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U S NAVY RESPONSES TO REGULATOR COMMENTS ON DRAFT FEASIBILITY STUDY/CORRECTIVE MEASURES STUDY FOR SITE 3 CAUSEWAY LANDFILL MCRD PARRIS ISLAND SC

6/5/2000

NAVAL FACILITIES ENGINEERING COMMAND SOUTHERN DIVISION

RESPONSES TO REGULATORY COMMENTS TO THE DRAFT FS/CMS FOR SITE/SWMU 3

RESPONSE TO U.S. EPA COMMENTS

Reviewer: Robert H. Pope
Federal Facilities Branch
Waste Management Division

General Comments

1. **Comment:** Page ES-3, Bullet 4

   The appropriate RGO should be to eliminate migration of COCs, not just reduce. Revise the text.

   Response:

   The text of report will be changed to reflect the requested language; however, please note this change is being made with the understanding that it is not possible to ever completely eliminate potential migration of COCs.

2. **Comment:** All Alternatives

   All contaminated soils that represent a Human Health Risk must be covered with a minimum of 18 inches of cover and 6 inches of topsoil. 1 foot of cover for any contaminated soils that represent a Human Health risk is unacceptable.

   Response:

   Only one surface soil location (PAI-03-SS-01) contains a detection of a chemical [benzo(a)pyrene] that exceed a site-specific human health RGO corresponding to an ILCR equal to 1.0E-06. In all action alternatives, the PAI-03-SS-01 area will be covered with 18 inches of cover and 6 inches of topsoil as indicated in the FS. Please note that no surface soil locations exceed site-specific human health RGOs corresponding to ILCRs equal to 1.0E-05 or 1.0E-04.

3. **Comment:** Page ES-4, Alternative 2a (and all other presented Alternatives)

   The FS should and the forthcoming Proposed Plan (PP) must be more specific regarding the sampling and reporting. It must be stated that the sampling (surface water, sediment, groundwater) will be done on an annual basis, at a minimum. In addition, it must be stated that the annual sampling results will be reported to the regulatory agencies on an annual basis along with the monitoring results of the Land Use Controls (institutional controls). Also, the PP and Record of Decision must detail the Land Use Controls that will be implemented at Site 3.

   Response:

   The FS report will be modified to add sediment testing in addition to the current language regarding the annual sampling of groundwater. In accordance with discussions during the

February 10-11, 2000 Partnering Team meeting, surface water sampling will not be conducted. Sampling results will be reported to the regulatory agencies on an annual basis. The Proposed Plan and Record of Decision will detail the Land Use Controls that will be implemented at Site 3.

4. **Comment:** Alternatives 3a and 3b:

It should be stated that as part of the Remedial Design, any "hot spot" areas would need to be further and more completely delineated.

Response:

The description of the sediment excavation portions of Alternatives 3a and 3b in Sections 5.1.4 and 5.1.5 contain similar language. No changes are proposed.

5. **Comment:** General

The FS should also state that the entire causeway will be covered down the center by an asphalt road which will help reduce infiltration of water and flushing of contaminants into the sensitive ecosystems of the Pond and Marsh. Also, it should be stated that the slopes of the causeway will be graded in areas where erosion is occurring to enhance surface water runoff and even further reduce infiltration and any resultant flushing.

Response:

The text of the report will be modified to indicate that an asphalt road will run along the length of the causeway. Additionally, to reduce infiltration, drainage ditches will be installed along the side of the road to preferentially drain road runoff to the marsh and pond. Slope stabilization and erosion control measures currently exist in all proposed alternatives.

6. **Comment**: Chapter 2

The text of Section 2.3 and 2.4 provide a brief discussion of the nature and extent of contamination and the results of the human health and ecological risk assessments conducted at the site. However, the text does not provide an adequate summary of the contamination identified during the previous studies that are listed. In addition, the text does not summarize the findings of the human health and ecological risk assessments and instead references the Remedial Investigation/RCRA Facility Investigation (RI/RFI) for this information. In order to present a clear description of the contamination at the site and the risks to potential human health and ecological receptors, additional information should be included in the text. This should briefly state the findings of each of the referenced studies and the baseline risk assessment.

Response:

The requested information is currently discussed in detail and is also summarized in the RI report. Because the RI and FS are being issued at basically the same time, it would not be efficient to repeat this information in the FS. In addition, both documents have been distributed to the Partnering Team and will be available to the public in the information repository. Furthermore, the Proposed Plan and Record of Decision for Site 3 will summarize this information. Due to these reasons, no changes are proposed in the FS.

7. **Comment**: Chapter 3 and Appendix C

It is unclear why the Clean Boundary Determinations for surface soil are presented only for mercury and not for other COCs; arsenic, lead, zinc, and polyaromatic hydrocarbons (PAHs). It should be verified that boundaries are based on all relevant COCs.

Response:

When comparing analytical results to the RGOs that correspond to an ILCR equal to 1.0E-04 and/or high risk to ecological receptors and taking into account South Carolina clean cover requirements, clean soil would be placed over soil southeast of surface soil location PAI-03-SS-08. PAI-03-SS-08 is chosen as a clean boundary point because hand auger borings indicate that less than two feet of clean cover is present southeast of PAI-03-SS-08 (see Table 2-1). Additionally, PAI-03-SS-08 does not exceed ecological or human health RGOs under this scenario. Northwest of PAI-03-SS-08, only one surface soil sample location exceeds an RGO under this scenario. PAI-03-SS-09 contains a detection of mercury that exceeds the RGO that correspond to a high risk to ecological receptors; however, in adjacent surface soil sampling locations, mercury was not detected at a concentration that exceeds the mercury RGO. The calculations provided in Attachment 1 of Appendix C are provided to estimate a boundary of impacted surface soil in the vicinity of the mercury exceedance at PAI-03-SS-09.

Similarly, when comparing analytical results to the RGOs that correspond to an ILCR equal to 1.0E-05 and/or moderate risk to ecological receptors and taking into account South Carolina clean cover requirements, clean soil would be placed over all soil southeast of surface soil location PAI-03-SS-08 as described previously. Northwest of PAI-03-SS-08, only two surface soil sample locations exceed an RGO under this scenario. PAI-03-SS-09 and PAI-03-SS-10 contain detections of mercury that exceed the RGO that correspond to a moderate risk to ecological receptors; however, in adjacent surface soil sampling locations, mercury was not detected at a concentration that exceeds the mercury RGO. The calculations provided in Attachment 1 of Appendix C are provided to estimate a

boundary of impacted surface soil in the vicinity of the mercury exceedances at PAI-03-SS-09 and PAI-03-SS-10.

When comparing analytical results to the RGOs that correspond to an ILCR equal to 1.0E-06 and/or low risk to ecological receptors and taking into account South Carolina clean cover requirements, clean soil would be placed over all the entire causeway. Because all surface soil samples exceed the RGOs under this scenario, no clean boundary calculations are presented.

Specific Comments

8. **Comment**: Page 3-45, Table 3-6.

Footnote 1 indicates that 2 times the "typical facility pesticide concentration" was used as a screen. Although, it seems to have no effect on the screening of the pesticide detections for Site 3, this method is inappropriate. While it is acceptable to conduct a screen of pesticides at the FS stage, using a number twice the average of the "typical facility pesticide concentration" is far from protective. Do not use this methodology in future documents. Pesticides are not to be treated as metals. Pesticides are anthroprogenic contaminants and are not considered to have a natural variation that would justify using twice the facility specific average concentration as a screen.

Response:

The use of two times the mean concentration for the typical facility concentration was intended to mirror the U.S. EPA Region 4 guidance for establishing background concentrations. At MCRD Parris Island, the typical facility concentration was developed to distinguish between site-related contamination and anthropogenic chemicals commonly found in the environment. Pesticides are of particular concern at this site and other similar recreational areas at MCRD Parris Island where these chemicals would normally have been applied to control insect populations.

The Navy will consider other approaches to distinguishing between site-related contamination and commercial application of pesticides using concentration data including the 95% upper tolerance limit, the 95th percentile, and/or a comparison of means (t-test). If the U.S. EPA has successfully used other methods, we can also consider them.

9. **Comment**: Page 3-45, Table 3-6.

   The No Observed Adverse Effect Level (NOAEL) for Aroclor 1254 of 74 ug/kg is based on the raccoon, not the heron. The table should be corrected.

   Response:

   Agreed. The correction will be made.

10. **Comment**: Page 3-48, Table 3-8.

    The table presents a summary of the sediment RGOs. The selenium RGO for low ecological risk is listed at 0.034 mg/kg, but should be 0.93 mg/kg, as listed in Table 3-6. The table should be corrected.

    Response:

    Agreed. The correction will be made.

11. **Comment**: Page 5-29, Section 5.3.4.3.

    If contaminated sediment is consolidated on site, MCRD will be responsible to determine that contaminant concentrations do not exceed levels that will trigger RCRA Land Disposal Restrictions (LDR). If LDR levels are exceeded, some sediment may not be able to be consolidated on-site and will have to be disposed of at an appropriate landfill (Subtitle D or Subtitle C). This is an issue that will have to be addressed in the Remedial Design, but it is important for MCRD to be aware of the issue before the remedy is selected.

    Response:

    Acknowledged.

12. **Comment**: Appendix A, Page A-1 and A-2.

    The appendix provides a comparison of the surface water and groundwater preliminary COCs to the chemical-specific criteria. The text provides a list of various surface water criteria and references Tables A-1 and A-2 for comparison of these values with the surface water concentrations. It appears that the text does not list the South Carolina Water Quality Criteria (SCWQC) for Protection of Human Health (South Carolina Regulation 61-68, Appendix 2) that are provided on Table A-1. This is also the case for the groundwater information provided in this appendix. The text of Page A-2 does not include the SCWQC although they are provided for comparison on Table A-3. The text should include this information.

Response:

Agreed. The text will be modified.

13. **Comment**: Page C-1.

Assumptions are listed near the bottom of the page. The first assumption is that the depth of impacted sediment is 2 feet. The rationale for this assumption is not provided. This information should be included on the table.

Response:

Based on the geometry of the causeway and the maximum water level elevations of the pond (4 feet), a two-foot depth was assumed for estimation purposes. If excavation of sediments is chosen, this depth will be verified during delineation sampling.

14. **Comment**: Page C-15, Table C-4.

This table lists COCs that exceed RGOs for the sediments sampling sites. There are apparently some sites missing from the table. For example, location PA1-03-SD-34-01, for which Aroclor 1254 exceeds the RGO for moderate ecological risk, is shown on Figure C-4 but is not in this table. A review to ensure that all relevant sample locations were used to establish impacted area boundaries should be conducted and additional information included on the table for clarity.

Response:

The delineation round of sediment data was not added to these tables; however, please note that the exceedances observed in the delineation samples were taken into account in the sediment volume calculations. Sediment samples PAI-03-SD-34 and PAI-03-SD-38 will be added to Table C-4.

Please see the response to U.S. EPA comment #16 for further clarification on this comment.

15. **Comment**: Page C-15, Table C-4.

The first note in the legend states that RGOs for arsenic and vanadium at sediment sites 23, 24, and 26 were based on the raccoon. The note continues, “Because this area is not a forage area for the raccoon [as it is in the center of the marsh], the sample location will not be retained as an impacted sediment area.” As ecological receptors serve as representatives of groups of ecologically similar species, the relevance of the risk conditions at the above sites should be reviewed for species which might be represented by the raccoon (e.g., mink, otter), and which might not be as restricted by water in accessing forage areas. In addition, raccoon can travel significant distances into salt marshes

during low tide if foraging areas such as tidal ditches are nearby. Additional justification is needed for excluding sites 23, 24 and 26 from this evaluation.

Response:

The footnote 1 of Table C-4 will be revised as follows:

(1) Sediment locations PAI-03-SD-23, PAI-03-SD-24, and PAI-03-SD-25 will not be retained as impacted sediment areas. Concentrations of vanadium at these locations were detected from 56.6 to 63.7 mg/kg, only 13 to 27 percent above background (50 mg/kg). Additionally, the one detection of arsenic was observed at a concentration of 19.8 mg/kg that is within a factor of two of the its background concentration (12 mg/kg). For the raccoon, LOAEL HQs calculated based on exposure to site average arsenic and vanadium concentrations (HQs of 1.1 and 2.97, respectively) only slightly exceeded a HQ of 1. Because published biota sediment accumulation factors (BSAFs) are not available for inorganics, HQs for arsenic and vanadium were calculated assuming a BSAF of 1. This is a conservative assumption since transfer through the food chain does not occur for most metals.

16. **Comment**: Page C-17 and C-18.

The tables on these pages show the Clean Boundary Determinations for surface soil (moderate and high risk) and sediments. Boundary determinations are not provided for impacted areas around soil locations SS-01 and SS-03, though the sites are listed in Table C-3 as posing moderate risk to ecological receptors. Similarly, the table for sediments does not show determinations for sediment locations 20, 22, 28, though these locations are listed in Table C-4 as posing moderate risk to ecological receptors. Further, the sediment table presents Clean Boundary Determinations based on sediment locations 34 and 38, though these two sites are not listed in Table C-4. An explanation of these apparent discrepancies should be provided and, if necessary, the above sites should be incorporated into the calculations on these tables. Verification that all relevant sampling locations were used to establish Clean Boundaries should be provided.

Response:

A clean boundary location was not provided for surface soil locations PAI-03-SS-01 and PAI-03-SS-03. Under all alternatives, these locations would be covered with clean soil in accordance with South Carolina requirements.

Sediment samples collected to delineate PAI-03-SD-20, PAI-03-SD-22, and PAI-03-SD-28 did not contain detections above RGOs. The delineation samples were used as the clean boundary

sampling points; therefore, calculations such as those performed in Attachment 1 of Appendix C were not performed.

Sediment samples PAI-03-SD-34 and PAI-03-SD-38 will be added to Table 3-4; however, please note that the exceedances observed in the delineation samples were taken into account in the sediment volume calculations. No other changes are proposed.

RESPONSE TO SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL COMMENTS

Reviewer: **J. Stamps, Engineer Associate**
Corrective Action Engineering Section
Division of Hazardous and Infectious Waste Management

1. **Comment:** General

   The RFI for SWMU 3 states that human exposure to surface water is minimal due to the presence of alligators. If so, the maintenance of these alligator postings must be incorporated as an institutional control.

   Response:

   Agreed. Maintenance of existing no swimming/wading signs will be added as an item in the institutional control section of each alternative.

2. **Comment:** General

   Please incorporate Tables and Figures throughout the document as referenced rather than placing them at the end of each section. This will facilitate the review of future documents and result in a more expedited review.

   Response:

   We can discuss, but our current preference is to present the tables and figures at the end of each section. Due to the number of tables and figures included within the report, the tables and figures were placed in the back of each of their respective sections to put them in an easily accessible area. Additionally, because one page of text nestled between several figures/tables can be difficult to find, the tables/figures were placed at the end of each section to alleviate this problem. Lastly, having the tables/figures in this format greatly facilitates the production of the report.

3. **Comment: Page ES-1**

   Please provide documentation that the northeast portion of the causeway landfill was comprised primarily of fill dirt rather than waste material.

   Response:

   The statement was referenced from the September 1986 Initial Assessment Study (IAS) conducted by NEESA for the Parris Island. This statement can be found on page 8-7, second paragraph, third sentence of the IAS.

4. **Comment: Page 3-4, Table 3-1**

Table 3-1 identifies RCRA Subtitle C as an ARAR; however, it seems as though the Hazardous and Solid Waste Amendments to RCRA should also be identified as an ARAR. HSWA is the instrument, which provided RCRA with corrective action authority. Please make this revision or explain why HSWA is not applicable as an ARAR.

Response:

Chapter 3 will be revised to include the 1984 Hazardous and Solid Waste Amendments to RCRA as a potentially applicable ARAR.

5. **Comment:** Table 3-5

Please explain why 4,4-DDT was not retained as a COC since its maximum concentration exceeded the ILCR of 10-6 for fish ingestion. The Department considers a COC to be any constituent contributing to a cumulative risk level of 1E-06 or greater and/or a cumulative hazard index above 1.0, and whose individual ILCR exceeds 1E-06 or whose hazard quotient exceeds 0.1. Additionally, please discuss the source of the "Background Typical Facility Pesticide Concentration". Are the concentrations listed obtained from background sediment locations or were they obtained from background soil locations? If the latter is true, then the background results may not be directly comparable to the sediment sampling results, as the comparison of analytical results from differing media is not appropriate. This may alter the elimination of DDT as an ecological COC as listed in Table 3-6.

Response:

Table 3-5 cities Background/Typical Facility Pesticide Concentrations for various chemicals. The background values are only cited for inorganics and are presented in Table 4-1 of the RI/RFI for Site 3. Typical facility pesticide concentrations are applicable to pesticides and are discussed in a 1999 technical memorandum presented to the Partnering Team. Footnote 1 will be revised to clarify the difference between the nomenclature of these values.

Sediment and surface soil sample locations used to calculate the typical facility pesticide concentrations were collected from locations where pesticides have historically been used to control insect populations. At the request of the Partnering Team, select background locations were also added to this data set even though the background locations are in areas where pesticides were not commonly used. In locations where pesticides were commonly used, low-level detections of pesticides where observed in both surface soil and sediment locations used in the data set.

As indicated in Table 3-5, 4,4'-DDT does not represent a potential risk to human health (1.0E-06) under any of the site-specific scenarios (ingestion of fish and dermal contact by construction/maintenance workers). However, as discussed with SCDHEC on May 1, 2000, 4,4'-DDT will be retained as a COC because 4,4'-DDT breakdown products (4,4'-DDD and 4,4'-DDE) were detected retained as COCs.

6. **Comment**: Table 3-6

Aluminum must be retained as an ecological COC. The food chain modeling presented in Tables 7-9 through 7-14 of the RFI indicate HQs much greater than 1.0. Consequently, aluminum appears to be a risk driver and as such must be retained as an ECOC. Additionally, for those constituents not selected as ECOCs, please indicate the basis for that determination. Please do the same for the sediment COCs listed in Table 3-5.

Response:

The requested discussion is presented on page 3-25 of the FS/CMS report and in the footnotes to Tables 3-5 and 3-6. In addition, a footnote will be added to Tables 3-4 and 3-6 listing 33,000 mg/kg as a typical eastern United States background soil value for aluminum. Maximum aluminum concentrations in were 10,800 mg/kg in Site 3 soil and 29,700 mg/kg in Site 3 sediment. Furthermore, a statement will be added to the text indicating that aluminum is not readily bio-available to ecological receptors (Venugopal and Luckey, 1978).

7. **Comment**: Table 3-8

Please explain why the RGO values corresponding to 10^{-5} and 10^{-6} risk do not simply differ by an order of magnitude. Were the inherent assumptions utilized in calculating these RGOs different?

Response:

Conservative fish ingestion assumptions were used to comprise the RGOs equal to an ILCR = 1.0E-06 and *site-specific* fish ingestion assumptions were used to comprise the RGOs equal to an ILCR = 1.0E-06. Benzo(a)pyrene will be used as an example to illustrate why RGOs value do not differ by an order of magnitude.

As discussed on page 3-29, Section 3.6.2.1, the RGO used as the RGO corresponding to a human health ILCR = 1.0E-06 is the lower of the two calculated values:

- The chemical concentration in sediment protective of the construction worker or maintenance worker that corresponds to an ILCR of 1.0E-06. This value was calculated to be 220 ug/kg

- The chemical concentration in sediment that corresponds to an ILCR of 1.0E-06 to the adult recreational user through consumption of fish. *Conservative ingestion* rates by the adult recreational user are assumed. This value was calculated to be 2.09 ug/kg.

Thus, 2.09 ug/kg was used as the RGO corresponding to a human health ILCR = 1.0E-06.

The RGO used as the RGO corresponding to a human health ILCR = 1.0E-05 is the lower of the two calculated values:

- The chemical concentration in sediment protective of the construction worker or maintenance worker that corresponds to an ILCR of 1.0E-05. This value was calculated to be 2,200 ug/kg

- The chemical concentration in sediment that corresponds to an ILCR of 1.0E-05 to the adult recreational user through ingestion of fish. *Site-specific* ingestion rates by the adult recreational user are assumed. This value was calculated to be 303 ug/kg.

Thus, 303 ug/kg was used as the RGO corresponding to a human health ILCR = 1.0E-06

8. **Comment**: Section 4

It is stated that the institutional controls are to be incorporated into the master work plan. However, page 4-15 references the use of "deed restrictions". Is there truly a deed for the Parris Island property? Are these two methods to be used in conjunction as a means of documenting ICs? Furthermore, it seems as though a LUCAP/LUCIP must be developed as a mechanism for documenting and enforcing the ICs.

Response:

In accordance with discussions during the February 10 – 11, 2000 MCRD Parris Island Partnering Team meeting, references to deed restrictions and the base master plan will be changed to reference the land use control implementation plan (LUCIP) and land use control assurance plan (LUCAP) as well as the MCRD Parris Island Master Plan. The LUCIP will be incorporated into the record of decision as an appendix.

9. **Comment**: Figures 4-1 and 4-2

   These figures should address the incidental excavation of sediments and the management of said sediments for alternatives 2a and 2b.

   Response:

   Agreed. Figures 4-1 and 4-2 will be revised accordingly.

10. **Comment**: Section 5

    As stated, all trees and shrubbery that will penetrate or obstruct the installation of the cover must be removed from the causeway landfill.

    Response:

    Agreed. The existing statement in the FS,

    > "Existing trees would be removed from the site to facilitate cover placement where required and to minimize root growth through the cover."

    will be revised to

    > "Existing trees and shrubbery that would penetrate or obstruct the installation of the cover would be removed from the site."

11. **Comment**: General

    Please ensure that all necessary permits are obtained prior to excavating the wetland areas, if applicable.

    Response:

    Acknowledged.

12. **Comment**: Figure 5-5

    The Department believes that the causeway landfill is one contiguous unit and must be closed as such. Consequently, a 2-foot cover consisting of clean fill must be applied to the entire length and width of the landfill. Additionally, measures must be implemented to maintain the integrity of the cover including, but not limited to, preventing erosion of the cover.

Response:

It is the Navy's position that the causeway was historically covered with clean cover material. Therefore, where the surface soil meets the definition of clean material (i.e., 1.0E-06 residential) and adequate thickness is present (i.e., 2 feet), then additional soil cover is not required.

Hand-auger soil borings were advanced at each location where a surface soil sample was collected (16 locations). Observations made in northwest portion of the landfill area during the advancement of hand auger soil borings indicate that no wastes were present in the first two feet of the borings. The results of the soil boring observations are presented in Table 2-1.

Additionally, based the surface soil sample analytical results from the 16 surface soil samples collected during the investigation, surface soil sample analytical results did not exceed residential U.S. EPA Region 3 RBCs (1.0E-06 residential) in the northwest portion of the causeway. Therefore, the existing cover in the northwest half of the causeway is suitable clean cover material and an additional 2-foot cover over the entire causeway is not necessary.

As discussed in each alternative, slope stabilization and erosion control measures will be implemented to maintain the integrity of the cover. These actions are proposed to minimize the potential for failure of the causeway's slideslopes and to reduce the erosion rate of cover due to surface water runoff, waves, and/or wind.

No changes are proposed.

13. **Comment**: General

Given the plans to construct a road on top of an approved corrective measure, the Department must review and accept the work plan outlining the construction details prior to the construction of the road. This is necessary so that the Department can ensure that the integrity of the corrective measure is maintained during and after construction activities.

Response:

In accordance with discussions during the February 10 – 11, 2000 MCRD Parris Island Partnering Team meeting, the design will be provided to the state for review.

14. **Comment**: General

The existing monitoring wells must be extended to the new elevation resulting from the installation of the cover. Alternately, the wells may be abandoned in accordance with R.61-71: South Carolina Well Standards and Regulations and reinstalled at adjacent locations.

Response:
Acknowledged.

15. **Comment**: **Page 5-7, 2nd paragraph**
The Department has reservations about placing contaminated sediment back onto the landfill as part of the soil cover or otherwise. The Department would like to discuss this issue in the February Tier I meeting.

Response:
In accordance with discussions during the February 10 – 11, 2000 MCRD Parris Island Partnering Team meeting, there is precedent at other sites to consolidate contaminated sediments within a landfill.

Excavated sediment that is consolidated on-site would not be used as the top one foot of cover material assuming that the consolidated sediment does not contain COCs at concentrations in excess of the soil RGOs that represent an ILCR greater than 1.0E-06. If the sediment does exceed these RGO values, the sediment would not be used as the top two feet of cover material.

16. **Comment**: General
Page 5-7, Institutional Controls and Long Term Monitoring: LTM must include monitoring of sediment, surface water, and groundwater, rather than solely groundwater monitoring. Please revise accordingly. A detailed LTM plan should be incorporated into the CMS including sampling frequency and a list of analytes to be monitored. The location of the surface water and sediment samples should be determined prior to each sampling event. Additionally, a contingency plan should be included to address what actions will be taken should the LTM reveal additional contamination resulting from further releases. These actions should include further investigation to determine if the landfill is truly the source of this contamination.

Response:

The FS report will be modified to add sediment testing in addition to the current language regarding the annual sampling of groundwater. In accordance with discussions during the February 10 – 11, 2000 Partnering Team meeting, surface water sampling will not be conducted. Sampling results will be reported to the regulatory agencies on an annual basis. The Proposed Plan and Record of Decision will detail the Land Use Controls that will be implemented at Site 3.

The long-term monitoring contingency plan will be addressed in the proposed plan and record of decision.

17. **Comment**: General

As outlined in OSWER Directive 9902.3-2A (RCRA Corrective Action Plan), dated May 31, 1994, the Corrective Measure Study should recommend a proposed remedy. Please revise accordingly

Response:

In the spirit of partnering, the Draft FS/CMS report for Site 3 did not propose a remedy. The intention was for the MCRD Parris Partnering Team to initially review the material presented in the Draft Report and then discuss and come to a consensus as a team regarding the most appropriate remedial action/corrective measures implementation for Site 3.

As discussed during the February 10 MCRD Parris Island Partnering Team meeting, the transmittal letter of future FS/CMS reports will contain a recommended alternative.

Reviewer: Donald C. Hargrove, Hydrogeologist
Hazardous Waste Section
Division of Hydrogeology
Bureau of Land and Waste Management

1. **Comment:** Section 4.2.3, Containment:
   This section should specify the requirement that risk from both chemical and physical exposure to the waste must be minimized. Please revise the text.

   Response:
   The first sentence of Section 4.2.3 will be revised accordingly. "Containment involves the application of physical measure to reduce the potential for contaminant migration and thereby reduce the risk ***from both chemical and physical exposure*** to the public and the environment"

2. **Comment:** Section 4.7, Identification of Remedial Actions/Corrective Measure Alternatives for Site 3:

   a) The descriptions of alternatives 2a and 3a are deceptive. They both claim to "...protect humans from exposure to contaminated soil and the contents of the landfill." However, both of these alternatives propose only half of the waste be covered with two (2) feet of clean soil cover. The purpose of the clean soil cover is to protect human health and the environment by limiting exposure to both physical and chemical hazards. The two foot clean soil cover must be installed over the entire area of landfill waste. This has already been shown in the figures to encompass the entire length of the causeway landfill (SWMU 3). As such, the only alternatives that should be considered, are those that include one of the following activities:

      i) An in-depth investigation of the existing cover material to assess physical and chemical risk, with specifications for adding clean cover to any portion of the existing cover that poses unacceptable risk due clean cover thicknesses less than two (2) feet.

      ii) An assumption that the existing cover would not pass the criteria in item i, with the proposal to install two (2) feet of clean cover over the entire landfill. This activity appears to be included in alternatives 2b and 3b already.

   If alternatives 2a and 3a are to remain part of this FS/CMS, then the statement that they are protective of human health should be removed.

Response:

It is the Navy's position that the causeway was historically covered with clean cover material. Therefore, where the surface soil meets the definition of clean material (i.e., 1.0E-06 residential) and adequate thickness is present (i.e., 2 feet), then additional soil cover is not required.

Hand-auger soil borings were advanced at each location where a surface soil sample was collected (16 locations). Observations made in northwest portion of the landfill area during the advancement of hand auger soil borings indicate that no wastes were present in the first two feet of the borings. The results of the soil boring observations are presented in Table 2-1.

Additionally, based the surface soil sample analytical results from the 16 surface soil samples collected during the investigation, surface soil sample analytical results did not exceed residential U.S. EPA Region 3 RBCs (1.0E-06 residential) in the northwest portion of the causeway. Therefore, the existing cover in the northwest half of the causeway is suitable clean cover material and an additional 2-foot cover over the entire causeway is not necessary.

Comment:

b) The subsections for each of the listed alternatives are mislabeled (4.3.1, 4.3.2, 4.3.3, etc) when they should be labeled as 4.7.1, 4.7.2, 4.7.3, etc. Please revise the text.

Response:

The numbers of the subsections will be revise.

3. **Comment:** Figure 4-1, Block Flow Diagram, Site 3-Alternative 2a:

The notes on this figure are confusing. Note #1 specifies that 2 feet of clean soil will be present over landfill contents (previously shown as the entire causeway). Note #2 specifies that some areas will only have 1 foot of clean soil over the landfill contents. These notes should be revised to incorporate Comment #2 (above).

Response:

As stated in comment response 2, observations made in the northwest portion of the landfill area during the advancement of hand auger soil borings indicate that no wastes were present in the first two feet of the borings and chemical testing found the soil to meet the definition of clean cover. Therefore, the existing cover in the northwest half of the causeway is suitable cover material. In those areas where less than 2 feet of cover material was observed but where the surface soil is clean, Alternative 2a proposes supplementing the existing cover so that a total of 2 feet of cover

material exists. For instance, at PAI-03-SS-07, hand-auger borings indicated that waste was detected at a depth of 1.6 bgs. Under this alternative, approximately 6 inches of cover soil would be added to the existing cover to bring the total cover to 2 feet. Footnote 1 implies this action.

For those areas where surface soil analytical results exceed the RGOs that represent a potentially high risk to ecological receptors, Alternative 2a proposes and additional 1 foot of cover on top of existing soil (i.e., up to 3 feet of clean cover soil over wastes) to be protective of ecological receptors. The upper 1 foot of soil represents the depth at which most soil macroinvertebrates live and vegetation roots extend. The area (where surface soil concentrations exceed high risk RGOs) corresponds to the area in the vicinity of surface soil location PAI-03-SS-09 as shown on Figure 5-1. Footnote 2 of Figure 4-2 implies this action.

No changes to the footnotes of Figure 4-1 are proposed.

4. **Comment:** Figure 4-2
Same as comment 3.

Response:
Regarding the justification of footnote 1, please see comment response 3.

For those areas where surface soil analytical results exceed the RGOs that represent a potentially low risk to ecological receptors, Alternative 2b proposes and additional 1 foot of cover on top of existing soil (i.e., up to 3 feet of clean cover soil over wastes) to be protective of ecological receptors. The upper 1 foot of soil represents the depth at which most soil macroinvertebrates live and vegetation roots extend. The area where concentrations in surface soil exceed the low risk RGOs protective of ecological receptors corresponds to the entire length of the causeway. However, under this alternative, more than 1 foot of cover material would be placed in certain locations in the lower half of the causeway for human health reasons and compliance with South Carolina regulations.

No changes to the notes of Figure 4-2 are proposed.

5. **Comment:** Figure 4-3
Same as comment 3.

Response:
No changes to the notes of Figure 4-3 are proposed. Please see the response to comment 3.

6. **Comment:** Figure 4-4
   Same as comment 3.

   Response:
   No changes to the notes of Figure 4-4 are proposed. Please see the response to comment 4.

7. **Comment:** Section 5.1.2, Alternative 2a-Partial Containment:
   The bullet stating that this alternative will be consistent with federal and South Carolina regulations should be removed. If only half of the causeway is proposed for a 2 foot clean soil cover, then this alternative is not consistent with South Carolina regulations.

   Response:
   The Navy believes that the existing cover in the northwest half of the causeway is suitable cover material and a 2-foot cover over the entire causeway is not necessary. Please see comment response 2a.

8. **Comment:** Section 5.1.4, Alternative 3a-Partial Containment with Sediment Excavation:
   Same as Comment #7 (above).

   Response:
   The Navy believes that the existing cover in the northwest half of the causeway is suitable cover material and a 2-foot cover over the entire causeway is not necessary. Please see comment response 2a.

9. **Comment:** Section 6.1, Introduction:
   The description for alternative 3a is incomplete (top of Page 6-2). Please revise accordingly.

   Response:
   Agreed. The description for alternative 3a will be revised accordingly.

RESPONSE TO SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES COMMENTS

Reviewer: **Robert E. Duncan**
Environmental Programs Director

General Comments

1. **Comment:**

The SCDNR believes that the "partial cover" alternatives (2a and 3a) should be modified to include a minimum of 1 foot of soil cover over surface soils that exceed a *moderate* (rather than *high*) risk to terrestrial ecological receptors. This modification would result in the coverage of soils over approximately the southeastern *two-thirds* (rather than the southeastern *half*) of the causeway. Unlike the proposed "partial cover" alternatives, this modification would protect small omnivorous birds (represented by the robin in the ecological risk assessment) from exposure to mercury concentrations (0.18 mg/kg at Station SS-10) that are more than 6 times greater than the LOAEL for this species.

Response:

The Navy agrees. The preferred alternative to be presented in the Proposed Plan will be a modified Alternative 3a that includes covering of surface soils to the moderate risk level.

2. **Comment:** All Alternatives

Please provide figures that show the approximate extent of soil cover and sediment excavation under each alternative. Although this information can be generally inferred from Figures 3-1 through 3-4, it is not immediately apparent to the reader. It is also unclear whether the intent is for the "partial cover" alternatives (2a and 3a) to include a *continuous* cover of soil which would span the gaps between areas determined to represent an unacceptable risk to terrestrial ecological receptors, or whether the cover would be discontinuous. This should be clarified in the text and in the additional figures requested above.

Response:

Additional figures will be presented to more clearly identify the contaminated sediments to be addressed and the extent of the bank stabilization.

The partial cover, as presented in the FS, would be discontinuous, consisting of two sections. From surface soil location PAI-03-SS08 to the southern eastern edge of the causeway, the soil cover would be continuous. The purpose of this section is to comply with South Carolina landfill requirements (2 feet of soil cover atop waste material). Incidentally, this section also provides 2 feet of soil cover atop

the only surface soil location (PAI-03-SS-01) that exceeds the site-specific human health ILCR greater than 1.0E-06.

The second section is located within the vicinity of surface soil location PAI-03-SS-09. This location is the only surface soil location that contains a detection of a chemical (mercury) that exceeds an RGO corresponding to a high risk to ecological receptors.

3. **Comment:** Page ES-4, Alternative 2a (and all other presented Alternatives)
The SCDNR believes that sediments adjacent to the causeway with contaminant levels that exceed the "moderate risk" criterion for higher level trophic groups should also be targeted for excavation as part of Alternatives 3a and 3b. This would include mercury-contaminated sediments at Stations SD-14, SD-15 and SD-28, as well as lead-contaminated sediments at Station SD-17. According to the footnotes at the bottom of Table C-4, the levels of mercury and lead at these sites "do not significantly impact food-chain receptors"; however, the lead concentration at Station SD-17 clearly exceeds the less conservative ("moderate risk") LOAEL for the great blue heron, and the mercury concentrations at Stations SD-14, SD-15 and SD-28 (0.14 – 0.35 mg/kg) exceed the LOAEL for the raccoon (see Table 3-6). The conclusion that there is no significant impact is apparently based on the large home range for each of these species compared to the area of impact; however, it should be noted that both the raccoon and the great blue heron were chosen as representative receptors for ecologically similar species, many of which may have substantially smaller home ranges. Since sediments at Stations SD-14 and SD-28 are already targeted for excavation under Alternatives 3a and 3b due to pesticide contamination, our proposed modification would only add "hot spot" removal in the vicinity of Stations SD-15 and SD-17 to these two remedial alternatives.

Response:
As proposed under the bank stabilization measures, the referenced sediment locations will be mostly covered and/or excavated. However, based on technical reasons, we do not believe that these additional locations and constituents require separate consideration under Alternatives 3a and 3b.

Several conservative assumptions used in the food chain modeling for lead result in considerable overestimates of risk. First, most toxicity studies of dietary exposure use a highly bioavailable form of lead. The mammal and avian NOAELs and LOAELs that are used as TRVs for Site 3 were based on laboratory studies in which lead acetate was administered in the diet (Sample et al, 1996). Lead acetate is considered to be 100 percent bioavailable (Wixon and Davies, 1993). The bioavailability (i.e., the portion that is absorbed) of environmental lead after ingestion depends upon a variety of factors, including the chemical form of lead, the species of organism, as well as the age, sex, and

nutritional status of the individual (Eisler, 1988). The absorption of oral lead in newborn rats can be up to 90 percent, but decreases to 15 percent within 20 to 30 days of age (Ma, 1996). In general, absorption rates of environmental forms of lead in mammals varies from 2 to 20 percent (Ma, 1996). Absorption rates for environmental lead in birds were not available, but are probably less than 100 percent. Thus, the TRVs used in the food chain model overestimate the potential risks of lead ingestion under field conditions. The extent of any overestimation, however, is uncertain.

A second factor that contributes to the overestimation of risk via the food chain is the assumption that concentrations of lead in prey items are equal to sediment concentrations. This assumption was used since BSAFs do not exist for inorganic compounds. Although the ratio of lead concentrations in aquatic prey items to concentrations in sediment is variable, available data indicate that such ratios (i.e., BSAFs) are usually much less than 1.0 (Eisler, 1988).

Furthermore, upper level receptors (mammals, birds) will be exposed to lead concentrations throughout the site, not just at the location of the maximum concentration and the mean concentration probably better represents the actual exposure term better than the maximum concentration. Therefore, with the above considerations in mind, the HQs in Table 7-12 of the RI (NOAEL HQs of 4.76 for lead and 1.57 for mercury) are not significantly elevated.

Lastly, please note that the referenced locations and constituents do not exceed effects range - median values.

4. **Comment:** Alternatives 3a and 3b:

For Alternatives 3a and 3b, please provide greater detail regarding the proposed method for containing and consolidating excavated sediments beneath the soil cover on the upland portion of the causeway. In order for either of these alternatives to be acceptable to the SCDNR, we would need to have reasonable assurance that the excavated sediments would be permanently isolated from the aquatic environment, and not be subject to run-back during excavation or erosion after placement on the causeway.

Response:

The original plan for excavating contaminated sediments in the pond area called for the pond level to be dropped by 1 to 3 feet to expose and dewater the contaminated sediments. Damp but largely water-free sediments would then be excavated and mixed in with existing causeway soils to stabilize the blend, covered with additional soil as needed, and then vegetated. However, upon further review of potentially significant environmental damage from this plan, we are re-considering lowering the

pond level as an option. However, there are only a few other options available, and all of these options cause short-term damage to the environment. Under these other options, sediment removal would occur while the sediments are under water.

For excavation near the bank where the water is relatively shallow, silt barriers could be installed in one to two feet of water and would be relatively efficient in controlling migration of contaminants. Also, the material nearest the bank is predominately coarser grained material and could be excavated with only small quantities of free water and then handed as originally planned.

However, for sediments further away from the bank, which are in deeper water, the excavated sediments would be diluted with much larger quantities of water. As a result, washout and sediment migration would be more prominent and difficult to control. Therefore, the concern raised with contaminated sediments re-entering the pond becomes very significant. Silt fences/curtains would be used to reduce migration in all cases. However, because of the water depth, these fences/curtains would only have a limited effectiveness. The geology of the areas to be addressed and depth of water in the pond also limit the effectiveness of other options such as cofferdams and hydraulic dredging.

Regarding estimated impacted sediment boundaries as shown in Figure 3-4 of the FS, the areas of PAH- and PCB-impacted sediment are conservatively shown as the maximum possible extent of sediment contamination. The PAH and PCB delineation samples are used as the clean boundary point with this conservative estimate because there were no PAHs or PCBs detected in these samples above the moderate risk levels. However, because the delineation samples are clean, the actual clean boundary of sediment contamination for these areas lies between the delineation samples and the bank of the causeway.

Based on these reasons, planned actions at each of the hot spot areas were further evaluated. This discussion is preliminary and is currently being refined. Specific hot spot areas are discussed as follows.

Based on revised calculations, PAH concentrations exceeding moderate risk levels extend outward a calculated distance of 10 to 30 feet. The planned excavation/cover in this area would extend outward approximately 6 to 10 feet.

Similarly, for the PCB hotspot area, PCB concentrations exceeding moderate risk levels extend outward a recalculated distance of 10 to 30 feet. The planned excavation/cover in this area would extend outward approximately 10 to 15 feet.

A footnote will be inserted onto Figure 3-4 of the FS noting that estimated PAH- and PCB-impacted sediment boundaries are based on the maximum possible extent of contamination.

For the two pesticide hot spot areas, the cover would extent outward approximately 3 to 6 feet. Pesticides in these areas were found at concentrations exceeding moderate risk levels at distances of 20 feet in one case and 75 feet out in the second case. We are still working on resolving an approach for the pesticide exceedances further out in the pond area, but are focusing on covering and/or monitoring biodegradation rates. Also, we may recalculate anthropogenic concentrations of pesticides to distinguish those associated with Site 3 from normal historic applications.

To address these concerns, a revised approach for addressing sediments was developed as follows. Excavate/cover the contaminated sediments only as needed for bank stabilization. After bank stabilization is complete, sample the sediments to determine if sediment contamination remains beyond the extent of the excavation/cover. This approach has the added advantage of addressing contaminants that might have migrated during implementation of the bank stabilization. Based on the volume, extent, concentration, and biodegradation rates, excavate the sediments (high concentration - low volume), monitor and remaining allow contamination to naturally attenuate (low concentration), and/or cover marsh type soils.

Once the source of contaminants is stopped via either preventing additional waste migration into the pond or the historical pesticide bans, natural attenuation of the contaminants will occur, although slowly. Referenced biodegradation rates of the primary contaminants are provided in the following table and indicate that moderate risk levels may be achieved in the pond sediments over reasonable time periods without creating short-term damage to the wetlands as discussed above. Note that under the proposed remedy, the majority of the most contaminated areas (areas closest to the causeway) will be excavated or covered during bank stabilization.

Site 3 Sediment COCs	Range of Detections 1998-1999 RI/RFI (μg/kg)	Site-Specific Clean-up Level (μg/kg)	Maximum Half Life (years)[1]	Estimated Maximum Time for Cleanup (years)
Anthracene	3.7 – 770	245	5.04	8.3
Benzo(a)anthracene	5.1 – 1200	303	7.45	15
Benzo(a)pyrene	8.1 – 1200	693	5.8	4.6
Chrysene	3.2 – 1900	846	11	13
Fluoranthene	15 – 3500	1494	4.82	5.9
Phenanthrene	5.8 – 2400	544	2.19	4.7
Pyrene	11 – 2700	1398	20.8	20
Aroclor-1254	65 – 250	178	NA	NA
Alpha-Chlordane	28	13.9	3.8[2]	3.8
DDD	40 – 290	33.6	15.6	49
DDE	45	31.6	15.6	8.0
Gamma-Chlordane	28	13.2	3.8[2]	4.1

1. Referenced from Howard, et. al, 1991. The slowest half-life value in the reference is presented in this table. Actual rates may be faster. Since the site sediments are in a marsh, anaerobic biodegradation half lives are assumed. Aerobic biodegradation rates for these chemicals are faster.
2. Because the aerobic rate is much slower than the anaerobic rate for this chemical, the aerobic rate was used.

NA: Not available or not applicable.

5. **Comment:** General

In summary, the SCDNR does not believe that Alternatives 1, 2a or 2b are adequately protective of aquatic ecological receptors, since “limited/incidental sediment excavation” in areas which exceed moderate risk for aquatic species may or may not occur during side slope stabilization. The SCDNR further believes that Alternatives 2a and 3a, as currently proposed, are not sufficiently protective of terrestrial ecological receptors because both alternatives would leave exposed soils with mercury concentrations that are more than 6 times greater than the LOAEL for small omnivorous birds. The SCDNR also recommends that Alternatives 3a and 3b be modified as described above (see comment #3) to include the excavation of sediments adjacent to the causeway which pose a “moderate risk” to higher level trophic groups (i.e., piscivorous birds and mammals). Provided the revisions suggested above are incorporated into the FS, the SCDNR would consider both Alternatives 3a and 3b to be sufficiently protective of aquatic and terrestrial ecological receptor species.

Response:

Acknowledged. In the Proposed Plan, the Navy has revised the proposed alternative to a modified Alternative 3a that includes soil cover to the moderate risk level. However, as discussed under the response to Comment 4, the Navy is concerned that excavating contaminated sediments in the pond area may cause more short-term environmental damage than is protected in the long term, especially when natural biodegradation of site contaminants is considered. The modified Alternative 3a would include the provisions for reassessing the sediment contamination after the bank stabilization is in place, and then either excavating, covering, or monitoring the contaminated sediments.

REFERENCES

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Ma, W., 1996. "Lead in Mammals" in Beyer, W. N., G. H. Heinz, and A. W. Redmond-Norwood, 1996. *Environmental Contaminants in Wildlife: Interpreting Tissue Concentrations,* CRC Press, Boca Raton, Florida, 494 pp.

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