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CARIBBEAN ENVIRONMENTAL PROTECTION DIVISION
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October 29, 2009

Mr. Kevin Cloe
Project Manager
Commander Atlantic Division
Naval Facilities Engineering Command
6506 Hampton Boulevard
Norfolk, VA 23508-1278

Re: Review of the Draft Remedial Investigation Report Solid Waste Management Unit 4, Former Naval Ammunition Support Detachment, Vieques, Puerto Rico

Dear Mr. Cloe:

The U.S. Environmental Protection Agency (EPA) completed the review of the Investigation Report Solid Waste Management Unit 4, Former Naval Ammunition Support Detachment, Vieques, Puerto Rico, dated August 2009. Enclosed you will find our comments.

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

Sincerely,

Daniel Rodríguez
Remedial Project Manager
Response and Remediation Branch

Enclosure

cc: Wilmarie Rivera, EQB, w/ encl.
Richard Henry, FWS, w/encl.
Brett Doerr, CH2M Hill, w/ encl.

EPA COMMENTS ON THE
DRAFT REMEDIAL INVESTIGATION REPORT
SOLID WASTE MANAGEMENT UNIT 4
FORMER NAVAL AMMUNITION SUPPORT DETACHMENT
VIEQUES, PUERTO RICO
AUGUST 2009

GENERAL COMMENTS

1. Section 2.2.4, Groundwater, Page 2-19, Table 2-2, Summary of Monitoring Well Construction Details, and all of the RI Report figures showing the monitoring well locations (e.g., Figure 2-2, Sampling Locations) indicate that monitoring well MW04, which was installed in 2000, was destroyed by a hurricane in 2003. It is unclear what is meant by "destroyed". If the inner well casing was bent so as to prevent future sampling or measurements and was not properly abandoned, the well could act as a conduit for surface contaminants to migrate vertically and impact the groundwater. It is unclear whether the destruction of monitoring well MW04 was discussed in previous Vieques reports. For clarity, revise the Draft Remedial Investigation (RI) Report for Solid Waste Management Unit (SWMU) 4 (hereinafter referred to as the RI Report) to discuss the nature of the destruction and the steps that may have been taken to properly abandon or seal monitoring well MW04.

2. The areas depicted on Figure 2-3, Surface Soil Sample Locations – Inset 1 and Figure 2-5, Subsurface Soil Sample Locations – Inset 1, appear to coincide with the area outlined as Inset 3 on Figure 2-2, Sampling Locations. In addition, the area shown as Inset 1 on Figure 2-2 does not appear to correspond to any other figures in the RI Report. Furthermore, areas shown on several of the figures in Section 4 of the RI Report also do not correspond to the insets shown on Figure 2-2. For example, Figure 4-10B, VOC Detections in Surface Soil – Inset 3, does not correspond to either Inset 1 or Inset 3, while Figure 4-14A, Pesticide/PCB Detections in Surface Soil – Inset 1, appears to correspond to Inset 3 on Figure 2-2. Revise the RI Report to correct these discrepancies.

3. A number of the figures provided in the Draft RI Report SWMU 4 show some of the various explosives safety arcs (with differing radii) surrounding the site. Most exclude the ocean water portion that should be inside the arcs (i.e., the arc follows the beach shoreline where it intersects with the ocean water in some instances). Please provide the reason for this or redraw the arcs to include the water area described thereby.

4. The terms 'fuze" and "fuse" are used in the Draft RI Report SWMU 4 in a manner that may cause some confusion. The military has generally (exceptions exist) confined the term "fuze" to those items that are assembled to ordnance items and that initiate the explosive train therein by their reaction to stimulus of some type. 'Fuse" has normally been reserved for those items assembled to ordnance materials (usually

detonators or blasting caps) which are lighted by some means and burn (or in some instances detonate) to initiate explosive charges. It would eliminate some potential confusion if the same spelling were used throughout the document for each of these two categories of ignition devices. Please make this change throughout the Draft RI Report SWMU 4.

5. The page numbers used in both the Executive Summary and Section 1 of the Draft RI Report SWMU 4 vary as to their format throughout these two portions of the document. Please review this discrepancy and correct it as needed.

6. Additional refinement steps, not outlined in the Draft 2009 Ecological Risk Assessment (ERA) Protocol for Vieques (Vieques Protocol), were used in this Screening-Level Ecological Risk Assessment (SLERA) to select Chemicals of Potential Concern (COPCs). These unscheduled refinement steps are listed below:

   a. A sample-by-sample comparison to a Toxicity Reference Value (TRV) or background Upper Tolerance Limits (UTLs) is often performed when the maximum Hazard Quotient (HQ) or the mean HQ exceeded 1.0 for a specific chemical. The 1997 EPA Superfund Guidance (EPA 540-R-97-006) recommends using only the highest measured or estimated on-site contaminant concentration of each environmental medium to ensure that ecological threats are not missed. Please remove the sample-by-sample comparison as a method for reducing the list of COPCs.

   b. The maximum concentration of a chemical lacking a TRV is often compared to the TRVs of similar chemicals. For example, the Risk Evaluation Section of Appendix W on page 1-23 states "Two SVOCs (benzo[g,h,i]perylene and indeno[1,2,3-cd]pyrene) and one VOC (carbon disulfide) were identified as COPCs in surface water because TRVs were not available. The maximum detected concentrations of these chemicals, however, were less than TRVs of other similar SVOCs and VOCs." It is unclear which chemicals were used in the comparison because neither the text nor Table W-25 (Screening Statistics – SWMU 4 – Surface Water) identifies which chemicals have similar toxicity. It is recommended, for clarification purposes, to add a footnote to each Screening Statistic Table (W-24 though W-30) to identify those chemicals which use surrogate TRV(s).

   c. A chemical concentration in one medium is compared to other on-site media to determine if the chemical is site-related or naturally occurring. For example, copper in the surface water of the lagoon was determined to be naturally occurring, because it was not observed in the site soil or groundwater. This approach is a poor substitute for comparing site concentrations to a local background reference location. A review of Table W-23 (Background Data and Upper Tolerance Limits) found no background marine surface water or sediment data. Please explain why no marine background surface water and sediment data was available for comparison.

d. Additional screening values, not listed in the TRV tables of the Vieques Protocol, are used to remove certain COPCs from further evaluation. For example, barium is removed from the lagoon sediment COCP list because its mean HQ of 1.5 could be reduced to below 1.0 if the threshold effect level presented by NOAA was used. Please refrain from using TRVs not presented in the Vieques Protocol.

e. The presence of certain chemicals in the laboratory blanks is used to justify removing four chemicals from the ephemeral stream sediment COPC list. The laboratory data is assumed to have undergone validation, which would account for blank contamination. Therefore, more information is necessary to support the removal of these chemicals based on blank considerations. It may be necessary to amend the Vieques Protocol to ensure that all parties agree with these new refinement steps.

It may be necessary to amend the Vieques Protocol to ensure that all parties agree with these new refinement steps.

7. The uncertainty analysis in Appendix W (Ecological Risk Assessment) briefly discusses the potential risks for non-detect chemicals with a mean reporting limit based HQ above 1.0. It is understood that the magnitude of uncertainty increases as the HQs for such chemicals become larger. Several non-detect chemicals have mean HQs above 50 and 100. For example, the mean Laguna Boca Quebrada surface sediment HQ for 2,4,5-trichlorophenol equal 140 (see mean HQ for 2,4,5-trichlorophenol in Table W-27). This exceptionally large HQ suggests that 2,4,5-trichlorophenol has great potential to cause ecological harm even though it was listed as non-detect. It is suggested to include a new table in the uncertainty analysis showing the ten highest non-detect mean HQs for each media type per habitat. This concise information will help risk managers decide if the potential risk associated with non-detect chemicals is acceptable.

8. Table W-21 (Ingestion-Based TRVs for Mammals) and Table W-22 (Ingestion-Based TRVs for Birds) list multiple sets of TRVs for select metals, PCBs, and pesticides. However, only one set of TRVs is ultimately used to calculate the HQs. Appendix W (Ecological Risk Assessment) does not provide the rationale used to select one set of TRVs over another. The food web modeling would generate substantially different HQs depending on which set of TRVs are selected. For example, the No Observable Adverse Effect Level (NOAEL) HQ for the spotted sandpiper exposed to Aroclor 1016 is 1.31 (Table W-31), but could also equal 5.47, depending on whether the calculations used a NOAEL TRV of 1.5 (see third NOAEL for Aroclor 1016 in Table W-22) or 0.36 (see first NOAEL for Aroclor 1016 in Table W-22) . Please explain the process for selecting one set of TRVs over another to calculate chemical-specific HQs when multiple TRVs are available for a chemical. In addition, consider amending the Vieques Protocol to ensure clarity in future SLERAs.

9. Volatile organic compounds (VOCs) were detected in soil and groundwater; however, potential exposure via indoor inhalation resulting from the vapor intrusion pathway was not evaluated in the HHRA. Revise the HHRA to address the vapor intrusion

pathway, providing decision rationale to support its exclusion, and clarify whether any soil gas data have been collected at the site to-date. The decision rationale should include a discussion of specific VOC concentrations in site media and an evaluation of these data in light of USEPA's 2002 guidance document, entitled: *Draft Guidance for Evaluating the Vapor Intrusion to indoor Air Pathway from Groundwater ad Soils*. If the decision to exclude vapor intrusion is based on the absence of buildings in the future, please be aware that this would require an institutional control of some type and trigger the need for Five Year Reviews on this area.

10. SWMU 4 was formerly used as an open burn/open detonation (OB/OD) site; however, it appears that dioxins/furans were not sampled at the site. Please revise the HHRA and the RI to clarify why dioxins/furans were not sampled and subsequently evaluated in the site characterization and risk evaluation. This appears to be a data gap that may require additional sampling. If chlorinated solvents were burned at SWMU 4, associated risk and hazard resulting from exposure to dioxins/furans in site media will need to be evaluated.

11. The conclusions of the RI indicate that there is no unacceptable human health risk. Based on the existing information in the RI and HHRA as presented, this conclusion is not clear.

SPECIFIC COMMENTS

1. **Acronyms and Abbreviations, page ix:** The acronym "ATF" is incorrectly defined in the section. The correct definition is "Alcohol, Tobacco, Firearms and Explosives." Please make this correction.

2. **Executive Summary, Introduction, page ES-1:** The second paragraph of this section states that, "SWMU 4 is approximately 400 acres in size and is known as the former Open Burn/Open Detonation (OB/OD) Site that was used for the thermal destruction of retrograde and surplus munitions, fuels, and propellants from 1969 through 1979." However, Section 1.2.2, SWMU 4, indicates that, "The SWMU 4 OB/OD units were used for the thermal destruction of retrograde and surplus munitions, fuels, and propellants from 1969 through 1979, and may have periodically been used as far back as the late 1940s." As these two statements concerning the period of use of the OB/OD units appear to be incongruent, please revise the statement from the introduction to include the possible use of the site beginning in the 1940s timeframe.

3. **Section 1.1.1, Munitions and Explosives of Concern Investigation, page ES 1-2, 5th Bullet:** Delete the word "sufficient."

4. **Section 1.1.3, Background Documents, page 1-3, 3rd Bullet:** EPA does not have a copy of the Draft Final Ordnance/Explosive Master Work Plan, Former U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico, June 2003. We have a copy of the Final Ordnance and Explosive (OE) Master Work Plan, Former U.S.

Naval Ammunition Support Detachment, Vieques Island, Puerto Rico, October 26, 2001. Please correct or submit a copy of the latest draft final OE Master Work Plan mentioned in the draft RI report.

5. **Section 1.2.2, SWMU 4, and Section 1.2.3, Previous Investigations, Initial Assessment Study, pages ES 1-4 and 1-5:** These sections state that UXO found around the targets on the EMA were disposed at the SWMU 4 OB/OD area. Please verify that this information is accurate. This conflict with previous Navy statements that UXO cannot be transported great distance for disposal.

6. **Section 1.2.3, Previous Investigations, page, 1-5:** The introduction to this section states that the previous environmental investigations conducted at SWMU 4 are summarized in Table 1-1. This section also describes the Background Investigation on Page 1-7, that was conducted in 2000. However, the Background Investigation was not included on Table 1-1, Summary of Previous Investigations and Environmental History. In addition, on Page 1-5, under the sub-heading, Initial Assessment Study, the Phase II RCRA Facility Assessment (RFI) was described as being conducted in October 1988. However, Table 1-1, indicates that the Phase II RFI field work was conducted in August 1988, with a report date of October 1988. For clarity, the RI Report should be revised to address these issues and the Phase II RFA that was conducted in October 1988 should be a separate sub-section under Section 1.2.3, Previous Investigations.

7. **Section 1.2.3, Previous Investigation, Initial Assessment Study, page 1-5**: The first paragraph of this section contains a sentence that reads, "The range had a maximum blow range of 4,000 pounds of TNT equivalent." This should be revised to read, "There was a maximum range limit of 4,000 pounds of TNT equivalent per detonation." Please make this correction.

8. **Section 2.1.4, Vegetation and Brush Removal, pages 2-3 and 2-4**: The first paragraph of this section contains a sentence that reads, "The vegetation removal team (mechanical and hand clearing) were supported in their work by a UXO technicians consisting of one Technician III and one Technician II." As currently constructed, the exact intent of this sentence is unclear. Please revise the cited sentence to better express the original intent thereof.

9. **Section 2.1.5, Secondary Surface MEC/UXO Removal, page 2-4**: The first paragraph of this section references "Whyte all-metals detectors." It appears that this is referring to a metal detector made by the White company. If this is the case, please correct the reference to use the term "White" in place of the current term "Whyte." If the referenced item is a Whyte all-metals detector, please list the model thereof and the manufacturer.

10. **Section 2.1.7, Anomaly Excavation/Intrusive Investigation, page 2-8**: The first paragraph of this section states that, "Typically, 25 flagged anomalies were evaluated intrusively in each investigation quadrant." No basis for this number of selected

anomalies is noted. Please expand the section to include a statement as to why 25 anomalies were selected per quadrant. Also, the same paragraph notes that, "Intrusive operations were not performed at all grids investigated; only surface evaluations were made at some grids." No reason is provided as to the selection basis for the surface-only investigations. Please revise the cited section to provide the cited selection criteria.

11. **Section 2.1.8, MEC/UXO and Scrap Metal Distribution, page 2-10**: The second paragraph states that, "The site UXOSO and SUXOS were present during demilitarization activities to minimize the potential for working on items that may still have contained energetic material or that may have needed additional demolition prior to certification." This sentence is difficult to understand. Please revise the noted sentence to better express the intent thereof.

12. **Section 2.1.8, MEC/UXO and Scrap Metal Distribution, page 2-11**: The MEC Consolidated Demolition and Demilitarization subsection contains a sentence which states that, "During the Phase I investigation efforts, an aluminum-cutting tool was used to demilitarize aluminum canisters." The identification of the munitions item represented by the term "aluminum canisters" is unclear. Please revise the subsection to include the identification of the "aluminum canisters" by munitions type and model number.

13. **Section 2.1.10, Quality Control, page 2-15**: The first paragraph of the Quality Assurance Activities subsection reads that, "The CH2M HILL UXOQCS performed a QA inspection of at least 10 percent of each grid that had passed the QC process. The CH2M HILL UXOQCS performed a magnetometer sweep of approximately 10 percent of the grid area to identify metallic anomalies. No QA deficiencies were found during the SWMU 4 MEC investigation." No statement is provided as to whether the anomalies were resolved. Please revise the cited subsection to provide this information.

14. **Section 2.2.2, Soil, page 2-17:** The third paragraph of this section states that the "[s]ubsurface samples were generally collected at 2-foot intervals to a proposed depth of 6 feet [below ground surface] bgs..." However, at three locations (SB-31, SB-35, and SB-39), an apparent "burn layer" (black charred soil) was encountered beneath 6 feet bgs…" therefore additional subsurface samples were collected…to a depth of 8 feet bgs." Table 2-1, Summary of Samples Collected, indicates that "samples collected with -68- in the sample identification were collected from 6 to 8 feet bgs. Of the three aforementioned samples that were collected below 6 feet bgs, sample location SB-39 was not identified with the "68" in the sample identification. Revise Table 2-1 to show that sample SB-39 was collected from the 6 to 8 foot bgs interval.

15. **Section 2.2.4, Groundwater, Monitoring Well Installation, page 2-19:** The first paragraph states that a total of 10 monitoring wells were installed during the RI including a replacement well (MW18) that replaced monitoring well MW04, which was destroyed in a hurricane in 2003 (Figure 2-7). However, Figure 2-7, Surface

Water and Sediment Sample Locations, does not depict the monitoring wells. Revise the RI Report to reference the correct figure (i.e., Figure 2-8, Monitoring Well Locations).
In addition, this same paragraph states that "[t]he total depths of these wells ranges from 20 to 62 ft bgs" and "[a] summary of the monitoring well construction details…is summarized in Table 2-2." However, Table 2-2, Summary of Monitoring Well Construction Details, indicates that the well depths ranged from 24 feet bgs (or 18 feet if MW 04 is considered) to 61 feet bgs. Revise the RI Report to indicate the correct depth range of the monitoring wells.

16. **Section 2.2.4, Groundwater, Hydraulic Conductivity Testing, page 2-21:** The first paragraph states that rising- and falling-head slug tests were performed at eight of the monitoring wells and were performed multiple times at each well. However, Appendix K, Hydraulic Conductivity Test Data Sheets and Plots, and Table 3-1, Monitoring Well Hydraulic Conductivity Test Results, show that only one rising-head slug test was performed in monitoring well MW02. Provide the rationale in the RI Report as to why only one slug test was conducted in this well.

17. **Section 3.1.5, Hydrogeology, Geology, page 3-4:** The fourth paragraph states that "[t]he upper saprolite was encountered to a depth that ranged from 10 to 15 [feet below ground surface] ft bgs." This appears to be true for the stratigraphy shown on Figure 3-7, Geologic Cross-Section B-B'. However, according to Figure 3-6, Geologic Cross-Section A-A', the upper saprolite was encountered to a depth less than 10 feet bgs (i.e., approximately 7 feet bgs at Surface Soil/Subsurface Sample SS/SB-40 and 2 feet bgs at monitoring well MW-04) on the southern portion of SWMU 4, south of MW-11. Revise the RI Report to indicate the correct thickness of the upper saprolite layer.

18. **Section 4.1.3, Nature and Extent of MEC, Physical Characteristics, page 4-3**: The first paragraph contains a sentence that reads that, "The surfaces of some of the OB/OD pits had visible metal debris visible, ranging from large pieces of identifiable scrap to small unidentifiable scrap." This sentence is confusing. Please revise the noted sentence to better express the intended meaning.

19. **Section 4.2.1, Soil, Semi-Volatile Organic Compounds, page 4-8**: The fourth paragraph of reads that, "Of the other detected SVOCs, benzo(g,h,i)perylene, bis-2(ethylhexyl)phthalate, dibenz(a,h)anthracene, di-n-butylphthalate, indeno(1,2,3-cd)pyrene, and naphthalene were also detected in the laboratory blank samples. These compounds are not believed to be site related constituents; rather they are likely related to the laboratory analysis (**Appendix O**). Phthalates (such as bis-(2-ethylhexyl)phthalate and di-n-butylphthalate) are common laboratory contaminants."

    While the cited Phthalates may be laboratory contaminants, it should also be noted that dibutylphthalate and diethylphthalate are also found as gelatinizing and waterproofing agents in many artillery and mortar propellants. As such, they may be

present in the site soil due to the destruction of these propellants there. Please make note of this in the cited section.

20. **Section 4.2.1, Soil, Semi-Volatile Organic Compounds, page 4-8:** This section states that several SVOCs, including many PAHs, were detected in the soils (surface and subsurface). The last paragraph of this section states that the presence of these compounds is attributed to laboratory analysis. This section references Appendix O, where, in Section 3.3.2.3, the text states that the PAH results qualified as "U" are defined as "attributable to blank contamination."' However, this is confusing, because the "U" qualifier for organics typically indicates that the compound was analyzed for, but not detected. In the data summary tables in Chapter 4, the "U" qualifier is defined as "The material was analyzed for, but not detected." Table I.1 on the CD with the appendices includes a list of lab qualifiers that also defines the "U" qualifier as undetected. Please clarify how the PAHs results have been qualified through the validation process as associated with laboratory contamination.

21. **Section 4.2.1, Soil, Pesticides/PCBs, page 4-9:** This section states that, "courts have found that normal application of pesticides does not constitute a release or disposal under CERCLA (Comprehensive Environmental Response Compensation and Liability Act)." It seems practical to include this information in the Vieques Protocol. The addition of this information would eliminate the need to repeatedly discuss why pesticides can be removed from the COPC list if they were only used for pest control at a site.

22. **Section 4.2.1, Soil, Explosives, page 4-9**: The Explosives subsection lists the compounds of interest at SWMU 4. Absent from the list is ammonium picrate (Explosive D), which was the most often used explosives filler for Naval projectiles of 3-inch and larger calibers manufactured prior to, during, and for some years after the Second World War. As a result, the potential presence of ammonium picrate at SWMU 4 cannot be discounted. Please revise the appropriate sections of the Draft RI Report SWMU 4 to compensate for this apparent omission.

23. **Section 4.2.2, Groundwater, Inorganic Constituents, page 4-15, 7th Bullet:** Detected concentrations of manganese in groundwater exceed the screening criterion in several locations. The text suggests that manganese concentrations are believed to be naturally occurring based on its presence and distribution in soil. However, manganese concentrations shown on Figure 4-25 do not confirm that manganese was detected across SWMU 4. MW 01, 9, 13, and 17 show no detections of manganese. It may be premature to conclude that manganese is present naturally without additional information. For example, a map showing the soil results and MW results would identify areas of co-location of manganese in soil and groundwater and provide another line of evidence to support this conclusion.

24. **Table 4-1, MEC Items Identified and Recovered, SWMU 4 MEC Remedial Investigation:** Table 4-1 provides a listing of the subject items by MEC type. However, the nomenclature used to describe the items is often incomplete. This result in an inability for the reader to determine the nature and explosives

characteristics of the items listed. For example, "20mm cartridge" is the most prevalent item noted, with over 1,200 of them recovered. Unstated is the type of 20mm cartridges – were they HE, HE-I, TP, AP, etc.? Also, items such as "CAD," "Nose fuze," "Booster Fuze," and "Incendiary" were listed. Please revise the cited table to correct as much of the noted nomenclature as can be determined from available records.

25. **Section 5, Chemical Fate and Transport, Page 5-1:** The last sentence in the fourth paragraph states that the constituents considered COPCs [chemicals of potential concern] and their chemical properties are summarized in Table 5-2. However, the title of Table 5-2 is "Physical and Chemical Data Representative Contaminants" and the left-hand column indicates the "Representative Constituents of Interest." Revise Table 5-1 or the RI Report to indicate whether the table is representative of all of the COPCs for this RI.

26. **Section 5.1.4, Transformation, page 5-3:** Of all of the 18 metals included as COPCs on Table 5-2, Physical and Chemical Data of Representative Contaminants, silver is not discussed in any of the subsections of this section. Revise the RI Report to included silver in the discussion of transformation.

27. **Section 5.2.1, Potential Sources of Contamination, page 5-7**: The first paragraph on the noted page contains a sentence which states that, "The majority of the MEC recovered from SWMU 4 were 20mm Marine artillery projectiles that contained high explosive filler, tracers, fuzes, or a combination of each." It should be noted that 20mm munitions items are not classed as artillery, and that all of the armed services had weapons that fired these items during the entire operational lifetime of SWMU 4. Please revise the noted section to reflect this information.

28. **Section 5.2.1, Potential Sources of Contamination, page 5-7:** The fourth paragraph on Page 5-7 states that numerous inorganic constituents (i.e., metals) were observed in the various media at SWMU 4. Of the metals discussed in this section, chromium was absent. Since chromium is a COPC and is included on Table 5-2, Physical and Chemical Data of Representative Contaminants, revise the RI Report to include chromium.

22. **Section 8.4.2, Aquatic Habitats, Surface Water, page 8-4:** The second paragraph in this section discusses copper concentrations in the lagoon surface water in conjunction with site surface soil concentrations. The references to soil data are confusing given that the heading for this section is "Surface Water". It appears that the objective of this paragraph is to show the relationship between the copper concentrations in surface water and surface soil. However, the structure of this paragraph obscures this relationship. It is suggested to add a sentence stating why surface soils concentrations are included in the discussion.

23. **Section 9.2.7, Human Health Risk Assessment, page 9-10:** Please revise the text in the third paragraph to state that the use designation of the groundwater at SWMU 4 is

potable. This is an ARAR and is significant in both the identification of potential exposure pathways as well as the development of remedial action objectives.

24. **Section 9.3, Proposed Future Action, page 9-11:** Please revise the second paragraph to state that the use designation of the groundwater at SWMU 4 is potable. This is an ARAR and is significant in both the identification of potential exposure pathways as well as the development of remedial action objectives.

25. **Appendix V, HHRA, Section 2.2.2, Comparison to Background Levels, Chemicals with Missing Screening Levels, page 2-4:** This section indicates that a screening level was calculated for 3-nitroaniline because a Regional Screening Level (RSL) was not available. However, this section does not reference the table where these calculations are presented. Revise Section 2.2.2 to reference the aforementioned calculations.

26. **Appendix V, HHRA, Section 2.3, Chemicals of Potential Concern, Residents, page 2-5:** This section states that "Three two explosives, one SVOC [semi-volatile organic compound] and . . . were identified as COPCs in surface soil." The text is unclear. Please revise this sentence to clarify that *three* explosives were identified as COPCs in surface soil.

27. **Appendix V, HHRA, Section 3.0, Exposure Assessment, page 3-1:** This section does not define a potentially complete pathway. For completeness and clarity, please revise Section 3.0 to define a potentially complete pathway, to include a conceptual site model (CSM) diagram of potentially complete exposure pathways, and to reference Table 1 of Appendix V Attachment 1 (Selection of Exposure Pathways). A CSM and Table 1 (of Appendix V, Attachment 1) should also be referenced in the RI Report itself. In addition, please clarify in Section 3.0 of Appendix V why indoor air inhalation potentially impacted by vapor intrusion is not a component of a complete exposure pathway for SWMU 4.

28. **Appendix V, HHRA, Section 3.1, Exposure Pathways Quantified, Fish Consumers, page 3-2:** Various assumptions were made in the calculation of exposure point concentrations (EPCs) in fish tissue. For example, the organic carbon content of sediment was assumed to be three percent, the fish lipid content was assumed to be eight percent and the percent moisture in fish fillets was assumed to be 75%. Please revise Section 3.1 to provide the justification for these assumptions and cite appropriate reference documents as needed.

29. **Appendix V, HHRA, Section 3.2.2, Exposure Factors, page 3-4:** Section 3.2.2 indicates that the form of arsenic in fish and crab tissue is assumed to be 10% inorganic and 90% organic arsenic, and that carcinogenic risk was estimated using 10% of the arsenic concentration whereas noncarcinogenic hazard was evaluated using 100% of the arsenic concentration. For clarity, please revise this section to provide the rationale for this approach.

30. **Appendix V, HHRA, Section 5.4, Summary of Risk Estimates, page 5-3:** This section provides a summary of risk estimates based upon reasonable maximum exposure (RME) to current, future and hypothetical site receptors. Excess lifetime cancer risk (ELCR) exceeds $1x10^{-4}$ for various receptors including hypothetical future adult/child ($2x10^{-3}$), current/future adult fish consumers ($2x10^{-3}$), current/future youth fish consumers ($2x10^{-3}$) and current/future child fish consumers ($1x10^{-3}$). While a refinement of risk for these receptors results in risk values within EPA's risk range of 1×10^{-6} and $1x\ 10^{-4}$, the refinement approach does not appear entirely appropriate. For example, while alpha-BHC may be present in groundwater as a result of application to soil to control pests, it still exists in groundwater at levels that are not protective of human health, and therefore, should not be removed from further consideration during the refinement process.

    In addition, manganese was also removed from further consideration in the refinement process on the basis that detected concentrations are within background soil and groundwater concentrations. However, appropriate sections of the RI Report have not been referenced to support this conclusion. In fact, the RAGS Part D tables (e.g., Table 2.1RME) indicate that manganese was detected above background concentrations. Please provide the complete rationale to support the elimination of manganese as a chemical of concern (COC). It is important to note that, based on the nature of activities conducted at SWMU 4 [a former open burn/ open detonation (OB/OD) site], it is entirely possible that manganese detected at the site is related to historical activities. Manganese is released into the environment from various sources including open burning from fossil fuel combustion (Agency for Toxic Substances & Disease Registry [ATSDR] 2009: http://www.atsdr.cdc.gov/toxprofiles/tp151.html, Toxicological Profile for Manganese). Please revise the HHRA to address the aforementioned concerns regarding the refinement of risk for current, future, and hypothetical site receptors. Revise the final conclusions regarding site COCs and HHRA conclusions presented in the RI, accordingly. Specifically, ensure that the HHRA is revised to include an expanded and detailed assessment as to whether manganese is or is not site-related.

31. **Appendix W, Ecological Risk Assessment, Section 1.5.1, Comparison with Medium-Specific TRVs, Surface Water, Ephemeral Stream, page 1-22:** Table W-26 (Screening Statistics for SWMU 4 Surface Water – Ephemeral Stream) identified 11 unfiltered metals, 3 SVOCs, and 20 pesticides/PCBs with maximum HQs above 1.0. However, not all of these chemicals are listed in this section. Please revise the text to accurately reflect all of the chemicals with maximum HQs above 1.0. As a result of this update, the list of maximum HQs greater than 1.0 will no longer match the list of mean HQs greater than 1.0. Please revise accordingly.

32. **Appendix W, Ecological Risk Assessment, Section 1.5.1, Comparison with Medium Specific TRVs, Surface Sediment, Ephemeral Stream, page 1-23:** Table W-28 (Screening for SWMU 4 Sediment – Ephemeral Stream) identified eight metals, 22 pesticides/PCBs, 20 SVOCs, and six VOCs with maximum HQs above 1.0. However, not all of these chemicals are listed in this section. Please revise the

text to accurately reflect all of the maximum HQs above 1.0. As a result of this update, the list of maximum HQs greater than 1.0 will no longer match the list of mean HQs greater than 1.0. Please revise accordingly.

33. **Table W-23, Background Data and Upper Tolerance Limits (UTLs)**: The background data presented in Table W-23 do not match the data presented in Table 22 (Background Data) from the Vieques Protocol. For example Table W-23 has an arsenic UTL for soil of 1.20 mg/kg while Table 22 has a value of 2.20 mg/kg. Please explain this discrepancy.

34. **Table W-34, Comparison of Site Surface Water COPC Concentrations to Background Concentrations**: Seven chemicals (arsenic, cadmium, mercury, selenium, silver, thallium, and zinc) show a mean surface water or sediment concentration, but no maximum concentration. Please add a footnote explaining how a mean was calculated, but a maximum could not be determined.