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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CARIBBEAN ENVIRONMENTAL PROTECTION DIVISION
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May 23, 2006

Mr. Kevin Cloe
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 for Solid Waste Management Unit (SWMU) 6 at the Former US Naval Ammunition Support Detachment (NASD) Vieques Island, Puerto Rico

Dear Mr. Cloe:

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 Solid Waste management Unit (SWMU) 6 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 Rodríguez
Remedial Project Manager
Response and Remediation 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 Comments
Draft Remedial Investigation Report
Solid Waste Management Unit (SWMU) 6
Former Naval Ammunitions Support Detachment
Vieques Island, Puerto Rico
April 2004

GENERAL COMMENTS:

1. The work plan for this site was enacted without resolving comments on the plan. The last version of the work plan is dated February 2003. There were extensive comments on this document and there does not appear to have been a resubmittal of the work plan with comments addressed. This presents a difficulty in reviewing the RI report in that there was no agreed upon plan to reference against what was actually done at the site. One of the key issues which was never formally resolved was EPA's request to sample under the debris piles. The Navy objected to this request and stated that it had collected additional information on the site through field reconnaissance. This additional information was requested, however, never presented to the EPA.

   From the drill logs and cross sections presented in the report, it appears that the site is best characterized as a case of surface dumping rather than as landfilling. This being the case, it is fully appropriate to collect samples from under areas where debris has been dumped. Samples collected where no debris was dumped are less likely to identify any contamination which is present.

   Surface samples collected during the RI were apparently in areas near material that was dumped, but not in actual potential source areas. As a result, it is not possible to determine if the site is actually impacted. Samples from beneath debris should be collected prior to making decisions about the site.

2. Subsurface soil samples were included in the draft work plan, but were not collected. The reason given is that groundwater was encountered at shallow depths of roughly 1 ft bgs. This is not acceptable. First of all, it was known previous to the sampling effort that the water table would be quite shallow. In the PA/SI, a few subsurface samples were collected and they should have been included here as well. Second, making a determination based only on surface samples is not an acceptable approach. With disposal having occurred years in the past, soils at the surface may have had contaminants leached from them, while contaminates persist at greater depth. Third, it is not acceptable for the Navy to eliminate part of the sampling program without agreement from the regulating agencies. The subsurface soil samples need to be collected prior to making decisions about the site.

SPECIFIC COMMENTS

3. **Executive Summary, Contaminant Fate and Transport Summary, page ES-3:** The second to last paragraph states that detections of chloroform, PCBs, and perchlorate may not be site related. These chemicals are anthropogenic and thus must be related to some release or human activity. If there is a plausible explanation for their presence aside from the dumping at SWMU-6, then that information needs to be provided. Otherwise, it should not be claimed that the contaminants may not be site related. Reading the rest of the report, it appears that the Navy wishes to make the case that the detections are suspect, rather than unrelated to the site.

4. **Section 2.3.5.2, Groundwater, page 2-4:** The text references Figure 2-7 as showing water levels 4 hours before low tide, while the figure indicates that it is at high tide. Figure 2-8, showing low tide groundwater elevations should also be referenced in this section. Please clarify and amend.

5. **Section 2.6.2, Expanded PA/SI, page 2-6:** Include discussion of all detections of anthropogenic compounds, not just those above PRGs.

6. **Section 3.3, Groundwater Monitoring Well Installation, Development, and Sampling, page 3-3:** Please indicate how the IDW was disposed of rather than simply stating that it was handled according to management plan. If it was tested prior to disposal, present the testing results.

7. **Section 3.4.1, Monitoring Well Sampling and Analysis, page 3-5:** 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.

   In addition, the text states that a minimum of three well volumes was purged. This is not the case. Please correct the text.

8. **Section 3.5.1, Surface Water Sampling, page 3-6:** Surface water (and sediment) sample locations are stated to be off by up to 1,000 feet as a result of the difficulty in returning to previous locations. While this may be reasonable, or at least acceptable for locations that

were off by a small distance, it is neither for those that were 400 and 1,000 feet off. Mis-locating a point by this much in this area is simply incompetence and does not fulfill the data need. The samples need to be recollected in the correct locations.

9. **Section 3.5.1, Surface Water Sampling, page 3-6:** The text indicated that filters were flushed with water prior to use. Please clarify if this was water from the sampling location or from another source. Flushing with DI water or water from any other than the sampling location could introduce inaccuracy into the results.

10. **Section 3.5.2, Sediment Sampling and Analysis, page 3-7:** Rather than stating that sediment samples were collected with either a hand auger or a ponar device, please state what equipment was actually used. Also, it is noted in the sediment section 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.

11. **Figure 3-3, Redial Investigation Monitoring Well Location Map:** In comments on the work plan, EPA had requested that a well be installed to the west of SB-03. The figure shows that instead, the well was placed north of the soil boring. At this location, it is not useful for providing information on flow from the site to the west, and thus does not provide the information which was being sought. Nonetheless, the overall groundwater sampling locations are sufficient for determining possible impacts. In the future, however, the desire to relocate a well should prompt a call with the agencies so that all can parties agree on the change.

12. **Section 4.1.4.1, Laboratory and Field Sampling Blank Contamination, page 4-4:** The text states that the perchlorate detection may be a false positive. It also appears that this conclusion is from one detection and one non-detect, although in fact there have been three (3) samples from this well. Please note that the well has been sampled three times, supporting the case that the single detection may have been anomalous.

13. **Section 4.1.5, Regulatory, Health-Based, and Ecological Screening Levels, pages 4-7 and 4-8:** The text identifies soil criteria from the Netherlands. These are clearly not applicable. In the past, EPA has requested that the Navy alert the agencies if new criteria are to be offered for consideration. This needs to be done before a document is received.

14. **Section 4.2.2.1, Surface Soil, Semivolatile Organic Compounds, page 4-12:** Please identify the two SVOCs for which PRGs were not available. It is possible that a surrogate chemical can be identified for screening and evaluation purposes.

15. **Section 4.2.2.1, Surface Soil, Volatile Organic Compounds, page 4-13:** The text notes that seven VOCs were detected. Please indicate what VOCs were detected, as well as including their concentrations on the Section 4 summary tables and figures. Referencing the full data tables in the appendix is not sufficient. Similarly, indicate which sample contained Aroclor-1254 and the concentration at which it was detected. This same comment applies to other portions of the sampling effort discussed in Section 4. All detections of

anthropogenic compounds should be included in the summary tables and figures, as well as noted in the text.

16. **Sections 4.2.2.3, Groundwater, and Section 4.2.2.4, Surface Water:** According to Section 3 of the report, groundwater and surface water were also sampled for alkalinity and anions. These results need to be presented and interpreted. For instance, if the data supports the conclusion that groundwater is significantly saline or similar to sea water, that would have implications as to whether it should be considered as a potential drinking water source.

17. **Section 4.2.2.3, Groundwater, Inorganic Analytes, page 4-15:** The levels of metals in groundwater warrant further discussion. Concentrations of arsenic, for example, are significantly elevated in a number of wells. Concentrations in total and dissolved fractions show marked differences, although the sampling data sheets indicate that there was quite low turbidity in the samples. Some attempts to explain or understand the results are needed. As discussed in a previous comment, the sampling method may explain the inconsistent results. The removal of the bladder pump prior to sampling for metals may have resulted in increased turbidity that was not recorded in purging log. The results here need to be interpreted.

18. **Section 4.2.2.3, Groundwater, Polychlorinated Biphenyls, page 4-16:** There were detections of PCBs in a single well, but it was not repeated in the second sampling round. To provide more definitive evidence as to their possible presence in the groundwater, a third sample should be taken.

19. **Section 4.2.2.5, Sediment, Inorganic Analytes, page 4-19:** Sample SD02 had elevated concentrations of a number of metals. It appears that more recent samples, such as SD12 and SD13 were targeted in the same area in attempts to check the results from this sample. This should be discussed in the text and the local area shown on a larger scale figure that better shows the layout of the samples (page 5-12, has a single sentence that indicates that the more recent samples were a "re-sampling" of the location, but more detail is needed).

20. **Section 4 Tables:** a) A DAF of 10 has been used for SSL values. The SSL guidance (and Region 9 PRG tables) provides for the adoption of default DAF values of 20 or 1, depending on site conditions. Other values need to be justified using site specific information. In the present case, the guidance indicates that a DAF of 1 should be selected, as the water table is very shallow. b) These tables (and associated figures) should include all detections of anthropogenic compounds, not just those above criteria and background.

21. **Section 5.2, Conceptual Site Model, page 5-2:** Salinity of groundwater is noted to be similar to that of seawater in a portion of SWMU-6. Presumably this implies that this is not the case in all the wells. Please present the data and show the distribution of saline versus fresh water across the site.

22. **Section 5.5, Contaminant Migration, page 5-12:** In the first sentence of the second paragraph, the term "principal threat waste" is used. Please define this term.

23. **Table 5-1, Summary of Field Sampling Data for Groundwater, 2003, page 5-15:** The table should include pH.

24. **Section 6.5.1, COPC Selection for Human Health Risk Assessment, Bullet 2, page 6-5:** It is not reasonable to assume that a resident child or adult would have exposure to contamination at depths greater than 2 feet under typical scenarios. Therefore, it is not necessary to evaluate the residential populations to soils at this depth.

    Construction activities would result in exposure to both surface and subsurface soils. Please evaluate exposure to this population using a dataset that contains soils from all depths.

25. **Section 6.5.1, COPC Selection for Human Health Risk Assessment, page 6-6:** The criteria for retaining chemicals for quantitative risk assessment are included in the first paragraph. EPA Region 2 also recommends retaining all Group A carcinogens, regardless of frequency of detection or comparison with a risk-based concentration. The rationale for this would be "TOX" in the RAGS D Table 2 series.

26. **Section 6.5.1, COPC Selection for Human Health Risk Assessment, page 6-6:** In the fourth paragraph, the detections of chloroform, PCBs, and perchlorate are discussed. The language used in this paragraph should be revised to state in an objective way what the results indicate. Chloroform is cited as a common laboratory contaminant. However, if the result was not qualified as such during QA/QC review, then this language should be removed. PCBs were reanalyzed and the results of the confirmatory analysis did not repeat the original results. Therefore, no conclusions should be drawn regarding the presence of PCBs. The same rationale is used for perchlorate, and this is also not correct. In addition, the language that states that the analytical method for perchlorate often results in false positives should be referenced or removed. The Navy should also consider looking into other analytical methods for perchlorate that would not result in such a high likelihood of false positives.

27. **Section 6.6.1.4, Recreational Receptors, page 6-9:** Please explain why recreational swimming with full body dermal contact with water is not evaluated in the HHRA.

28. **Section 6.6.1.4, Recreational Receptors, page 6-9:** Please define the age of the youth trespasser.

29. **Sections 6.6.1, Potentially Exposed Population, and 6.6.2, Exposure Route Factors:** Please revise these sections so that the exposure parameters and pathways are comprehensively discussed in only one section.

30. **Section 6.6.2.3, Sediment Ingestion, page 6-10:** Please provide the rationale for selecting ½ of the soil ingestion rate as the sediment ingestion rate.

31. **Section 6.6.2.4, Surface Water Ingestion, page 6-10:** Please revise the second sentence to

read, "The ingestion intake of surface water...."

32. **Section 6.6.2.5, Surface and Subsurface Soil Dermal Contact, page 6-10:** Please revise this section to include a more comprehensive description of the population specific soil to skin adherence factors, and how these values were selected. It is unclear how some of these values were selected for use in the human health risk assessment.

33. **Section 6.6.2.9, Surface and Subsurface Soil Inhalation, page 6-11:** 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).

34. **Section 6.6.3.2, Exposure Point Concentration, page 6-11:** Please note that the latest version of the ProUCL tool is version 3.00.02 and is available at: http://www.epa.gov/nerlesd1/tsc/form.htm

35. **Section 6.7, Toxicity Assessment, page 6-13:** Please provide a more comprehensive discussion on the use of the TEF approach to evaluate PAHs. A table which lists the PAH TEF values, and a discussion of the EPA reference for this approach should be included.

36. **Section 6.7, Toxicity Assessment, page 6-13:** 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. Perchlorate: Please use the RfD of 0.0007 mg/kg-day, as recommended by the National Academy of Sciences review.

    d. Vanadium: Please use the chronic RfD recommended in the 1997 HEAST document.

    e. Mercury: Please use the RfC of 0.09 ug/m^3 developed by CalEPA.

    f. Nickel: Please use the RfC of 0.09 ug/m^3 as recommended by ATSDR.

    g. Carcinogenic PAHs: Please note that these chemicals are currently being evaluated by EPA ORD/NCEA for structural analysis to determine if any surrogate chemical can be used to identify an RfD value. The results will be forwarded when the evaluation is complete.

h. PCBs: Please note that these chemicals are currently being evaluated by EPA ORD/NCEA for structural analysis to determine if any surrogate chemical can be used to identify an RfD value. The results will be forwarded when the evaluation is complete.

37. **Section 6.8, Risk Characterization, page 6-14:** In the last paragraph of this page, there is a discussion of COPCs in land crab tissue and fiddler crab tissue. First, this exposure pathway (ingestion of crab) should be included in the RAGS D Table 1 as an exposure pathway. Second, it appears as though the process used to evaluate these tissue concentrations was to compare these crab values to risk-based values for fish tissue ingestion. If this is correct, please include these comparisons in a RAGS Part D Table 2 for tissue ingestion. If not chemicals are flagged for further evaluation, this assessment would then be complete.

38. **Section 6.9.1, COPC Selection, page 6-16:** The last sentences of this section suggest that certain COPCs do not have SSLs, but are not of concern because they are either within background concentrations or do not present a threat for migration to groundwater. First, it is premature to discount these COPCs on the basis of a background comparison. Second, the chemicals which lack SSL values and are thought to not be of concern for groundwater migration should be identified by name.

39. **Section 6.9.2, Exposure Assessment, page 6-17:** Please revise this section to more accurately reflect the intent of the exposure assessment, which is to evaluate the maximum exposure reasonably anticipated to occur at a site. The use of groundwater as a potable water supply is being evaluated as a future use scenario only; this is driven by the ARAR that requires groundwater to be classified as a potable water supply. When evaluating potential exposure scenarios, land use scenarios may take into account a variety of factors, many of which are outlined in the OSWER Directive "Land Use in the CERCLA Remedy Process". However, groundwater use is clearly not covered by this guidance, and is evaluated as stated in Section 300.430 (a)(1)(iii)(F) of the National Contingency Plan, which requires EPA to evaluate and return groundwaters to their beneficial use. Issues such as technical impracticability, likelihood of occurrence or productivity of the aquifer are addressed in the conclusions of the RI and in the FS.

40. **Section 6.10.1.1, Iron, page 6-18:** EPA recognizes that iron is naturally occurring in the soils on Vieques. However, the range of iron concentrations in the soil - 2960 mg/kg to 93200 mg/kg with a mean of 18500 mg/kg - indicates certain "hot spots" of iron contamination. Considering SWMU 6 was a nuisance dump site, it is possible that some of these areas may require additional investigation and/or remediation. Please consider the appropriateness of identifying these iron hot spot areas and evaluating them separately in the risk assessment.

41. **Tables 6-1, 6-2, 6-3, and 6-4, pages 6-23 to 6-26:** 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.

42. **Figure 6-1, Proposed Land Use and Zoning Classifications by Puerto Rico Planning Board:** Please include the location of SWMU 6 on the figure.

43. **Section 7.2.1.1, Environmental Setting, page 7-5:** The on-site vegetation is noted as having similar species composition and structure to the reference location. However, no data are provided to support this statement. It is unclear whether the 25 percent cover noted for the red mangrove and black mangrove community (page 7-4) is typical of an unimpacted area. Similarly, the discussion regarding fauna and the statement that "there was no visible evidence" of an impact on the wildlife (page 7-5) should be supported. More detail regarding the aquatic receptors present in the lagoon, canal, and intermittent stream should be provided.

44. **Section 7.2.1.3, Preliminary Conceptual Model, Receptors, page 7-8:** It is recommended that a mammalian and avian herbivore and a mammalian insectivore be included for the exposure modeling. The potential for species such as shrews, herbivorous small mammals, and herbivorous (seed, berry, or grain eating) birds to be present at the site should be considered. Further, the use of the Norway rat and Indian mongoose are not recommended as receptor species. During the SLERA it is recommended that the diets modeled reflect the maximum ingestion of the most contaminated food source. Modeling to an omnivore would minimize potential exposure. Depending on the contaminant, a more limited diet may result in higher risk estimates, depending upon the bioaccumulation factors of contaminants in various dietary items. The American Robin is often used in ecological risk assessment as an avian insectivore; it is recommended that this organism be used in place of the pearly-eyed thrasher which is an omnivore. If the pearly-eyed thrasher is used, their diet should be considered to consist entirely of soil invertebrate.

45. **Section 7.2.1.3, Preliminary Conceptual Model, Receptors, page 7-9:** It is noted that SWMU 6 lacks significant habitat for amphibians and reptiles. However, mangrove communities often provide habitat for these organisms. Further, Table 7-2 *Wildlife Observed at SWMU 6* notes the presence of lizards (*Anolis sp.)*.

46. **Section 7.2.2.1, Exposure Estimation, page 7-10:** All contaminants in exceedances of ecological screening values should be included in the food web models.

47. **Section 7.2.2.1, Exposure Estimation, Soil Invertebrates, page 7-11:** Although soil ingestion may be accounted for separately in the food web model, for the screening level ecological risk assessment (SLERA) it is recommended that undepurated values be used in assessing risk to insectivores/omnivores.

48. **Section 7.2.2.1, Exposure Estimation, Fish, page 7-12:** In addition to sediment exposure, the measurement endpoint should include comparing maximum surface water concentrations multiplied by a bioacummulation factor (BAF) to a threshold reference value.

49. **Section 7.2.4.1, Selection of Chemicals of Potential Concerns (COPCs), Food Web Exposures, page 7-15:** Dose model calculations should be provided and be transparent, so it is easily understood how doses were determined. For example, a table which provides maximum soil, sediment, and surface water concentrations used in the calculations should be provided.

50. **Section 7.2.4.1, Selection of Chemicals of Potential Concern (COPCs), Food Web Exposures, page 7-15:** It is indicated that, "Three pesticides and six PCBs were retained as COPCs because the maximum reporting limits exceeded screening values." This text is confusing, since food web exposures are estimated by comparing an ingested dose to NOAELs and LOAELs, rather than using screening values directly. It appears that the maximum reporting limits for detections below quantification limits were used as the input into the food chain models, and compounds with resulting HQs greater than 1.0 (i.e., dose estimates were greater than TRVs) were retained as COPCs. The text should be clarified or corrected to better reflect this. Additionally, it should also be noted that hexachlorobenzene was also retained for the same reason.

51. **Section 7.2.5, Screening Risk Conclusions, page 7-16, and Table 7-15, Summary of COPCs – Step 2, page 7-66:** It is indicated on page 7-16 that a summary of COPCs identified in soil, sediment and surface water are identified in Table 7-15. However, this table only provides information on food web model COPCs. Tables 7-11 through 7-13 provide information regarding COPCs in all three media, which is discussed in Section 7.2.4.1, Selection of Chemicals of Potential Concern Surface Soil, Surface Water, and Sediment (page 7-15) and should be summarized in Table 7-15, or in another table. The compounds 4-bromophenyl-phenylether, 4-chlorophenyl-phenylether, hexachlorocyclopentadiene , hexachloroethane, and 1,1,2,2-tetrachloroethylene should not be indicated in this table as being retained, since undetected chemicals without screening values were not identified as COPCs (see last paragraph on P. 7-15). Correction is needed.

52. **Section 7.3.2.3, Sediment, page 7-18:** The ERA states that literature screening values could not be found for the several detected VOCs. However, screening values for acetone, carbon disulfide, ethyl benzene, methylene chloride, and toluene may be found in Jones et al. (1997). Using the Jones et al. (1997) screening value for acetone (0.0087 mg/kg) and carbon disulfide (0.00085 mg/kg), calculated HQs would be 69 and 16 (acetone) and 26 and 11.4 (carbon disulfide), using the maximum and average concentrations, respectively. Therefore, these contaminants may be carried forward because contaminant concentrations exceed screening values, rather than because they do not have screening values.

53. **Section 7.3.3.1, Surface Soil Exposure, pages 7-19 and 7-20, and Table 7-24, Comparison of PCOC Surface Soil Concentrations to Background Concentrations, page 7-83:** There is no information provided in this table on aluminum background or on-site concentrations; therefore discussions comparing on-site data to background cannot be

verified. In the discussion of iron concentrations, it would be helpful to indicate the frequency of exceedances of on-site iron concentrations in comparison to average background values, rather than simply background upper tolerance limits. Other inorganics are removed from further consideration because the screening value is protective of plants (zinc and lead) and it is noted that "the vegetation throughout the site is comparable to reference plant communities." However, it is unclear whether reference plant communities have been identified; information regarding the comparison of on-site vegetation to a reference community should be provided. Further, no information indicating that the plant community has not been negatively impacted by the COPCs at the site has been provided. The sixth paragraph should be specific to lead, and HQs for zinc should not be discussed here.

It should be noted that for DDT the intervention value provided by the MHSPE has been revised to 1.0 mg/kg, for DDD the value is 34 mg/kg and for DDE the value is 1.3 mg/kg (MHSPE, February 2001). Therefore Table 7-20 Step 3 Screening Statistics – SWMU 6 – Surface Soil can be appropriately revised and DDD, DDT, and DDE may be removed from the COPC list.

The discussion of PAHs in soil is very confusing. If the maximum detected concentrations of all PAHs were identified in one sample location, than this area may need to be addressed during the FS or proposed removal action. However, depending upon the sampling frequency this may not mean that PAH exceedances are limited to just one area. Please note that HQs should not be qualified by indicating that a HQ of 4.5 is "low." Any HQ greater than "1" is considered to be associated with risk. The paragraph on PAHs in the soil needs to be rewritten so that the reader has a better understanding where PAH exceedances exist and the risk associated with these exceedances.

54. **Section 7.3.3.2, Surface Water Exposures, page 7-20:** As noted above, HQs should not be qualified as "low;" all HQs greater than "1" are considered to be associated with risk. If the average HQ is greater than 1.0, it is an even stronger indication (compared to maximum HQs being greater than 1.0) that a population-level risk may exist. Total metal concentrations exceeding maximum benchmark concentrations may still present risk to ecological receptors. Elevated concentrations of total metals could result in elevated concentrations of dissolved metals under certain circumstances, depending upon water and soil quality parameters.

55. **Section 7.3.3.3, Sediment Exposures, pages 7-21 and 7-22:** As previously noted, HQs should not be qualified, and all references that HQs were "relatively low" should be removed from the document. The document indicates that the maximum detected concentrations for most of the metals occurred at Station NDW06SD02, and leads the reader to believe that if data from this sampling event were removed and more recently collected data from nearby sample locations (NDW06SD10, -11, -12, and -13) were considered than there would be no exceedances from this area, as concentrations of metals were at or below background and less than screening values. However, this is incorrect: Cu concentrations were above background and screening values at locations NDW06SD10,

NDW06SD11, and NDW06SD12. There were also lead and zinc exceedances at NDW06SD10 (Table 4-9 Chemicals Detected Above Screening Criteria and Background levels in Sediment). In fact, even when excluding NDW06SD02 from calculations, the mean concentrations of these compounds at the site exceed background concentrations; in the case of Cu, the mean concentration exceeds the screening value as well. The apparent drop in contaminant concentrations at location NDW06SD02 from 2000 to 2003 may be due to the movement of contaminated sediments (or contaminants in sediment) rather than to erroneous readings having been obtained during the 2000 sampling event.

In the third paragraph, maximum and average concentrations of arsenic, barium, and copper are recalculated by removing Sample NDW06SD02 data from the calculations. Please provide a table which shows the recalculated concentrations and compares these values to both background concentrations and ecological screening values.

DDD, DDE, and DDT concentrations in sediment were found to be higher than screening values at some sampling locations. As mean HQs based on ERMs were greater than "1" for DDD and DDE, these contaminants should be retained as COCs, and not dropped from further consideration.

It should be noted that eight VOCs rather than six VOCs were identified as PCOCs because no screening values were available for these chemicals. It is unclear how it can be determined that these VOCs are not related to solid waste materials discarded at the site.

56. **Section 7.3.3.4, Food Web Exposures, page 7-22:** As previously noted, the actual models used to calculate hazard quotients, including all input parameters should be provided so that these calculations are transparent (Tables 7-14 and Table 7-23). Further, although Tables 7-9 Ingestion Screening Values of Mammals and 7-10 Ingestion Screening Values for Birds presents the LOAELs and NOAELs obtained from the literature for use in the food chain models, there is no indication as to which specific sets were used in calculating HQs, when more than one set of NOAELS and LOAELs are presented. Therefore, it is difficult to determine whether the conclusions drawn from these HQs are appropriate.

57. **Section 7.3.3.5, DOI Crab Sample Collection at SWMU 6, pages 7-22 and 7-23:** Please present the actual back-calculations used along with the input parameters and NOAELS/LOAELS used to determine concentrations of DDE,DDT, cadmium, lead and vanadium which present no risk to the three species of wading birds modeled.

58. **Table 7-4, Preliminary Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints, pages 7-29 and 7-30:** As discussed above, the assessment endpoint addressing reptile populations should include the *Anolis* as a receptor. It is recommended that the risk to the Pearly-eyed thrasher be calculated solely on the ingestion of soil invertebrates, which it primarily feeds on, rather than including fruits and berries (terrestrial plants), which may minimize the risk from soil contaminants of concern. An omnivorous mouse (house mice [Mus musculus]) would likely represent a more conservative model than the Norway rat or Indian mongoose. See comments above regarding additional appropriate assessment

endpoints. Further it should be noted why mammalian carnivores and piscivores were not included as assessment endpoints. In addition, maximum surface water contaminant concentrations should be compared to benchmarks (in addition to sediment chemical concentrations) to assess risk to fish communities. For aquatic habitats, determine whether biota sediment accumulation factors should be used for fish and a dose calculated and compared to threshold reference values.

59. **Table 7-6, Soil Bioconcentration and Bioaccumulation Factors for Plants, Soil Invertebrates, and Small Mammals - Step 2, pages 7-33 and 7-34:** Bioacumulation factors for omnivorous mammals are used to model doses to upper trophic level carnivorous receptors (i.e. red-tailed hawk). However, this may bias the dose because uptake factors for insectivores, herbivores, omnivores and "general" feeding for soil-small mammals vary (Sample et al.[1998b]). Therefore, it may make more sense to use either the general uptake factors (UFs) (since carnivorous birds are likely to consume whatever small mammals they can get), or, to be conservative, use the highest soil-small mammal UF listed for each contaminant in Sample et al. (1998b).

60. **Table 7-8, Exposure Parameters for Upper Trophic Level Ecological Receptors – Step 2, page 7-38:** Please show allometric equations used to obtain water and food ingestion rates. During the SLERA minimum body weights to maximum ingestion rates should be used. Further, the reference for the soil ingestion rate for the spotted sandpiper is unclear. As noted in the Wildlife Exposure Factors Handbook (EPA/600/r-93/187a December 1993), there is a range of soil ingestion rates for sandpipers (7.3 % - 30%). Since the objective in the SLERA is to be as conservative as possible, it may make sense to either model the spotted sandpiper using the most conservative soil ingestion rate for all sandpipers listed (30% for the Semipalmated sandpiper), or to use the Semipalmated sandpiper (which, while not as common in Puerto Rico, does occur there occasionally) in the food chain models. Please change the page numbers for Tables 7-14 & 7-15 so that they are in numerical order.

61. **Table 7-16, Soil Bioconcentration and Bioaccumulation Factors for Plants, Soil Invertebrates, and Small Mammals – Step 3, page 7-69:** It is unclear how the uptake values were derived for these tables. It is noted that "central tendency estimates (e.g., median or mean)" were used. However, very few of the numbers match the means or the medians listed in the source documents and page 7-16, Section 7.3.1 Refinement of Conservative Screening Assumptions. It is also not clear why the median was chosen for some compounds and the mean for others. Please provide an explanation regarding where these values are from and why they were selected.

62. **Table 7-18, Exposure Parameters for Upper Trophic Level Ecological Receptors – Step 3, pages 7-71 and 7-72:** Please show calculations for allometric equations. The food ingestion rate of the red-tailed hawk is listed as being lower than the food ingestion rate of the green heron. This might make sense if the food ingestion rate was listed on a kilogram per kilogram (kg) body weight per day basis, but it is not; it is listed on a kg/day basis. A 1.13 kg hawk would have to consume more per day than a 0.212 kg green heron.

Clarification or correction is needed.

63. **Table 7-23, Summary of Hazard Quotients for Upper Trophic Level Receptors – Step 3, page 7-82:** Please provide some sample calculations with all the receptor inputs such that the calculations are transparent.

64. **Section 8.1, Summary and Conclusions, page 8-1:** The texts states that high salinity is based on high observed TSD reading. According to the table presenting the field results, TSD was not measured, only inferred from conductivity. Salinity is therefore based only on specific conductance. The specific conductance of the surface water samples is consistently lower than that of the groundwater, making it unclear how the report can reach the conclusion that the values are similar, or that the specific conductance of groundwater is due to salinity.

65. **Appendix L, RAGS D Table 1, Selection of Exposure Pathways:** Please include the adult, youth, and child recreator exposure to surface water and sediment as a quantitative evaluation.

66. **Appendix L, Table 2 Series:**

    a. Please update the Region 9 PRG table values. The Region 9 table was updated most recently in October 2004.
    b. The rationale for identifying the COPCs is unclear. There are chemicals which were not detected above screening levels but were retained (antimony in Table 2.1). Please review these tables to ensure that all COPCs were appropriately retained.
    c. Please retain all Group A carcinogens for the quantitative assessment, and add "TOX" as the rationale. This includes arsenic and benzene in any media in which they were detected, independent of frequency of detection or maximum detected concentration.

67. **Appendix L, Table 3 Series:** Please reference the lastest version of the ProUCL tool.

68. **Appendix L, Table 4 Series:**

    a. Table 4.1RME and others: Please verify the soil to skin adherence factor for the recreational adult. It may be appropriate to use the default value of 0.07 mg/cm^2.
    b. Table 4.3RME and others: For the skin surface area for recreational users, please develop a value that represents areas of the body likely to contact sediment (feet, lower legs, hands, and forearms, for example).
    c. Table 4.9RME and others: Please revise the event time for the adult resident shower time to 0.58 hours.

References

Ministry of Housing Spatial Planning and the Environment, Directorate General for the

Environment (DGM), Directorate of Soil, Water and Rural Areas. "Technical Evaluation of the Intervention Values for Soil/sediment and Groundwater." February 2001.

Puerto Rico Environmental Quality Board
Technical Evaluation of the Draft Remedial Investigation
Solid Waste Management Unit (SWMU 6)
Former Naval Ammunition Support Detachment
Vieques Island, Puerto Rico
April 2004

General Comment

1.) The document should include an Acronyms and Abbreviations section to summarize the numerous acronyms and abbreviations that are used throughout the text, figures and tables for the convenience of the reader and to be consistent with other documents prepared for Vieques sites. Many of the acronyms and abbreviations were not initially defined in the customary fashion.

2.) Industrial PRGs are not protective of construction worker exposure. Analytes detected in surface and subsurface soil should be quantitatively evaluated in the HHRA for the construction worker receptor. There is insufficient information in the sections provided for review to determine what analytes were detected in subsurface soil. Although Section 6.5.1 states that soils to 10 feet bls are included in the HHRA evaluation, there is no discussion of analytes in each medium. The discussion presented in Section 6 covers those analytes above screening criteria, which are not appropriate for the construction worker exposure scenario.

3.) Perchlorate detection limits are not low enough to conclude that perchlorate is not present at the site. Analytical results presented in Appendix I indicate that the detection limits were 40 ug/L and 20 ug/L. The report should identify and discuss potential limitations, as well as recommend a corrective action (i.e., resampling and analysis using lower detection limit).

Page-Specific Comments

1. Page ES-5, Paragraph 2 – The cited reference (DoD, 2002) is not presented in Section 9 (References).

2. Page ES-5, Paragraph 4 – Clarify the cited reference for the EPA Ecological Risk Assessment Guidance for Superfund. The paragraph cites "EPA, 1997" which is not presented in Section 9. It is unclear if the correct reference is "EPA 1997a" as presented in Section 9.

3. Page ES-6, Paragraph 5 – The presence of glass and metal debris identified in the report is unsightly, and therefore impacts public welfare, and is hazardous to public safety through physical harm. Paragraph 4 on page ES-5 notes the presence of a chain link fence that presumably limits human access, but not wildlife access. 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 may be

required in the foreseeable future to prevent risk of physical harm if the remaining waste materials are not removed.

Page 2-1, Section 2.2 - The lateral extent of waste remains a data gap and should be determined. Comments were provided to the Work Plan regarding the limitations of geophysical techniques used and the absence of sufficient field confirmation efforts. The confirmation of the lateral extent of waste is needed to ensure data collection activities provide sufficient coverage of the waste and potentially impacted areas. Note that cross-sections presented in Figures 2-5 and 2-6 do not indicate the estimated depth of waste at SWMU 6.

4. Page 2-4, Section 2.4, Paragraph 2 – The cited reference (Little and Wadsworth, 1964) is not presented in Section 9.

5. Page 2-5, Section 2.6.1, Paragraph 1 – Clarify the discrepancy between the cited reference (ESE, 1988) and the 1986 date on the Environmental Science and Engineering, Inc. citation in Section 9.

6. Page 2-6, Section 2.6.2, Paragraph 1 – The text should provide the depths of the subsurface soil samples that were evaluated in the HHRA.

7. Page 2-6 and 2-7, Section 2.6.3 - A figure should be included in this report that illustrates the extent of the geophysical anomalies in relationship to surface and subsurface soil and groundwater sample locations. Figure 2 in the geophysical report presented in Appendix H does not present this information.

8. Page 2-6, Section 2.6.2, Paragraph 3 – Clarify why the presence of different metals at relatively similar concentrations is indicative background (non-site related) conditions. Cite all sources relied upon to make this assertion.

9. Page 2-7, Section 2.6.5 - The presence of site-related contaminants in the crab tissue should be further discussed. A more comprehensive study should be conducted in order to obtain data sufficient for quantitative analysis in the HHRA. Note that the qualitative analysis of the potential risk associated with contaminant concentrations in crab tissue presented in Section 6.8 is insufficient, as discussed in the comment below. Background crab sample data should be collected from crabs located outside the NASD facility due to the potential for lead contamination from other sites at the facility.

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

11. Figures 2-7 and 2-8 – A figure illustrating the waste boundary, like that shown in solid blue on these figures, and the limits of fencing should be prepared and included in the report to allow an independent assessment of the adequacy/suitability of fencing to prevent human exposure to debris remaining at this site.

12. Page 3-3, Section 3.3.1 and Table 3-3 – The report should identify and discuss potential limitations due to monitoring well screen construction depths that are below the water table. Table 3-3 indicates that wells have a 10-foot screen from 3 to 13 bls. Text in Section 2.3.5.2 and well completion diagrams in Appendix C indicate a depth to groundwater that was approximately 1 to 2 feet bls. Therefore, monitoring wells were installed with the tops of the screens up to 2 feet below the water table. This construction method may cause samples to be collected from deeper groundwater and therefore be unrepresentative of shallow groundwater. This method of well construction renders the wells incapable of verifying the absence of floating free product. The text should present a corrective action to document the absence of floating free product.

13. Page 3-9, Section 3.6, Paragraph 6 – The text should be revised to clarify that changes in groundwater flow direction (due to tidal influence) are not ubiquitous across the site.

14. Figure 3-1 – Indicate the location and extent of fencing that prevents unauthorized human access to the site on this figure. This will allow an independent assessment of the proximity and adequacy/suitability of fencing to prevent human exposure to debris remaining at this site.

15. Figure 3-1 – The discrepancy in the number of samples must be clarified. Figure 3-1 illustrates the location of 23 surface soil samples; however, Section 3.2.2 states that 15 samples were collected during the RI.

16. Figure 3-1 to Figure 3-3 – The scale of the three figures should be the same so that the relative locations of the different sample media can be assessed. The locations of surface water and sediment sample locations should be illustrated.

17. Figure 3-6, Tidal Study – Expand the size of the first notation box (MW-1) so that all of the text can be read. The end of the text is currently cut-off.

18. Page 4-4, Section 4.1.4.1, Paragraph 3 – From the second sentence, delete "metals" from "Common organic contaminants include *metals*…"

19. Page 4-4, Section 4.1.4.1, Paragraph 4 – The text must explain the elevated detection limits of 40 ug/L for the 2000 sampling event and 20 ug/L for the 2003 sampling event. The text should identify and discuss limitations to the investigation considering that the screening criterion is 0.36 ug/L. Additional information must be provided to support the conclusion that the detection was likely a false positive. The document must consider that perchlorate is a site-related contaminant of concern and recommend additional sampling and analysis with appropriate sample quantitation limits (considering that the screening criterion is 0.36 ug/L). Based on the 12/20/03 STL email presented in Appendix J, the selected laboratory should use disposable containers, rather than containers that are washed, to eliminate potential cross-contamination.

20. Page 4-6, Section 4.1.5, Paragraph 1 - Provide supporting documentation for the selection of an SSL based on a DAF of 10. A default value of 1 should be used unless it can be

shown that a higher value is representative of site conditions at SWMU 6. The supporting documentation should include the model and input parameter values used to calculate the DAF.

21. Page 4-6, Bullet 5 – Correct the reference "Long, 1995" to read "Long et al. 1995" to be consistent with the reference citation in Section 9.

22. Page 4-7, Bullet 1 – Correct the reference "EPA (1991)" to read either EPA 1991a or 1991b, which ever is applicable, to be consistent with the reference citation in Section 9.

23. Page 4-8, Section 4.2.1 – The report should provide information to support the comparison of background soil samples to site soil samples (i.e., soil type, moisture, etc.). Note that background surface soil sample data should not be combined with subsurface background soil sample data.

24. Pages 4-8 to 4-9, Section 4.2.1.1 – The report should present a table summarizing background data for all inorganics detected in surface soil. Note that the tables provided in Section 6.11 only include those contaminants evaluated in the risk assessment.

25. Page 4-9, Section 4.2.1.3 – The text and Table 4-13 must be revised for consistency. The text states that site-specific and base-wide background surface water inorganic chemicals are included in Table 4-13. However, only site-specific background concentrations are presented in Table 4-13.

26. Page 4-10, Section 4.2.1.5, Paragraph 2 – The essential nutrient evaluation is not an appropriate methodology for eliminating parameters from consideration in the ecological risk assessment. The paragraph must be revised to remove the evaluation and reinstate consideration of the "essential nutrients."

27. Page 4-10, Section 4.2.1.5, Paragraph 1 – Typographic Error. Correct the reference "EPA, 1989" to read "EPA, 1989b" to be consistent with the reference citation in Section 9 (References).

28. Page 4-10, Section 4.2.2.1 - Generic SSLs should not be used to evaluate soils adjacent to coastal water where groundwater is hydraulically connected to surface water, unless the coastal water quality standard is less stringent than the drinking water standard used to calculate the SSL. Although SSL criteria are not available for some metals and organics, SSL criteria should be calculated at a DAF of 1 using the appropriate target groundwater concentration (the more stringent of the coastal water quality standard or drinking water standard). The SSLs for metals should be calculated using soil-water partitioning coefficients (Kds) for the applicable pH of the soils.

29. Page 4-11, Section 4.2.2.1, Inorganic Analytes –
    - The text states that 11 metals were above the screening criteria. However, only seven metals were listed on Table 4-5 that summarizes screening criteria exceedances. Please clarify.

- The text states that eight metals exceed their respective EPA Region IX PRGs. However, according to Table 4-5, only five metals are above the EPA Region IX PRG. Aluminum, manganese, and vanadium are not listed on Table 4-5 but are included in the text as exceeding the EPA Region IX PRG. Please clarify.

30. Page 4-12, Section 4.2.2.1, Semivolatile Organic Compounds –
    a. The number of SVOCs described in the first sentence is inconsistent with the number of SVOCs described in the second sentence. The first sentence states that 20 SVOCs were detected in surface soil samples. However, the second sentence states that the detected SVOCs consisted of "11 PAHs, carbazole, and bis(2-ethylhexyl)phthalate)." Please clarify.
    b. The text states that benzo(a)anthracene was the only SVOC to exceed its SSL. However, carbazole also exceeded its SSL in sample NDW06SS05, as presented in Table 4-5 and as discussed on page 4-13. The text should be corrected.
    c. The text states that an SSL was not available for benzo(a)pyrene. However, Table 4-5 shows an SSL of 4 mg/kg. Please clarify.

31. Page 4-14, Section 4.2.2.2 –
    a. The text should be expanded to include a discussion about the PCB Aroclor analyses performed on subsurface soils.
    b. The text states that antimony was detected in all eight subsurface soils. However, Table 4-11 shows that antimony was detected in only five of the eight subsurface soils. Please clarify.

32. Page 4-14, Section 4.2.2.2 - The depth of the subsurface soil samples should be provided in the text. Note that the use of SSLs to screen subsurface soil data collected from intermittently saturated or fully saturated soil (i.e., smear zone or groundwater matrix samples) is inappropriate. SSLs for organics or mercury do not apply to such a system. Furthermore, SSLs for inorganics do not apply to such a system unless the DAF is equal to 1 and the appropriate criteria mentioned in the comment on Section 4.2.2.1 are used. If subsurface soil samples were collected from subsurface vadose zone soil and not smear zone or saturated soil, they should be screened using SSLs a DAF of 1 unless supporting documentation is provided that demonstrates that a DAF of 10 is protective of groundwater.

33. Page 4-14, Section 4.2.2.2, Paragraph 3 - The list of detected inorganic analytes should be provided in the text. Clarify which of the 23 inorganic analytes were above appropriate background concentrations. The text only discusses those chemicals without SSL criteria. Those inorganics exceeding appropriate background subsurface soil concentrations should be screened using the appropriate SSL (at a DAF of 1 and using the appropriate target groundwater concentration). This paragraph states that of the 12 inorganic chemicals without SSLs, aluminum, calcium, cobalt, iron, magnesium, manganese, and sodium were not detected above their respective background concentrations. Therefore, copper, lead, mercury and potassium were detected above their respective background concentrations and do not have SSL criteria and should be included on Table 4-6 and should be further evaluated in the HHRA.

34. Page 4-14, Section 4.2.2.2, Paragraph 6 – Table 4-6 should list the three SVOCs identified in this paragraph for which SSLs were not available.

35. Page 4-15, Section 4.2.2.3 –
    a. The text lists metals that exceeded screening criteria in unfiltered and filtered groundwater samples. Two of the metals listed (barium and manganese) were incorrect and should be replaced with chromium and lead, as seen in Table 4-7.
    b. The text states that screening criteria were not available for chromium and lead. However, screening criteria are presented for these metals in Tables 4-7 and 4-12. Please clarify.
    c. The background concentrations listed in the text for chromium in unfiltered and filtered groundwater should be reversed for consistency with Table 4-1.

36. Page 4-16, Section 4.2.2.3, Perchlorate – The text states that perchlorate was resampled from the well in which it was detected in 2003 due to the potential for false positive results with the perchlorate method. Perchlorate was not detected in the February 2004 resampling. However, the reporting limit for perchlorate (20 ug/L) was higher than the concentration (12.8 ug/L) detected in 2003. Therefore, it cannot be definitively stated that perchlorate was a false positive in the 2003 sampling round. Both the detected concentration in 2003 and the reporting limit in 2004 exceed the EPA Region IX PRG of 0.365 ug/L. The reason for the elevated reporting limit should be provided; recollection and reanalysis with lower reporting limits should be proposed to provide meaningful data with which to assess the 2003 perchlorate detection.

37. Page 4-16, Section 4.2.2.3, Paragraph 10/11 - The text must explain the elevated detection limits of perchlorate analysis. The text should identify and discuss limitations to the investigation considering that the screening criterion is 0.36 ug/L. Additional information must be provided to support the conclusion that the detection was likely a false positive. The document must consider that perchlorate is a site-related contaminant of concern and recommend additional sampling and analysis with appropriate sample quantitation limits (considering that the screening criterion is 0.36 ug/L).

38. Page 4-17, Section 4.2.2.4, Inorganic Analytes –
    a. The text states that four inorganic chemicals exceeded their respective ecological screening criteria in unfiltered surface water samples. However, five inorganic chemicals exceeded criteria; lead was not included in the list of exceedances. The text must be corrected.
    b. The text states that nickel was detected above its screening criterion in filtered surface water samples. A discussion should be provided on this nickel exceedance, similar to that provided for the other metals exceedances.
    c. The text states that one filtered mercury sample exceeded site-specific background. However, Table 4-13 indicates that the maximum concentration of dissolved (filtered) mercury detected was 0.0452 ug/L which is below the site-specific background concentration of 0.0561 ug/L. Please clarify.

39. Page 4-19, Section 4.2.2.5, Inorganic Analytes –
    a. The text discussion for each metal exceedance incorrectly included the base-wide background concentration although the text states that the listed concentration is the site-specific background concentration. The text must be revised to include the correct site-specific background concentrations.
    b. The text should clarify why there are only 14 total sediment samples for zinc but 19 for all other metals.

40. Page 4-20, Section 4.2.2.5, last sentence – The text states that detected organic chemicals were not above the available screening criteria. However, this is not true for bis(2-ethylhexyl)phthalate, DDD, DDE, and DDT as indicated in Table 4-9 and the paragraphs discussing pesticide results. Please correct.

41. Table 4-1 –
    a. Correct the typographic error on page 4-27. The footnote for "=" has an incorrect spelling for "indicates."
    b. The table has an incorrect spelling for Aroclor (the "h" should be deleted).
    c. The detection of carbon disulfide in the background surface water sample (page 4-22) should be presented and discussed on page 4-16, paragraph 5 (Volatile Organic Compounds).
    d. The table and text should be revised for consistency. Page 4-16, paragraph 5 notes that chloroform was detected in two groundwater samples collected from SWMU 6, but Table 4-1 (Analytical Results from Background Groundwater Samples) indicates that chloroform was non-detect.

42. Table 4-2 -
    a. Correct the typographic error on page 4-34. The footnote for "=" has an incorrect spelling for "indicates."
    b. The table has an incorrect spelling for Aroclor (the "h" should be deleted).

43. Table 4-3 -
    a. Correct the typographic error on page 4-42. The footnote for "=" has an incorrect spelling for "indicates."
    b. The table has an incorrect spelling for Aroclor (the "h" should be deleted).

44. Table 4-5 –
    a. Correct the typographic error on page 4-46. The footnote for "=" has an incorrect spelling for "indicates."
    b. Correct the discrepancies between the PRG date references in the table notes with the citations in Section 9 (References).

45. Table 4-6 –
    a. Correct the typographic error on page 4-47. The footnote for "=" has an incorrect spelling for "indicates."
    b. Correct the discrepancy between PRG date referenced in the table notes with the citation in Section 9 (References).

46. Table 4-7 –
    a. Correct the typographic error on page 4-49. The footnote for "=" has an incorrect spelling for "indicates."
    b. Correct the discrepancy between the PRG date referenced in the table notes with the citation in Section 9 (References).
    c. The table has an incorrect spelling for Aroclor (the "h" should be deleted).
    d. The column for the chemical names should be widened as the full name of the PCBs is truncated.

47. Page 4-50, Table 4-8 – It is unclear why nickel is not presented in this table since it exceeds the ecological criteria and background in one filtered surface water sample, according to Table 4-13. Please clarify and revise as appropriate.

48. Table 4-8 –
    a. Correct the typographic error on page 4-50. The footnote for "=" has an incorrect spelling for "indicates."
    b. Correct the discrepancy between the PRG date referenced in the table notes with the citation in Section 9 (References).

49. Table 4-9 –
    a. Correct the typographic error on page 4-52. The footnote for "=" has an incorrect spelling for "indicates."
    b. The citation "Long, 1995" should be revised to "Long et.al. 1995" to be consistent with the citation in Section 9 (References).
    c. The citation "USEPA, 2000" should be revised to "USEPA, 2000a" to be consistent with the citation in Section 9 (References).

50. Table 4-10 –
    a. Correct the discrepancy between the PRG date referenced in the table notes with the citation in Section 9 (References).
    b. Correct discrepancy between SSL date referenced in the table notes with the citation in Section 9 (References).
    c. Correct the discrepancy between the CH2M Hill date referenced in the table notes with the citation in Section 9 (References).

51. Table 4-11 –
    a. Correct the discrepancy between the SSL date referenced in the table notes with the citation in Section 9 (References).
    b. Correct discrepancy between the CH2M Hill date referenced in the table notes with the citation in Section 9 (References).

52. Table 4-12 –
    a. Correct the discrepancy between the PRG date referenced in the table notes with the citation in Section 9 (References).

- Correct discrepancy between the CH2M Hill date referenced in the table notes with the citation in Section 9 (References). The table has an incorrect spelling for Aroclor (the "h" should be deleted).

53. Page 4-55, Table 4-12 –
    a. The site-specific background concentrations listed for total and dissolved chromium should be reversed for consistency with Table 4-1.
    b. The site-specific background concentrations for chloroform, PCB-1221, PCB-1232, and perchlorate should not be listed as NA, which signifies "Not Available." These compounds were analyzed for in background samples and site-specific background concentrations should be reported as ND, not detected, as indicated in Table 4-1.

54. Table 4-13 –
    a. Correct the discrepancy between the USEPA National Recommended Water Quality Criteria date referenced in the table notes and the citation in Section 9 (References).
    b. The word "Board" is cut short by a formatting error and should be corrected.
    c. Correct the typographic error on page 4-56. The footnote for "=" has an incorrect spelling for "indicates."

55. Table 4-14 –
    a. The citation "Long, 1995" should be revised to "Long et.al. 1995" to be consistent with the citation in Section 9 (References).
    b. Correct the discrepancy between the CH2M Hill date referenced in the table notes with the citation in Section 9 (References).

56. Page 4-57, Table 4-14 – The site-specific background concentrations for bis(2-ethylhexyl)phthalate, DDD, DDE, and DDT should not be listed as NA, which signifies "Not Available." These compounds were analyzed for in background samples and site-specific background concentrations should be reported as ND (not detected), 0.0011 mg/kg, 0.0028 mg/kg, and ND, respectively, for consistency with Table 4-3.

57. Figure 4-7 – Nickel exceeded the screening criterion in one filtered surface water. This exceedance should be included on Figure 4-7.

58. Page 5-3, Section 5.3.2 - An evaluation of migration pathways should be conducted 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. Consideration of current media concentrations exceed screening criteria is irrelevant to determining if a migration pathway exists that may continue to transport contaminants from one media to another.

59. Page 5-3, Section 5.3.3 – The text should include a discussion of those compounds that were detected in soil and underlying groundwater at the site. Site data indicates that lead is leaching from soil to groundwater. Elevated concentrations of lead have been detected in soil and underlying groundwater. Regardless of whether EPA-derived generic

screening criteria exist for a particular contaminant identified at SWMU 6, site data should be evaluated to determine if there is evidence to suggest that site contaminants are migrating.

60. Page 5-5, Paragraph 6 – Correct the discrepancy between the cited ASTDR references for chloroform and the citations in Section 9 (References), which contain no corresponding citations for chloroform.

61. Page 5-6, Paragraphs 1 and 2 – Provide references, where appropriate, for the information concerning the fate and transport characteristics of naphthalene.

62. Page 5-6, Paragraph 4 – Provide references, where appropriate, for the information concerning the fate and transport characteristic of carbazole.

63. Page 5-6, Paragraph 7 and Page 5-7, Paragraph 1 – The reference to "Howard, 1991" should be "Howard et.al., 1991."

64. Page 5-7, Paragraph 2 – Provide references, where appropriate, for the information concerning PAH metabolism identified in this paragraph.

65. Page 5-7, Paragraph 4 – Provide references, where appropriate, for the information concerning the fate and transport characteristics of chlorinated pesticides.

66. Page 5-10, Paragraphs 3, 4, and 5 – Provide references, where appropriate, for the information concerning the fate and transport characteristics of arsenic, antimony, chromium, and selenium.

67. Page 5-11, Paragraphs 1 and 2 – Provide references, where appropriate, for the information concerning the fate and transport characteristics of silver.

68. Page 5-11, Paragraphs 4 and 5 – Provide references, where appropriate, for the information concerning the fate and transport characteristics of iron and manganese.

69. Page 5-11, Paragraph 6 – Provide references, where appropriate, for the information concerning the fate and transport characteristics of thallium.

70. Section 5.5, Paragraph 2 - Lead was detected at 617 mg/kg in surface soil sample SS01. This concentration combined with elevated lead concentrations in other surface soil samples in the vicinity of this location (SS23 and SS13) indicates the presence of a potential hot spot. Furthermore, lead concentrations in groundwater underlying this portion of the site are elevated, suggesting that migration of lead from soil to groundwater is occurring. Therefore, the first sentence of this paragraph should be removed.

71. Section 5.5.1 - The purpose of this section is to evaluate potential migration of contaminants from surface soil to surface water. The inclusion of a discussion of filtered

water samples is irrelevant to the purpose of this paragraph, where overland flow is likely to include particulates. Also, there is no discussion of the location where unfiltered surface water samples exceeded screening criteria. The text should be revised to include a discussion of the spatial relationship between concentrations of particular contaminants detected in surface soil and in surface water samples collected in areas where overland flow from the location of the surface soil sample discharges to surface water.

Whether or not concentrations exceed risk-based criteria is irrelevant to determining if migration of contaminants via this pathway is occurring. Also, since the premise of Section 5.5 is that surface soil is the source of all contaminants in other media, movement of contaminants from soil to groundwater then to surface water should be discussed in this section. Lead, in particular, is present in surface soil and groundwater is hydraulically connected to surface water. This migration pathway should be fully evaluated and discussed.

72. Section 5.5.4, Paragraph 3 - Lead has been detected in surface soil and underlying groundwater. This contaminant is not discussed in this section. Include a detailed discussion of the site data that shows that lead is migrating from soil to groundwater.

73. Section 5.5.4, Paragraph 5 - The text should include and consider the detection limits for the perchlorate analysis. The 2000 data had an elevated detection limit of 40 ug/L, which is 100 times the screening level for perchlorate. The 2003 data had a detection limit of 20 ug/L, which is 50 times the screening level for perchlorate. Further investigation should be conducted to determine if perchlorate is present at this site. A laboratory that can obtain lower detection limits and which uses disposable containers should be used.

74. Figure 5-1 – Clarify why a residential child receptor would be considered exclusive of an adult residential receptor for surface water/sediment exposure.

75. Figure 5-2 – Clarify to what the depth designation 1-7' applies.

76. Figure 5-3 –
    a. A tan box is not provided around NDW06MW02. Correct as needed.
    b. Legend notations for "Top of Quebrada" and "Bottom of Quebrada" do not appear to be needed.

77. Page 6-3, Section 6.2, Paragraph 2 - Crab tissue is also a media of concern for this site and should be included in the exposure model. Site-related contaminants were detected in crab tissue samples collected from crabs located at this site. A subsistence exposure scenario should be quantitatively evaluated in the HHRA. Revise the text and tables accordingly.

78. Page 6-5, Section 6.5.1 – The text should clarify the 10-foot bgs exposure scenario or be revised as appropriate. The scenario considers that subsurface soil as deep as 10 feet bgs could be exposed during construction activities. Section 6.2 states that the depth to groundwater is 1 to 2 feet bgs. It is unclear how subsurface soil will be evaluated to 10

feet bgs. Also, industrial PRGs are not protective of construction worker exposure. All detected compounds in surface and subsurface soil should be included in the dataset used to quantitatively evaluate construction worker exposure via soil.

79. Page 6-5, Section 6.5.1, Third Bullet - EPA Soil Screening Levels for surface and subsurface soils in the vadose zone should be based on a dilution attenuation factor of 1, not 10, unless a site-specific demonstration is made that this DAF is protective of groundwater. Furthermore, SSL criteria for metals are pH-dependent. Therefore, the pH of soil should be determined so that appropriate SSL criteria can be adjusted for pH. All surface and subsurface soil samples should be screened against direct contact criteria. It is not appropriate to screen out chemicals using SSLs, which are transport pathway-derived screening criteria, prior to screening using direct contact criteria. In some cases, the direct contact criteria are lower than the SSLs.

80. Section 6.5.1, paragraph 3 - Provide further discussion on which chemicals were eliminated from further risk consideration and which criteria were used to eliminate each chemical without a PRG.

81. Section 6.6.1, paragraph 2 - Due to the presence of edible wildlife species with detected concentrations of site-related contaminants (i.e., lead, DDT and DDE in land crab tissue) a subsistence scenario should be evaluated quantitatively in the risk assessment. Revise text and tables accordingly.

82. Section 6.6.1.1 - Considering that groundwater is at 1 to 2 feet bgs, it is likely that maintenance workers could be exposed to groundwater during landscape activities. Therefore, dermal exposure to groundwater should be evaluated for this exposure scenario. Revise text and tables accordingly.

83. Section 6.6.1.2, paragraph 2 – As recommended in EPA's RAGS Part E: Dermal Guidance, inorganics should be assessed for the dermal exposure pathway. Since groundwater is not considered a potable drinking water source, all contaminants exceeding appropriate direct contact screening criteria should be carried through the quantitative risk assessment for all complete exposure pathways rather than qualitatively dismissing them. All contaminants should be evaluated quantitatively for the construction worker exposure scenario since appropriate direct contact screening criteria are not available.

84. Section 6.6.2.4 – The text should be modified to provide the appropriate EPA reference for the 2.6 hour recommended Exposure Time for swimming.

85. Section 6.6.2.9 - Construction workers are exposed to surface soil as well as subsurface soil. The exposure point concentrations for construction workers should be calculated using surface and subsurface soil data. Also, 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.

86. Section 6.6.2.10 - Clarify whether chloroform has been eliminated from the groundwater dataset based on an evaluation of laboratory blank concentrations. If chloroform was not detected in the blanks, then it is considered a contaminant of concern for this site and the description as "common laboratory contaminant" should be removed.

87. Section 6.6.3.2, paragraph 3 - Clarify whether total or dissolved concentrations were used in the risk assessment for aluminum, iron and manganese.

88. Section 6.8, paragraph 2 - For screening, the maximum lead concentration should be used. In addition to exceeding residential criteria, the highest lead concentration (617 mg/kg) is over 100 times the lowest concentration (3.58 mg/kg), indicating a potential hotspot that should be evaluated further. Concentrations of lead in groundwater collected from wells located in the vicinity of the elevated surface soil lead concentrations are also elevated. The concentrations of lead in groundwater in MW02, MW03, and MW05 range from 41 ug/L to 97 ug/L, above the coastal water quality standard of 8 ug/L. MW02 was used in the tidal study, which concluded that groundwater is hydraulically connected to surface water, and groundwater hydraulically connected to surface water should meet surface water standards. Lead has also been detected in land crab tissue. Lead is a contaminant of concern for this site that should be evaluated quantitatively using the IEUBK model for children and the Adult Lead Model for adults as recommended in EPA's guidance for performing human health risk analysis on small arms shooting ranges (EPA, XXX). Exposure point concentrations for food resources can be input into these models. Therefore, these models can be used to evaluate the risk associated with the ingestion of lead-contaminated food resources.

89. Page 6-14, Section 6.8, Paragraph 4 - The ingestion of crab under a subsistence exposure scenario should be evaluated quantitatively in the HHRA. The appropriateness of the fish-consumption-based PRGs cannot be confirmed. The PRG values referenced in the text are not provided in Appendix I and the calculations and exposure parameters used in developing these values are not provided. Generic, nationally-based fish ingestion rates are not protective of crab consumption for local residents who may consume higher rates of aquatic organisms than the average US citizen nor is a discussion of the number of meals that can be eaten over a 10-day period of time appropriate for evaluating long-term consumption of crab tissue by island inhabitants. Remove this comparison from the HHRA. Furthermore, DDT and DDE were detected in surface soil in 7 and 12 of 23 samples, respectively. A comparison of the soil concentrations to residential PRGs as a basis for eliminating the ingestion of DDT and DDE in crab tissue is inappropriate. Screening criteria calculated based on incidental ingestion and dermal contact with soil is completely unrelated to the exposure pathway under consideration - the purposeful ingestion of crab tissue. Furthermore, bioaccumulaton of these contaminants in crab tissue is not considered by the qualitative analysis presented here. Remove this discussion from the text. A recommendation for further investigation of impacts to crabs and other local species that may be consumed by island inhabitants and a subsequent evaluation of human risk associated with consumption of these species should be included in the conclusions section of the report.

90. Section 6.8, paragraph 7 - Cumulative risk for each receptor includes risks from all media combined. Risks to receptors presented for various ages should be combined to represent exposure to a resident over 30 years. Separating the 30-year exposure into various age groups (i.e., a child, youth and adult) allows for the evaluation of potentially sensitive exposures relating to age and simplifies calculations, but the overall risk to the receptor is the sum of the risks during each of the age periods.

91. Section 6.10.2 - Thallium, cadmium, antimony, arsenic and iron were not detected in the site-specific background groundwater samples, although the detection limit for thallium in the site-specific background sample is consistent with the detected concentrations in on-site wells. Arsenic and thallium were not detected in the base-wide groundwater samples (detection limits unknown). This specific information should be included in this section rather than a general statement that "most of these groundwater COPCs were also detected in the general background wells and in the two site-specific background wells..." Also include a discussion of those risk drivers that exceeded background concentrations. The maximum arsenic concentration exceeded background by a factor of 3. The maximum selenium concentration exceeded the highest background concentration by a factor of 2. The maximum antimony concentration exceeded the background concentration by a factor of 20.

    Arsenic, antimony and thallium are site-related contaminants, based on an evaluation of surface soil data. Antimony was detected above background and SSL concentrations in surface soil; arsenic was detected above background in soil; thallium was detected above background concentrations. This indicates that these metals are site-related. Note that the use of subsurface soil data results to support the assumption that leaching is not occurring is inappropriate due to the shallow depth to groundwater. The depth of the subsurface soil samples is not provided in this report. However, if they were collected from below 1 to 2 feet bls, they represent aquifer matrix samples, not vadose zone samples. Revise the text accordingly.

92. Section 6.10.2.1 - Total concentrations should be used to determine risk under the assumption that groundwater is a potable drinking water source. The purpose of this section is to discuss background concentrations of antimony. Therefore, remove conclusions or recommendations from this section and include a discussion of background concentrations of antimony in this section.

93. Section 6.10.2.2 - Arsenic was not detected in any background wells. This statement should be included in this section. Also, arsenic was detected in MW02 at a concentration of 51.7 ug/L. This groundwater sample was collected in the vicinity of the following surface soil samples: SS01, which has an arsenic concentration of 7.6 mg/kg; SS23, which has an arsenic concentration of 7.9 mg/kg; and SS13, which has an arsenic concentration of 3.09 mg/kg. The SSL for arsenic is 1 mg/kg at a DAF of 1. These exceedances along with background data indicate that arsenic in surface soil is a site-related contaminant and a source of contamination to groundwater. Revise the text accordingly.

94. Section 6.10.2.7 - Thallium was detected above background concentrations in surface soil samples; therefore, site soils do have elevated thallium levels. This indicates that the presence of thallium is related to site activities. Revise the text accordingly.

95. Section 6.10.3 - Include a discussion of lead concentrations in this section. Elevated lead concentrations have been detected in surface soil, groundwater, sediment and surface water. Elevated lead concentrations in surface soil are related to site activities and surface soil contamination is migrating to all other media. Lead was detected in surface soil sample SS03 at 104 mg/kg. This sample is in the vicinity of sediment samples SD02 and SD10, which have elevated lead concentrations of 144 mg/kg and 95.5 mg/kg. Further investigations and/or actions should be taken to address lead in environmental media, including sediments, due to the presence and potential accumulation of this contaminant in food resources (i.e., crab) at this site.

96. Section 6.11, paragraph 2 - Perchlorate detection limits were not sufficiently low to determine the presence or absence of perchlorate above levels of human health concern. Additional sampling should be conducted and analysis performed by a laboratory that can achieve detection limits at or below 4 ug/L.

97. Section 6.11, paragraph 3 – The Ingestion of Food Resources exposure pathway should be evaluated in this risk assessment. Site-related contaminants have been detected in crab tissue providing for exposure via this scenario. Also, arsenic, antimony and thallium were detected above background concentrations and pose a human health risk at this site through the ingestion of groundwater exposure pathway.

    Further investigation is required to determine the extent of impacts to food resources at the site, to evaluate potential lead hotspots in soil and the potential for migration of metals from surface soil and groundwater to surface water, as discussed in the comments provided.

98. Page 8-6, Paragraph 4 - The citation "EPA, 1997" should be "EPA, 1997a" to be consistent with the citation in Section 9 (References).

99. Page 8-9, Section 8.2 - While detected contamination associated with the SWMU 6 disposal area may have been found to be limited based on the limited data available, this is a not 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 SWMU 6, a long term monitoring program must be implemented to assess whether site conditions change over time. Such a 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 SWMU 6 as a disposal area, consideration of certain remedial actions are warranted. 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.

100. Page 8-9, Paragraph 3 – The presence of glass and metal debris identified in the report is unsightly, and therefore impacts public welfare, and is hazardous to public safety through physical harm. Maintenance on limits to site access such as fencing or institutional controls may be required in the foreseeable future to prevent risk of physical harm if the remaining waste materials are not removed.