-3) and subsequently to the ditch downstream. Therefore there appears to be a potential for on-site contaminants to be transported off-site.

39) Page 5-11: The text states that MW-04 is within the area where disposal occurred. On the figures, it is outside of the line drawn to indicate the waste boundary. Please resolve the conflict.

40) Page 5-11: In the first paragraph, the text states that there is high turbidity in the unfiltered samples. Is this turbidity measured or observed. If measured, the results should be presented in a table, along with the total and filtered metals results. If observed, the field report which notes the visible turbidity should be referenced.

41) Page 5-11: In the last paragraph, the text states that the first sample for perchlorate reported a concentration and the resample reported nondetect. The conclusions drawn from this are that the original reported value was a false positive. Is there any information to support that this is correct, and that the second result was a false negative?

42) Page 6-3, The text in Section 6.3 states that the land is zoned for low-density and tourism and resource conservation. However, in RAGS D Table 1, future land use is discussed as "not expected to be developed for residential use." Please provide further text to clearly explain this interpretation which is slightly inconsistent with the zoning. Suggested text is included in Comment 20.

43) Page 6-6: In the last paragraph of Section 6.5.1, please explain why another downgradient well was not sampled for perchlorate, and why there is not a recommendation to resample the well once a new method is approved.

44) Page 6-8, Section 6.6.1.3: The text states that industrial workers would be in direct contact with soils. Therefore, the soil ingestion rate should be 100 mg/day. The reference for this is the 2002 Soil Screening Guidance. The use of 50 mg/day is typically used for those commercial workers whose duties are primarily located indoors.

45) Page 6-10, Section 6.6.2.5: The default PEF of 1.36E+9 m^3/kg was developed based on certain parameters such as area size and percent of bare soil at the site. Are these default parameters consistent with SWMU 7? Please provide a table of the default parameters and the site specific information so that EPA can determine if it is appropriate to use the default PEF.

46) Page 6-11, Section 6.6.3.2: This section references Region 3 guidance for evaluating filtered and unfiltered samples. However, this site is not in Region 3. Region 2 recommends quantifying risk using unfiltered samples, then discussing any differences between unfiltered and filtered samples in the uncertainty section.

47) Page 6-12, Section 6.7: Please reference the OSWER Directive 9285.7-53, "Human Health Toxicity Values in Superfund Risk Assessments".

48) Page 6-15, Section 6.9.3: Please revise this section to clarify whether the concern is with relative bioavailability or absolute bioavailability, and how, specifically, this factor might impact the results of the quantitative risk assessment.

49) Table 6-1:
   i. Why are SSLs not calculated for all COPCs?
   ii. What do the footnotes "*" and "**" mean?
   iii. Please clarify if the SSLs are based on migration to groundwater or direct contact.

50) Table 6-4: Please revise the "reason for selection or exclusion" for the residential scenarios to read, "The site is zoned for low-density residential use. Although this use may be unlikely, it is included here as part of the legally permitted land uses. This scenario is also likely to have the highest levels of exposure."

51) Table 6-6: Please include a column that lists the number of data points for each contaminant.

52) Table 6-9: Please clarify why ½ of the detection limit was not used for dissolved iron.

53) Page 7-1: It should be noted in the second paragraph that, as per ERAGs, at the conclusion of Step 2 it may be determined that not enough information is available to make a determination of whether risk exists, and therefore the ERA process would continue on to Step 3 (as noted in **Section 7.1.1 Objectives of the ERA**).

54) Page 7-11: Minimum adult body weights were not used in the SERA, as it is noted that body weights included in Table 7-8 (Step 2) were greater than body weights used in Table 7-15 (Step 3). These values should be corrected.

55) Tables 7-8 & 7-15: Please provide the appropriate reference(s) for the dietary values and body weights provided in this table.

56) Tables 7-12 & 7-18 *Summary of Hazard Quotients for Upper Trophic Level Receptors - Step 2 & Summary of Hazard Quotients for Upper Trophic Level Receptors - Step 3*: The calculations used to determine the dietary ingestion values to support this table, should be provided in an Appendix or in Section 7. Further, the area use factor used for the Step 3 calculations should also be provided.

57) Page 8-1: The ecological risk assessment section (Section 7) should have included data from the two downgradient sediment samples. As noted in Section 5.5, it may be possible for site contaminants to migrate downstream during storm events. An attempt should be made to see if there any patterns to the inorganics data in the sediments, soils, and groundwater.

58) Page 8-5: In the third paragraph, please provide a reference for the text that suggests that the analytical method for perchlorate is "prone to false positive detections".

59) Appendix L: The title for all of the RAGS D tables states that the site is a quebrada. Please revise this text to state that the area is either an intermittent stream or a drainage ditch.

60) Appendix L, Table 5.1: The oral absorption factor for cadmium in water is 5%, as provided in RAGS Part E, the dermal guidance.

61) Appendix, L, Table 6.2: Please clarify the footnote (1).