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July 23, 2004

U.S. Environmental Protection Agency - Region II
290 Broadway – 22nd Floor
New York, New York 10007-1866

Attn: Mr. Adolph Everett, P.E.
Chief, RCRA Programs Branch

Re: Contract N62470-95-D-6007
Navy CLEAN, District III
Contract Task Order (CTO) 0271
U.S. Naval Activity Puerto Rico (NAPR), Ceiba, PR
RCRA/HSWA Permit No. PR2170027203
Navy Responses to EPA Comments Dated April 9, 2004 on the
Draft Additional Data Collection Report and Screening Level Ecological Risk Assessment and Step 3a of the Baseline Ecological Risk Assessment at SWMUs 1 and 2 dated February 13, 2004 and the Draft Additional Data Collection Report and Screening Level Ecological Risk Assessment and Step 3a of the Baseline Ecological Risk Assessment At SWMU 45 dated January 30, 2004

Dear Mr. Everett:

Baker Environmental, Inc. (Baker), on behalf of the Navy, is providing you with the formal Navy response to comments on the EPA letter dated April 9, 2004 (Attachment 1). On May 21, 2004 the Navy submitted via e-mail preliminary responses to EPA comments for review. On June 11, 2004 the EPA via e-mail provided comments on these preliminary responses. A conference call discussing theses comments was conducted on June 21, 2004. Revised responses were e-mailed to the EPA on July 9, 2004 reflecting the outcome of the June 21, 2004 conference call. On July 16, 2004 Mr. Gordon informed the Navy via e-mail that the EPA is satisfied with the revised draft responses.

As identified in the Screening Level Ecological Risk Assessment and Step 3a of the Baseline Ecological Risk Assessment at SWMUs 1 and 2 and in the attached response to comments, additional data collection has been proposed for these two SWMUs. The proposed additional data collection effort is being provided for your review (Attachment 2). It is the Navy's intent to initiate this fieldwork during September 2004. Therefore it would be appreciated if your review and concurrence of this proposed additional data collection effort were completed before August 20, 2004.

Mr. Tim Gordon submitted an e-mail on July 16, 2004 requesting that the above reference documents be revised by July 28, 2004 or advise if this date is not acceptable. Attachment 3 provides the proposed schedule for conducting the ecological work at SWMUs 1, 2, 9, and 45. The EPA approved Additional Data Collection Investigation Report for SWMU 9 dated June 14, 2004 recommended that the ERA process at SWMU 9 proceed to Step 3b (baseline risk assessment problem formulation) however no

schedule was provided due to uncertainty of funding. Therefore, the attached schedule reflects the next phase of work for SWMU 9 due to the availability of funding.

If you have questions regarding this submittal, please contact Mr. Kevin Cloe, P.E. at (757) 322-4736. Additional distribution has been made as indicated below.

Sincerely,

BAKER ENVIRONMENTAL, INC.

Mark E. Kimes, P.E.
Activity Manager

MEK/lp
Attachments

cc: Mr. Kevin R. Cloe, LANTDIV - Code EV24KC (1 hard copy and 1 e-copy via e-mail)
Mr. Peter Cummings, LANTDIV – Code AQ114 (letter only)
Ms. Madeline Rivera, NSRR (1 hard copy and 1 e-copy via e-mail)
Mr. Tim Gordon, US EPA Region II (1 hard copy and 1 e-copy via e-mail)
Ms. Kathy Rogovin, Booz Allen & Hamilton (1 e-copy via e-mail)
Mr. Carl Soderberg, US EPA Caribbean Office (1 e-copy via e-mail)
Mr. Carmelo Vazquez, PR EQB (1 e-copy via e-mail)
Mr. John Tomik, CH2M Hill Virginia Beach (1 e-copy via e-mail)

ATTACHMENT 1

NAVY RESPONSES TO EPA COMMENTS DATED APRIL 9, 2004

NAVY RESPONSES TO USEPA COMMENTS DATED APRIL 9, 2004
DRAFT ADDITIONAL DATA COLLECTION REPORT AND SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT AND STEP 3A OF BASELINE ECOLOGICAL RISK ASSESSMENT AT SWMUS 1 AND 2 NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO

I. GENERAL COMMENTS

1. Review of the February 13, 2004, Draft Additional Data Collection Report and Screening Level Ecological Risk Assessment and Step 3A of the Baseline Ecological Risk Assessment at SWMUs 1 and 2 (hereafter referred to as the ADCR) revealed a number of technical inadequacies. As detailed in the comments below, key deficiencies include: unprotective food web model assumptions for the West Indian manatee, a threatened and endangered (T&E) species; elimination of all non-detected chemicals from further evaluation without adequate justification; potential errors in calculations; and use of background concentrations from locations that have not been documented. Naval Station Roosevelt Roads (NSRR) should address the comments below and submit a revised draft ADCR.

   Navy Response: *Navy responses to the issues identified in General Comment No. 1 are presented below. Please note that the ecological risk assessment (ERA) for SWMUs 1 and 2 was prepared in accordance with previous documents approved by the USEPA and agreements reached between the Navy and USEPA. As such, many of the comments listed below contradict methodology that was previously considered acceptable to the USEPA. Comments regarding the use of background levels in the ERA also contradict Navy policy. These issues are noted where appropriate.*

2. NSRR has calculated "concentrations in surface soil resulting in a mean exposure dose greater than or equal to the NOAEL-based screening value" for wildlife receptors in order to examine the spatial extent of risks. It appears, however, that these calculations are incorrect (see Specific Comment 27). Chemicals that were eliminated from further evaluation based on arguments using these calculations should be re-evaluated.

   Navy Response: *The Navy partially agrees with this comment. Please see the response to Specific Comment No. 27.*

3. Many chemicals of potential concern (COPCs) are eliminated from further evaluation based on comparisons to background concentrations. Complete descriptions and maps of all background locations, however, are not presented. This information must be included in the ADCR to justify the use of background data (see Specific Comment 10).

   The Navy disagrees with this comment. Background sampling locations, sampling procedures, laboratory and field quality assurance/quality control (QA/QC), and background analytical data have previously been presented and discussed in documents approved by the USEPA. Inclusion of this information in every document generated is an unnecessary budgetary burden. It is further noted that the ADCR included figures showing background locations. Background surface soil sample locations are depicted on Figures 4-20 (basewide background surface soil sampling locations) and 4-21 (SWMU 9 background surface soil sampling locations), while estuarine wetland and open water surface water and sediment background sampling locations are depicted on Figures 2-1 and 4-22, respectively. Finally, the surface soil, surface water, and sediment background analytical data used in Step 3a of the baseline ERA were presented within the ADCR as Appendix G.22 through Appendix

G.33. The specific documents where background information was previously presented and discussed are identified in the paragraph below.

The basewide background surface soil sampling locations and associated analytical data were previously presented and discussed in the Revised Draft RCRA Facility Investigation Report for Operable Unit 3/5, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 1999; approved by the USEPA September 9, 1999). The SWMU 9 background surface soil sampling locations and associated analytical data were previously presented and discussed in the Draft Corrective Measures Study Investigation Report for SWMU 9, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2001a; approved by a the USEPA February 19, 2003). This USEPA approved document also contained an evaluation that justified a unified basewide and SWMU 9 background surface soil dataset. The estuarine wetland background sampling locations (surface water and sediment) were previously presented and discussed in Baker (2001a) and the Draft Additional Data Collection Work Plan for SWMU 9, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2003a; approved by the USEPA June, 3, 2003). Open water surface water and sediment background sampling locations were previously presented and discussed in the Draft Additional Data Collection Work Plan in Support of Ecological Risk Assessment at SWMUs 1 and 2, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2001b; approved by the USEPA October 4, 2001). A discussion of the sampling locations, including the associated analytical data, also was presented in the Final Additional Data Collection Investigation Report, Tow Way Fuel Farm, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2003b; approved by the USEPA June 10, 2003). The

Based on USEPA approval of the aforementioned documents, which contained descriptions of background sampling locations, sampling procedures, laboratory and field QA/QC, and associated analytical data, the Navy does not believe that justification for use of the background data is warranted. Furthermore, as discussed above, figures showing the location of background sampling locations were included in the ADCR as Figures 2-1, 4-20, 4-21, and 4-22, while background analytical data were presented in Appendix G.22 through Appendix G.33. It is worth noting that recent documents have presented the background samples in a similar fashion without comment, including the Final Corrective Measures Study Task 1 Report, Tow Way Fuel Farm, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2003c; approved by the USEPA June 10, 2003) and the Final Corrective Measures Study Report for SWMU 53, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2003d; approved by the USEPA January 30, 2004). It is acknowledged that text within the last bullet item in Section 4.7 (location where use of background data is introduced) did not include the references for several documents identified above. The text will be revised to include references to these documents. However, the ADCR will not be revised to include the information presented within these documents.

In addition to the revisions identified in the preceding paragraph, text will be added to the document to provide 1) a clear description of the decision framework for using descriptive statistics, box plots, statistical comparisons of the means, and statistical comparisons of the right-tail of the distribution; 2) descriptions of how outliers and non-detects were evaluated; and 3) all relevant statistical parameters used in the evaluations (e.g., alpha levels).

4. In many cases, maximum detected concentrations of chemicals in surface water and sediments occurred at the northern or southern limits of the sampling effort, calling into question whether the extent of contamination has been adequately characterized. The ADCR provides no discussion and suggests no remedy for this problem. See Specific Comments 23,24,42 and 44 below.

Navy Response: *The Navy partially agrees with this comment. Please see the responses to Specific Comment Nos. 23, 24, 42, and 44.*

5. NSRR has not tabulated prey exposure concentrations or calculated doses for wildlife receptors. These values should be tabulated and attached to the ADCR to ensure that the results presented can be reproduced by readers.

   Navy Response: *The Navy has considered this comment and offers the following points of clarification. Unlike USEPA human health guidance (USEPA, 1997), which contains specific requirements for reporting, USEPA and Navy ERA guidance and policy (USEPA, 1997 and CNO, 1999, respectively) do not include recommendations or requirements regarding the tabulation of estimated prey tissue concentrations and receptor doses. It is noted that the requested information was not included in previous ERAs approved by the USEPA. Regardless, components of the food web model that were used to derive upper trophic level risk estimates will be included as an appendix to the document for a sample of chemicals. However, the model output pages will not be formatted in a manner consistent with USEPA (1998) human health requirements, nor will they be manipulated to show input parameters linked from other worksheets within the model (food ingestion rates, body weights, dietary proportions, bioconcentration factors [BCFs], and bioaccumulation factors [BAFs]).*

II. SPECIFIC COMMENTS

Section 4.3.1.3, Exposure Pathways and Routes

1. The final paragraph of this section states, "although this represents an uncertainty in the assessment it is assumed that terrestrial reptile and amphibians are not likely to be more sensitive to chemical exposures than the other receptor groups that are included in the screening-level ERA." It is likely that sufficient toxicity data for amphibians, and perhaps, reptiles exist to permit a more rigorous analysis. EPA suggests examining recent publications that review herpetofauna toxicity data (e.g., Sparling et al. 2000) to evaluate whether herpetofauna are more sensitive than other receptors for detected constituents at Solid Waste Management Units (SWMUs) 1 and 2. If this analysis suggests that risks may be significantly underestimated by omitting herpetofauna as receptors in the risk assessment, then a quantitative analysis of risks may be required.

   Navy Response: *The Navy has considered this comment and offers the following points of clarification. The approach used to evaluate terrestrial amphibians and reptiles and aquatic reptiles is consistent with previous ERAs conducted at NSRR. Therefore, the approach used has historically been acceptable to the USEPA. It is worth noting that the approach used also is consistent with USEPA Region III BTAG policy regarding reptiles and amphibians (USEPA, 2004). Furthermore, the USEPA (2003), during development of Ecological Soil Screening Levels (Eco-SSLs), initially considered seven ecological receptor groups, including reptiles and amphibians. However, the available toxicity data for amphibians and reptiles were deemed insufficient to derive Eco-SSLs. Given that the USEPA guidance document for Eco-SSL development post-dates the reference provided above (Spalding et al., 2000), it can be concluded that information within this referenced document was reviewed during Eco-SSL development and deemed insufficient for Eco-SSL development. At this time, the Navy does not believe revisions to the document are necessary; however, the Navy will review the literature to determine if any relevant data are available for amphibians and reptiles. If relevant toxicity data are available from the literature, this information will be presented and discussed within the Step 3b baseline risk assessment problem formulation for SWMUs 1 and 2.*

Section 4.4.2, Ingestion-Based Screening Values

2. This section indicates that mammalian no observed adverse effect level (NOAEL) values were not scaled based on body weights of the test species and the receptor species, but does not provide rationale. NOAEL values are appropriately scaled in Step 3a of the risk assessment according to Equation 4-5. Analysis of this equation indicates that the scaled NOAEL value will be less than the original value if the receptor species is larger than the test species. Considering that the receptor species (i.e., West lndian manatee) 1s likely to be larger than all test species, it is more protective, and therefore necessary, to use the scaled toxicity values in the screening-level risk assessment. Revise the ADCR text and relevant tables accordingly. Additionally, the scaled NOAEL values should be tabulated somewhere in the document.

   Navy Response: *The Navy agrees with this comment. Mammalian NOAEL values used in the Step 2 screening-level risk calculation will be scaled to reflect differences in body weight between the test species and the receptor species (West Indian manatee). The text in Section 4.0 also will be revised as necessary to reflect this change. The scaled NOAELs will be incorporated into the text either as a new table, part of an existing table, or as a new appendix.*

Section 4.6.1.2.6, Terrestrial and Aquatic Food Web Exposures

3. This section notes that ingestion-based screening values were not available for a number of herbicides and organochlorine pesticides. Toxicity data for a number of these chemicals can be found in the Department of Interior's Handbook of Toxcity of Pesticides to Wildlife (USDOI l984), or can likely be found in primary literature sources or from EPA's Office of Pesticide Programs. These chemicals should not be eliminated from further evaluation in Step 3a of the risk assessment until a comprehensive search for applicable toxicity data has been conducted.

   Navy Response: *The Navy partially agrees to this comment. The Navy will review the literature for herbicide and organochlorine pesticide data. If appropriate values are identified from the literature, they will be used in the derivation of upper trophic level risk estimates. It is noted that an extensive literature search has been conducted during compilation of toxicity data. Budgetary limitations will dictate the extent of the search performed.*

Section 4.6.2, Uncertainties Associated with the Screening-Level Ecological Risk Assessment

4. Several of the uncertainties listed in this section may result in an underestimation of potential risk, but NSRR has not explicitly identified them as such. In contrast, NSRR specifically states that certain uncertainties are expected to result in overestimates of risk. To provide a more balanced discussion, revise this section to specifically state which uncertainties may result in underestimation of risk (e.g., omission of inhalation and adsorption pathways for upper trophic level receptors, omission of herpetofauna from quantitative risk analysis).

   Navy Response: *The Navy agrees with this comment. Section 4.6.2 will be revised accordingly to provide a more balanced discussion of uncertainties; however, the Navy offers the following point of clarification. With regard to the omission of inhalation and adsorption pathways for upper trophic level receptors, Section 4.3.1.3 (Page 4-10) included a detailed discussion that presented rational for the exclusion of dermal and inhalation exposure pathways for terrestrial receptors. Based on the information presented from the scientific and regulatory community (see section 4.6.2), as well as the physical and chemical properties of the chemicals detected at SWMUs 1 and 2, the uncertainty*

associated with the exclusion of these two pathways from dose calculations is minimal. Clearly, the inhalation and dermal adsorption pathways are insignificant relative to ingestion exposures.

5. See Specific Comment 1 regarding risks to amphibians and reptiles. This section should also include discussion of whether the evaluated exposure pathways are likely to be protective of threatened and endangered (T&E) species of sea turtles that may use Ensenada Honda as feeding habitat.

   Navy Response: *The Navy agrees with the comment. Please see the response to Specific Comment No. 1.*

6. NSRR should discuss uncertainties associated with extrapolating NOAEL and Lowest Observed Adverse Effect Level (LOAEL) values from the test organisms to the wildlife receptors. Particularly, it is important to discuss this uncertainty with respect to the West Indian manatee, which requires extra protection as a T&E species. NSRR should list chemicals that would be retained as COPCs for the West Indian manatee if an interspecies extrapolation factor of 5 or 10 were applied to the NOAEL.

   Navy Response: *The Navy partially agrees with this comment. A discussion of uncertainties associated with the extrapolation of NOAEL and LOAEL values from the test organisms to the wildlife receptors will be added to Section 4.6.2. The Navy also agrees to list specific detected chemicals that would be retained as ecological COPCs for West Indian manatee food web exposures if an interspecies uncertainty factor was applied to scaled NOAEL values; however, the specific uncertainty factor used (a factor of 2) will be based on recommendations in Wentsel et al. (1996).*

Section 4.7, Step 3a of the Baseline Ecological Risk Assessment

7. Most of the methodological refinements described on pages 4-46 and 4-47 are not appropriate for the West Indian manatee, a T&E species that must be protected at the individual level.

   Specifically:
   - Maximum, not mean, chemical concentrations should be used in calculating exposures;
   - Uptake factors should be based on 90th percentile, not central tendency, values;
   - Maximum or high-end estimates for body weight and food ingestion rate should be used in favor of central tendency estimates; and
   - NOAEL toxicity values should be used exclusively.

   Revise the ADCR accordingly to ensure that methodologies used are adequately protective.

   Navy Response: *The Navy agrees with this comment. Recommendations regarding West Indian manatee aquatic food web exposures will be based on the Step 2 screening-level risk calculation. Refined risk calculations for the West Indian manatee and associated text also will be deleted from Section 4.7. However, in accordance with Navy policy (CNO, 2004), chemicals identified as ecological COPCs in Step 2 of the screening-level ERA for West Indian manatee aquatic food web exposures will not be identified as a potential risk drivers in Step 3a if statistical evaluations demonstrate that the concentration distribution of ecological COPCs in embayment sediment are statistically equivalent to background concentrations. In addition to this discussion, please see the response to Specific Comment No. 24.*

8. See Specific Comment 2 regarding scaled screening values for the West Indian manatee. Note that, as discussed in EPA's June 2003 letter, NOAEL values should be used exclusively for the West Indian manatee. Revise this section and applicable tables accordingly.

   Navy Response: *The Navy agrees with this comment. Please see the response to Specific Comment Nos. 2 and 7.*

Section 4.7.1, SWMU I Refined Risk Calculation and Risk Evaluation

9. This section does not include discussion of non-detected chemicals with reporting limits greater than screening values, but NSRR appears to be eliminating these chemicals from possible further investigation in the baseline risk assessment. Considering the large number of chemicals (e.g., >6O chemicals in sediment) with mean reporting limits exceeding screening values, and the large magnitude of exceedence (e.g., mean HQ>100 for many chemicals in sediments), it is not clear that it is appropriate to eliminate all of these chemicals from further evaluation at this time. The ADCR should consider the following points for these chemicals: 1) the magnitude of the mean HQ; 2) whether the chemicals are expected to be present based on historical site operations and chemical-specific fate and transport considerations; 3) the proportion of samples for which detection limits exceeded screening values; and 4) whether lower detection limits are practicably achievable. Revise this section to justify eliminating these chemicals from further evaluation.

   Navy Response: *The Navy has considered this comment and offers the following points of clarification and discussion. First of all, it would not be reasonable or appropriate to recommend further investigation for chemicals with analytical data that do not suggest a source is present or a release has occurred. Secondly, the ADCR has identified potential risk drivers for surface soil and subsurface soil at SWMUs 1 and 2, and recommended that SWMUs 1 and 2 should proceed to Step 3b of the Navy ERA process. Although not discussed at this stage of the ERA process, further evaluation of these potential risk drivers likely will involve the collection and submittal of SWMU 1 and 2 soil to an appropriate laboratory for chronic soil toxicity testing for purposes of establishing site-specific NOAEL value. In addition to focusing on the specific risk drivers, this evaluation also will address the uncertainty related to all chemicals identified as ecological COPCs for SWMUs 1 and 2 soil in Step 2 of the screening-level ERA, as well as mixtures of ecological COPCs. Thirdly, the manner in which non-detected chemicals with maximum reporting limits greater than screening values were evaluated in the ADCR is consistent with previous documents approved by the USEPA.*

   The Navy will revise Sections 4.7.1 and 4.7.2 to include a qualitative evaluation of chemicals identified as ecological COPCs in Step 2 of the screening-level ERA because maximum reporting limits exceeded screening values. This evaluation will be limited to a discussion of mean HQ values and a review of upgradient media to determine if there is any evidence that a release has occurred. For example, if a non-detected chemical identified as an ecological COPC for estuarine wetland sediment at a given SWMU was not detected in upgradient abiotic media, it will be assumed that the chemical is not site-related. However, if the evaluation of upgradient media indicates that a non-detected chemical in estuarine wetland sediment at a given SWMU may be site-related and may be present at ecologically important concentrations, that non-detected chemical will be retained as a potential risk driver. Section 3.0 of the document also will be revised to include a discussion of why detection limits specified in the work plan were not achieved.

10. Although a number of chemicals have been eliminated from further consideration based on comparison to background concentrations, a complete description of the background data set is not included in the report. NSRR should append to the ADCR text that provides the rationale for the

selected background, locations and figures depicting the locations of the all the background samples. The statistical sampling procedure (e.g., random sampling), and the potential for impacts from NSRR or any other anthropogenic sources to the background locations, should also be discussed. This section of the text should refer the reader to the added background information, Chemicals eliminated from further evaluation based on background will be re-evaluated by EPA once this information is made available.

Navy Response: *The Navy disagrees with this comment. Please see the response to General Comment No. 3.*

Section 4.7.1.1, Refined Risk Calculation and Risk Evaluation for Surface Soil

11. NSRR recommends additional sampling and analysis of identified risk drivers in the vicinity of locations 1SB03, 1SS06, and 1SDOI to define the spatial extent of potential contamination. Although this proposal appears adequate for most risk drivers, copper contamination at SWMU 1 at levels above screening values is more widespread (e.g., exceedances at 1SS04, 1MW04, and 1MW01). Of particular concern is the detected concentration at location 1MWO1 of 169 mg/kg copper, which is more than three times greater than the screening value. The detected concentration of zinc is also greater than its screening value at this location. NSRR should develop recommendations that address these concerns, and revise this section accordingly.

    Navy Response: *The Navy disagrees with this comment and offers the following points of clarification. One of the objectives of the sampling program recommended in the ADCR is to verify the historical sample results and establish current levels of exposure. It would be more likely to meet this objective by collecting samples in the vicinity of maximum concentrations. Although not specifically stated as such in the ADCR, a second objective is to ensure that locations of maximum detections have been established for each of the potential risk drivers. Knowledge of this information is essential to the proper design of future site-specific studies (i.e., terrestrial toxicity tests) since site-specific studies will evaluate the range of concentrations present for the establishment of site-specific NOAEL values. It is not the intention of the additional sampling program to establish nature and extent at every location where a screening value was exceeded, nor is this necessary for the future design of the site-specific studies. The ADCR will be revised as appropriate to ensure that the objectives of the sampling program are adequately presented.*

    With regard to the copper and zinc detections at 1MW01, two surface soil samples (1MW02 and 1SS03) were collected upgradient from 1MW01 (see Figure 4-9). The copper and zinc concentrations detected in 1MW01 (19.8 mg/kg and 13.9 mg/kg, respectively) and 1SS03 (37.9 mg/kg and 23.1 J mg/kg, respectively) were less than the surface soil screening values established for both metals (50 mg/kg). These data indicate that copper and zinc are not present in upgradeint surface soil at ecologically important concentrations. Furthermore, the 1MW01 surface soil sample was collected near the upland-estuarine wetland boundary, adjacent to a roadway. The absence of detections in upgradient surface soil above screening values and the location of the 1MW01 surface soil sample relative to the estuarine wetland system and roadway does not indicate that surface soil in the vicinity of 1MW01 would contain copper and zinc at concentrations greater than those detected at 1SB03,1SS06, and/or 1SD01. For this reason, the Navy does not believe further action beyond clarification of the objectives of the recommended sampling program is warranted.

Section 4.7.1.2, Refined Risk Calculation and Risk Evaluation for Subsurface Soil

13. This section omits discussion of carbon disulfide, which is included in Table 4-47. Revise the text or the table to correct this discrepancy.

Navy Response: *The Navy agrees with this comment. Section 4.7.1.2 will be revised to include a risk evaluation for carbon disulfide.*

14. NSRR recommends collecting additional soil samples at location 05SS101 and areas downgradient of this sample to establish current levels and define the spatial extent of 4,4'-DDT contamination. The maximum detected concentration of 4,4'-DDT, however, occurred at location 05SS103, accordmg to Figure 4-10. NSRR should either correct the apparent error or explain the rationale for proposed sampling in the area of 05SS10l.

Navy Response: *The Navy agrees with this comment. The text in Section 4.7.1.2 (Page 4-54) will be revised so the correct surface soil sample (i.e., 05SS103) is identified.*

Section 4.7.1.3, Refined Risk Calculation and Risk Evaluation for Estuarine Wetland Surface Water

15. NSRR should strengthen the argument that tin is unlikely to present risks to aquatic receptors by noting that detected concentrations are well below the EPA Region 5 Ecological Screening Level of 180 ug/L (USEPA 2003).

Navy Response: *The Navy disagrees with this comment and offers the following point of clarification. As discussed in Section 4.7.1.3 (Page 4-55), the statistical evaluation of the tin datasets demonstrated that the distribution of tin concentrations in estuarine wetland surface water are statistically equivalent to background concentration (see Table 4-30). The descriptive statistics presented in Table 4-51 support the conclusion of the distributional statistics (maximum tin concentration occurred within the background dataset). Therefore, it can be concluded that that this metal is not likely to be site-related and not presenting risks to aquatic receptor populations above background levels. The elimination of chemicals based on comparisons to background levels is consistent with Navy policy (CNO, 2004). In summary, the Navy believes that the results of the statistical evaluations presented in Table 4-51 are sufficient information supporting a recommendation of no further evaluation, and changes to the document are not warranted.*

Section 4.7.1.4, Refined Risk Calculation and Risk Evaluation for Estuarine Wetland Sediment

16. EPA is unable to reproduce the sediment quality guideline (SQG, based on DiToro and McGrath (2000) values (e.g., 11,800 ug/kg for pyrene) presented in this section. NSRR should submit example calculations to clarify.

Navy Response: *The Di Toro and McGrath (2000) Sediment Quality Guidelines (SQGs) are expressed in units of umole/g OC (concentrations normalized for organic carbon). They were converted to ug/kg dry weight in accordance with the example calculation shown below for pyrene.*

Pyrene Sediment Quality Guideline = 5.83 umole/g OC (Di Toro and McGrath, 2000)
Organic Carbon Content = 1 percent (assumed by Di Toto and McGrath, 2000)
Pyrene Molecular Weight = 202.26 g/mole (Di Toro and McGrath, 2000)

Step 1 (Convert umole/g OC to umole/g dry weight assuming one percent OC):

(5.83 umole/g OC)(1% OC /100) = 0.0583 umole/g dry weight

Step 2 (Convert umole/g dry weight to ug/kg dry weight):

(0.0583 umole/g) x (202.26 g/mole) x (1mole/1,000,000 umole) x (1,000 ug/mg) x (1,000 mg/g) x (1000 g/kg) = 11,791 ug/kg dry weight

The value derived in Step 2 above (11,791 ug/kg dry weight) was rounded to 11,800 ug/kg dry weight.

17. This section justifies eliminating 4,4'-DDD and 4,4'-DDE from consideration as risk drivers based on a comparison of site and background concentrations. This practice is generally not acceptable for organic constituents. NSRR should provide justification for these background comparisons by discussing historical activities in the vicinity of SWMU 1 and the background locations that could explain the presence of 4,4'-DDD and 4,4'-DDE. NSRR should discuss whether DDT was historically used or stored at SWMU 1. Furthermore, it appears that the nature and extent of contamination by DDT and its metabolites have not been adequately characterized because the highest detected concentrations occurred at location 1EWSOl, which is the southernmost location sampled. NSRR must provide additional justification for eliminating 4,4'-DDD and 4,4'-DDE from consideration as risk drivers.

    Navy Response: *The Navy partially agrees with this comment. Navy policy on the use of background chemical levels (CNO, 2004) dictates that naturally occurring and anthropogenic chemicals (including pesticides) below background levels must be eliminated from consideration in Step 3a of the baseline risk assessment. The elimination of 4,4'-DDD and 4,4'-DDE was therefore consistent with Navy policy. However, the Navy agrees that the nature and extent of 4'4-DDD and 4,4'-DDE in estuarine wetland sediment has not been fully characterized. Given the 4,4'-DDT and its biodegradation products where identified as potential risk drivers for SWMU 1 surface soil and subsurface soil, additional sediment samples will be collected from the estuarine wetland downgradient from 1EWS01 and 1EWS02 and analyzed for 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE to establish nature and extent. If nature and extent is adequately characterized and the statistical evaluation of the SWMU 1 and background datasets demonstrate statistical equivalence, these pesticides will be dropped from the list of potential risk drivers. Again, elimination of anthropogenic chemicals (including pesticides) in Step 3a of the baseline ERA based on statistical comparisons to background levels is consistent with Navy policy. If the conditions with regard to nature and extent and statistical equivalence is not met, they will be carried through the ERA process.*

18. The discussion of the various sediment screening levels (e.g., threshold effect level (TEL), Effects Range-Low (ER-L) presented on page 4-58 is not sufficiently descriptive to allow the reader to interpret the meaning of these different screening values. Revise this section to more clearly define the effect levels associated with all screening values.

    Navy Response: *The Navy agrees with this comment. Although sources for the various screening values are adequately identified in Section 4.4.1.3 (Page 4-17), the Navy will provide descriptions of those screening values used as lines of evidence in the Step 3a risk calculation and risk evaluation for estuarine wetland sediment downgradient from SWMU 1 (see Specific Comment No. 22). The descriptions will be presented in Section 4.4.1.3.*

19. NSRR indicates on page 4-58 that the descriptive statistics given in Table 4-53 support the conclusion that silver is not a risk driver in the estuarine sediments. Although EPA agrees that silver is likely not

a risk driver, the comparison to background data does not support this claim, given that silver was detected in five of nine site samples and none of the six background samples. NSRR should revise this section to eliminate the suggestion that background data support the recommendation for silver.

Navy response: *The Navy agrees with this comment. The lines of evidence presented in Section 4.7.1.4 (Page 4-58) for silver will be revised to eliminate comparisons to background analytical data.*

20. The discussion on page 4-56 regarding cyanide is speculative and does not present concrete evidence that cyanide is not causing risks in the estuarine wetland sediment. Unless additional justification can be provided, NSRR should retain cyanide for further evaluation in the baseline risk assessment.

    Navy Response: *The Navy disagrees with this comment and offers the following points of clarification. The text in Section 4.7.1.4 (Page 4-56) referenced Section 4-56 where an extensive discussion was presented regarding cyanide speciation and toxicity, including the recognition by both the scientific and regulatory community that it is the free, biologically available form of cyanide in the environment that is of concern. Based on the information presented in Section 4.6.2, the exposure estimate based on total cyanide likely overstated the potential for risk at SWMU 1. As a second point of clarification, total cyanide was not detected in upgradient surface soil and subsurface soil collected at SWMU 1 (se Appendix G.1 and Appendix G.2). In fact, with the exception of a single detection in estuarine wetland sediment (1.1 J mg/kg in 01EWSSD02), this inorganic was not detected in any sample associated with SWMU 1. Based on these data, there is no evidence of a cyanide release from SWMU 1. The text in Section 4.7.1.4 (Page 4-56) will be supplemented with this information. Beyond inclusion of this information, no additional action is deemed necessary.*

21. Due to the prevalence of tin concentrations in excess of background concentrations at SWMUs 1 and 2, the limited toxicity data available for tin, and the absence of data regarding the form of tin present in sediment at NSRR, it is not defensible to eliminate tin from further evaluation at this time. Unless additional justification can be provided, tin should be retained for further evaluation. NSRR should strengthen the argument that beryllium is not a risk driver for benthic macroinvertebrates by noting that a comparison of surface water screening values, which are developed based on toxicity tests with a variety of aquatic organisms, indicates that beryllium is less toxic to aquatic organisms than, for example, cadmium, copper, and vanadium. The detected concentrations of beryllium in sediments are less than the sediment screening values for these other metals.

    Navy Response: *The Navy partially agrees with this comment. With regard to beryllium, the text presented in Section 4.7.1.4 (Page 4-64) will be supplemented with the recommendation in Specific Comment No. 21 above.*

    As discussed in Section 4.7.1.3, the sediment screening value used in the Step 2 and Step 3a risk calculations for tin was an Apparent Effects Threshold (AET) value (Buchman, 1999). The AET value was reported as >3.5 mg/kg. This toxicological benchmark does not represent a threshold concentration. As such, there is uncertainty associated with its use in the Step 2 and Step 3a risk calculations. Section 4.7.1.3 presented literature-based toxicity values from a study (Kristin et al., 1998) that investigated the chronic effect of tributyltin (TBT) on four benthic invertebrate species. The minimum effect concentration, a median inhibition concentration (IC_{50}) based on mayfly (Hexagonia sp.) growth (600 mg/kg), is over one order of magnitude greater than the maximum detected tin concentration expressed as mg TBT/kg (i.e., 6.4 J mg Sn/kg is equivalent to 24.4 mg TBT/kg [Note: the ADCR did not provide a conversion from mg Sn/kg to mg TBT/kg prior to comparison to the literature-based toxicity values; the ADCR will be revised to reflect the proper comparison]). Although toxicity data from a single study was used as the primary line of evidence for a recommendation of no further evaluation, the value used was the minimum reported value for

four species. Many of the literature-based toxicological thresholds commonly used in ERAs, including the ERA at SWMUs 1 and 2, are based on a similar number of data points or a fewer number of data points. Examples include the AET values reported in Buchman (1999), many of the USEPA Region 4 chronic surface water screening values (USEPA, 2001), and several toxicological thresholds for earthworms reported in Efroymson et al. (1997).

The AET value used in the Step 2 and Step 3a risk calculations, as well as the toxicity data reported by Kristin et al. (1998) are based on the most toxic form of tin (USEPA, 2002). Given that all detected tin was assumed to be present as tributyltin, and the comparison of the maximum tin concentration (expressed as mg TBT/kg) to available tributyltin toxicological thresholds or literature-based toxicity data did not indicate that detected levels are impacting benthic macroinvertebrate communities, the absence of data on the form of tin present is not relevant. A copy of the Kristin et al. (1998) paper is attached to this response letter.

While the Navy believes sufficient evidence was presented to justify the recommendation based on existing data, a review of the spatial pattern and distribution of tin concentrations in estuarine wetland sediment (see Figure 4-12) indicates that the nature and extent of tin has not been adequately characterized. Furthermore, given that tin was identified as a potential risk driver for SWMU 1 surface soil, the Navy agrees that additional evaluation is warranted. This will be accomplished by collecting additional sediment samples downgradient from locations of maximum detected concentrations. If nature and extent is adequately characterized and the additional data do not suggest that tin is present at ecologically relevant concentrations (i.e., maximum concentrations are less than toxicity data reported by Kristin et al. 1998), tin will be dropped from the list of potential risk drivers for estuarine wetland sediment downgradient from SWMU 1. If these conditions are not met, tin will be carried through the ERA process.

22. NSSR should strengthen the argument that beryllium is not a risk driver for benthic macroinvertebrates by noting that a comparison of surface water screening values, which are developed based on toxicity tests with a variety of aquatic organisms, indicates that beryllium is less toxic to aquatic organisms than, for example, cadmium, copper, and vanadium. The detected concentrations of beryllium in sediments are less than the sediment screening values for these other metals.

Navy Response:

The Navy agrees with this comment. The discussion presented in Section 4.7.1.5 regarding beryllium will be supplemented with the recommendation presented in Specific Comment No. 22 above.

23. NSRR proposes on page 4-60 to eliminate copper from further evaluation if acid volatile sulfides/simultaneously extracted metals (AVS/SEM) data indicate that copper is not bioavailable. This approach may not be adequately protective because AVS/SEM theory has not been tested for copper in long-term studies (although tests have been conducted for other metals, see Ankley et. a1 1995). Additionally, the extent of copper contamination has not yet been fully characterized (i.e., highest detected concentrations occur at locations 1EWS0l and 1EWS05, which are the southernmost and northernmost samples, respectively). NSRR should revise its recommendations for copper to address these issues.

Navy Response: *The Navy disagrees with this comment and offers the following points of clarification. It is agreed that specific literature-based information is not available on the significance of sulfide partitioning in controlling the chronic toxicity of copper in freshwater or marine sediments (i.e., spiked sediment toxicity tests). However, Ankley (1996) states that, " The bioaccumulation of*

lead, zinc, and copper appears to be explained reasonably well by a model based on AVS binding." Ankley et al. (1996) also present four methods for deriving Sediment Quality Criteria (SQC) for cadmium, copper, lead, nickel, and zinc. One method includes the comparison of molar AVS concentrations to the summed molar concentration of the five metals simultaneously extracted with the AVS. Ankley et al. (1996) indicate that SQC derived using this approach should be considered no effect concentrations. This study indicates acceptance by the scientific community regarding the applicability of the AVS/SEM model for predicting chronic effects of copper on benthic macroinvertebrates.

With regard to the additional sampling identified in Specific Comment No. 23 above, it is important to note that it was not the intention of the ERA to introduce detailed information for the recommended sampling program. This information will be included within a future sampling and analysis plan. Although specific sampling locations were not identified, they will include areas downgradient from the location of maximum detection. As part of this evaluation, bulk sediment analyses for copper also will be performed.

In summary, the Navy does not believe that recommendations for copper warrant revision. As such, no further action related to this comment will be taken.

Section 4.7.1.5, Refined Risk Calculation and Risk Evaluation for Ensenada Honda Surface Water

24. Because the maximum detected concentration of copper occurred at the northernmost sampling location (lOW05), it is uncertain whether the extent of contamination has been fully characterized. NSRR should retain copper as a chemical requiring further evaluation, or else provide additional justification for eliminating it.

    Navy Response: *The Navy disagrees with this comment. The statistical evaluations presented in Table 4-51 demonstrated that both total recoverable and dissolved copper concentrations in Ensenada Honda surface water downgradient from SWMU 1 are statistically equivalent to background levels. The descriptive statistics also demonstrate that the two datasets are similar. Given that elimination of this metal from additional evaluation based on the statistical evaluations presented in Table 4-51 is consistent with Navy policy (CNO, 2004), the Navy does not believe that copper warrants identification as a potential risk driver.*

    One additional point of clarification is offered (which will be added to Section 4.7.1.5). The concentration of dissolved copper at each Ensenada Honda surface water sampling location was less than the USEPA dissolved CCC value (USEPA, 2002).

Section 4.7.1.6, Refined Risk Calculation and Risk Evaluation for Ensenada Honda Sediment

25. See Specific Comments 16 and 18.

    Navy Response: *Please see the response to Specific Comment Nos. 16 and 18.*

26. NSRR should strengthen the argument that beryllium and thallium are not risk drivers for benthic macroinvertebrates by noting that a comparison of surface water screening values, which are developed based on toxicity tests with a variety of aquatic organisms, indicates that beryllium and thallium are less toxic to aquatic organisms than, for example, copper and vanadium. The detected concentrations of beryllium and thallium in sediments are considerably less than the sediment screening values for these other metals.

Navy Response: *The Navy partially agrees with this comment. With regard to thallium, the maximum detected concentration in estuarine wetland sediment sample (0.16 J mg/kg) is less than the maximum detected background concentration (0.91 mg/kg). Although the low number of detections in the SWMU 1 and background datasets impaired the statistical evaluation, the slippage test did demonstrate statistical equivalence. Elimination of thallium from further evaluation based on background comparisons is consistent with Navy policy (CNO, 2004). In summary, the Navy believes that the results of the statistical evaluations provide sufficient justification for a recommendation of no further evaluation for thallium, and changes to the document are not warranted.*

As discussed in Section 4.7.1.6 (Page 4-64), a statistical evaluation of the beryllium datasets could not be performed due to the lack of detections in the background dataset. Because this line of evidence was not available for beryllium, the Navy agrees with the comment. Therefore, the discussion presented in Section 4.7.1.4 regarding beryllium will be supplemented with the recommendation presented in Specific Comment No. 26 above.

Section 4.7.1.7.1, Terrestrial Food Web Exposures

27. It appears that Equation 4-6 is incorrect. Assuming the hazard quotient (i.e., 0.99) is the calculated dietary intake (Dl) divided by the NOAEL, when Equation 4-4 is substituted for DI and the terms are rearranged to solve for the soil concentration, Equation 4-6 is not the correct result. It is also unclear how the concentrations in food items are calculated (i.e., what soil/sediment exposure point concentration is used to model the food item concentrations?). Furthermore, additional discussion should be added to better explain the purpose and the rationale behind this analysis; it is unlikely that the uninitiated reader will understand this analysis as it is currently described. NSRR should correct any errors in Equation 4-6 and make the requested clarifications. Chemicals that were eliminated from further evaluation based on comparison of maximum detected concentrations to the calculated "concentrations in surface soil resulting in a mean exposure dose greater than or equal to the NOAEL-based screening value" must be re-evaluated once this comment is addressed.

    Navy Response: *The Navy partially agrees with this comment. The equation, as presented, does contain an error. The input parameter "FC_{xi}" (concentration of chemical x in food item i) should be replaced by a chemical specific bioconcentration factor (BCF) or bioaccumulation factor (BAF). However, this had no bearing on derived sediment concentrations since this formula was presented for illustrative purposes only (actual calculations were performed with the food web model by manually entering sediment concentrations until an HQ of 0.99 was derived). Therefore, re-evaluation of Aroclor-160, vanadium, and cobalt are not necessary. The Navy agrees to provide clarification of the calculations, including their purpose and meaning. It is noted that the discussion presented in Section 4.7.1.4.2 (Page 4-43) for the West Indian manatee will be removed based on previous Navy agreements regarding the West Indian manatee (see responses to Specific Comment Nos.*

28. To support the argument for eliminating dioxins and furans from further consideration, NSRR notes that these chemicals were not detected in surface water and sediments downgradient at SWMU 1. This argument is not valid because detection limits were greater than screening values in these media and because one would expect concentrations to be greatest in soil locations, which are in closest proximity to the source of potential contamination. To determine whether a low frequency of detection argument can be defensibly used to justify eliminating dioxins and furans from further evaluation, NSRR should discuss whether soil detection limits were below levels of concern for the

American robin. If detection limits were greater than these levels of concern, then dioxins and furans should be retained for further evaluation.

Navy Response: *The Navy agrees with this comment. Dioxin/furan compounds will be retained for further evaluation. This evaluation will initially involve the collection of additional surface soil samples in the vicinity of 1SD01 and 1SD02 (locations where dioxin/furan compounds were previously detected). Samples will be analyzed for the following congeners:*

2,3,7,8-TCDD
1,2,3,7,8-PeCDD
1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-HxCDD
1,2,3,4,6,7,8-HpCDD
OCDD
2,3,7,8-TCDF
1,2,3,7,8-PeCDF
2,3,4,7,8-PeCDF
1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-HpCDF
OCDF

It is noted that surface soil samples previously collected at SWMU 1 were not analyzed for the specific congeners listed above. The congener-specific analyses will determine if the toxic dioxin/furan compounds are present in SWMU 1 surface soil. If dioxin/furan compounds are not detected or not detected at ecologically significant concentrations, they will be dropped from the list of potential risk drivers. If detected at ecologically significant concentrations, they will be carried through the ERA process.

29. To better support the argument that butylbenzylphthalate, ethylbenzene, and beryllium are unlikely to cause risks in the terrestrial food web, NSRR should note that detected concentrations of all three of these chemicals are well below Region 5 Ecological Screening Levels (EPA 2003), which were developed based on food web exposure to the masked shrew.

Navy Response: *The Navy disagrees with this comment. Specifically, the Navy questions the utility of using a USEPA Region 5 ecological screening level based on food web exposures to a mammalian species as a line of evidence for avian receptors. The recommendation for butylbenzylphthalate will be strengthened by comparing the maximum detected concentration of this phthalate (75 J ug/kg) to the maximum detected concentration of bis(2-ethylhexyl)phthalate. Bis(2-ethylhexyl)phthalate has an established avian NOAEL value (see Table 4-10), and did not present risks to avian receptors at a maximum concentration of 200 J ug/kg in the screening-level risk calculation (see Table 4-27). Given that both butylbenzylphthalate and bis(2-ethylhexyl)phthalate are within the same chemical class, and the maximum butylbenzylphthalate concentration was less than the maximum bis(2-ethylhexyl)phthalate concentration, it is not likely that butylbenxylphthalate is presenting risks to avian receptors.*

30. Revise the sections regarding further evaluation of 4,4'-DDE on pages 4-68 and 4-69 to indicate that 4,4'-DDD and 4,4'-DDT will also be analyzed, consistent with the discussion in Section 4.7.1.1.

Navy Response: *The Navy agrees with this comment. The text in Section 4.7.1.7.1 (Pages 4-68 and 4-69) will be revised to include 4,4'-DDD and 4,4'-DDE.*

Section 4.7.1.7.2, Aquatic Food Web Exposures

31. See Specific Comment 27.

    Navy Response: *The Navy partially agrees with this comment. Please see the response to Specific Comment No. 27.*

32. See Specific Comment 17 regarding background comparisons for 4,4'-DDT and its metabolites. NSRR should present a spatial examination of risks for 4,4'-DDD and 4,4'-DDE.

    Navy Response: *The Navy partially agrees with this comment. As discussed in the response to Specific Comment No. 17, a statistical evaluation of anthropogenic chemicals (including pesticides) is consistent with Navy policy.*

    The Navy agrees that 4,4'-DDT and its biodegradation products require additional evaluation (see response to Specific Comment No. 17). This additional evaluation will also apply to great blue heron aquatic food web exposures. As such, the text in Section 4.7.1.7.2 (Page 4-70 and Page 4-71 will be revised accordingly.)

33. See Specific Comments 7 and 8 regarding exposure and effects characterization for the West Indian manatee. Risks to the manatee must be re-evaluated once these comments are addressed. Note that it is not appropriate to discuss mean doses for this receptor; decisions regarding its further evaluation must be made based on maximum exposure point concentrations.

    Navy Response: *The Navy agrees with the comment. Please see the responses to Specific Comment Nos. 7.*

34. On page 4-72, the ADCR states that the double-crested cormorant's foraging range is 49,000 ha, which is considerably larger than the foraging range determined by Custer and Bunck (1992). This study radio-tracked foraging cormorants from two colonies and found that, while birds might go as far as 10 km or so from the nesting site, a substantial proportion foraged within approximately 2 **krn** (about 1,200 ha). NSRR should revise the foraging range to present a more protective estimate, and should discuss the area of contaminated habitat provided by Ensenada Honda.

    Navy Response: *The Navy agrees with this comment. A more conservative foraging area will be used for this receptor (specific value used will be based on a review of the study referenced in Specific Comment No. 34 above). The Navy will also revise this section to include a discussion of the foraging range selected in relation to the size of open water aquatic habitat associated with SWMU 1.*

Section 4.7.1.8, Uncertainties Associated with Step 3a of the Baseline Ecological Risk Assessment for SWMU 1

35. This section should discuss uncertainty associated with toxic effect levels in sediments and note those chemicals that were identified as preliminary COPCs based on one screening value, but then eliminated from further evaluation based on other screening values. Clearly, there is uncertainty regarding the potential for effects in the range of concentrations bracketed by the various screening values cited. Revise this section accordingly.

    Navy Response: *The Navy agrees with this comment. Section 4.7.1.8 will be revised in accordance with the recommendations presented in Specific Comment No. 35 above.*

36. See Specific Comment 6. NSRR should discuss what hazard quotient values for the West Indian manatee would be if interspecies extrapolation factors were applied to the NOAEL.

    Navy Response: *The Navy agrees with this comment. Please see the response to Specific Comment No. 6.*

Section 4.7.1.9, Step 3a Decision Point and Recommendations for SWMU 1

37. NSRR should revise this section in accordance with the comments detailed above. EPA will re-evaluate all subsections within Section 4.7.1.9 when a revised draft is submitted.

    Navy Response: *Please see the response to general and specific comments that relate to SWMU 1. Section 4.7.1.9 will be revised in accordance with the Navy responses to these general and specific comments.*

Section 4.7.2, SWMU 2 Refined Risk Calculation and Risk Evaluation

38. See Specific Comments 9 and 10.

    Navy Response: *The Navy disagrees with this comment. Please see the response to Specific Comment Nos. 9 and 10.*

Section 4.7.2.2, Refined Risk Calculation and Risk Evaluation for Subsurface Soil

39. NSRR has not presented adequate justification for eliminating polycyclic aromatic hydrocarbons (PAHs) from further evaluation. Given the small sample size available (i.e., six samples), it is not clear that risks to terrestrial plants are acceptable. Note that arguments regarding screening values for invertebrates and Region 5 screening values, which were developed based on masked shrew exposures, have no bearing on risks with respect to terrestrial plants. Unless additional justification can be provided, PAHs should be retained as risk drivers in SWMU 2 subsurface soil.

    Navy Response: *The Navy has considered this comment and agrees that additional information supporting the recommendation of no further action is warranted. The Navy also offers the following points of clarification. First of all, the use of USEPA Region 5 surface soil screening values was recommended by the previous USEPA Region 2 reviewer in the surface soil risk screening with full knowledge that they are based on upper trophic level receptors. Secondly, the discussion regarding the screening value for terrestrial invertebrates has direct bearing since potential risks to this receptor group must be considered in addition to plants. Thirdly, while the Navy is in agreement with the*

comment regarding frequency of detection, the magnitude of detections above screening should be considered. Mean concentrations of benzo(b)fluoranthene, chrysene, and phenanthrene were less than surface soil screening values, the mean concentration of benzo(k)fluoranthene was equal to the screening value, while mean concentrations of fluoranthene and pyrene were slightly elevated above screening values (HQ = 1.17 and 1.01, respectively). The spatial distribution and magnitude of detections, as evidenced by maximum HQ values for these PAHs (see Table 4-31), also indicate that "hot spots" are not present for individual PAH compounds in SWMU 2 subsurface soil. To further support the recommendation of no further action, the text in Section 4.7.2.2 (Page 4-82) will be revised to include the discussion presented below.

Sverdrup et al. (2003) investigated the effect of fluoranthene, phenanthrene, and pyrene on red clover, ryegrass, and mustard seedling growth. After 21-days of exposure, fluoranthene EC_{20} values ranged from 140 mg/kg to 650 mg/kg on a fresh weight basis and 150 mg/kg to >1,000 mg/kg on a dry weight basis. 21-day EC_{20} values for phenanthrene ranged from 37 mg/kg to 300 mg/kg on a fresh weight basis and 46 mg/kg to 340 mg/kg on a dry weight basis, while pyrene EC_{20} values ranged from 49 mg/kg to >1,000 mg/kg on a fresh weight basis and 56 mg/kg to >1,000 mg/kg on a dry weight basis. In addition to effects on seeding growth, Sverdrup et al. (2003) reported effects on red clover, ryegrass, and mustard seed emergence for each PAH compound. 21-day fluoranthene, phenanthrene, and pyrene LC_{50} values were greater than 1,000 mg/kg for each species. Maximum detected fluoranthene, phenanthrene, and pyrene concentrations in SWMU 2 subsurface soil (3.2 mg/kg, 1,9 mg/kg, and 2.1 mg/kg) are at least an order of magnitude below these literature-based toxicity values. Given that the screening values used in the Step 2 and Step 3a screening-level risk calculation for these three PAHs are surrogate values derived from studies with benzo(a)pyrene and benzo(b)fluroanthrene, the toxicity values reported by Sverdrup et al. (2003) are more relevant for fluoranthene, phenanthrene, and pyrene.

In summary, the toxicity values reported by Sverdrup et al. (2003) support the original conclusion that fluoranthene, phenanthrene, and pyrene should not be identified as potential risk drivers. Although additional toxicity data were not identified from the literature for chrysene and benzo(k)fluoranthene, the Navy does not believe they warrant identification as potential risk drivers. The mean chrysene concentration was less than the surface soil screening value, while the mean benzo(k)fluoranthene concentration equaled the screening value. The magnitude of detections above the screening value also were low as evidenced by their maximum HQ values (1.7 for benzo(k)fluoranthene and 1.2 for chrysene). Finally, with the exception of the single subsurface soil sample containing PAH detections, PAH compounds were not detected at ecologically relevant concentrations (i.e., concentrations above screening values) in any of the SWMU 2 surface soil samples. Beyond incorporation of the information presented above, the Navy does not believe that additional action is warranted (i.e., PAHs will not be identified as potential risk drivers for SWMU 2 subsurface soil).

40. NSRR recommends collecting samples in the vicinity of 06SS146 to analyze for identified risk drivers. Concentrations exceeding screening values also occurred at other sampling locations (e.g., 06SS141). NSRR must provide greater justification for not recommending more widespread sampling to fully characterize the extent of soil contamination at SWMU 2.

Navy Response: *The Navy disagrees with this comment and offers the following points of clarification. The text in Section 4.7.2.2 recommends the collection of additional samples in the vicinity of two subsurface soil sampling locations (06SS141 and 06SS146). The recommended sampling includes subsurface soil at the location identified in Comment No. 40 above (i.e., 06SS141). Furthermore, samples collected upgradient and downgradient from 06SS141 and 06SS146 will include locations downgradient from other sample locations that contain concentrations of potential ecological risk drivers above surface soil screening values (06SS143, 06SS147, and 06SS153). As*

such, additional characterization of the extent of contamination at 06SS141 and 06SS146 will provide additional characterization at these sample locations. Finally, as discussed in the response to Specific Comment No. 11, it is not the intention of the additional sampling program to establish nature and extent at every location where a screening value was exceeded. As evidenced by Figure 4-16, maximum concentrations occurred at the two sampling points recommended for additional characterization. In summary, the Navy does not believe any additional action is warranted beyond what has already been recommended.

Section 4.7.2.3, Refined Risk Calculation and Risk Evaluation for Estuarine Wetland Sediment

41. See Specific Comments 16 and 26.

    Navy response: *With regard to derivation of DI Toro and McGrath (2000) SQGs, please see the responses to Specific Comment No. 16. With regard to Specific Comment No 26, which recommends that the Navy strengthen arguments presented for thallium and beryllium, the Navy partially agrees with this comment and offers the following points of clarification.*

    With regard to beryllium, the statistical evaluation presented in Table 4-69 demonstrated that the distribution of beryllium concentrations in estuarine wetland sediment downgradient from SWMU 2 is statistically equivalent to background levels. Elimination of beryllium from further evaluation based on background comparisons is consistent with Navy policy (CNO, 2004). In summary, the Navy believes that the results of the statistical evaluations provide sufficient justification for a recommendation of no further evaluation for beryllium, and changes to the document are not warranted.

    As discussed in Section 4.7.2.3 (Page 4-87), a statistical evaluation of the thallium datasets could not be performed due to the lack of detections in the background dataset. Because this line of evidence was not available for thallium, the Navy agrees with the comment. Therefore, the discussion presented in Section 4.7.1.4 regarding beryllium will be supplemented with the recommendation presented in Specific Comment No. 26.

42. The maximum detected concentrations for seven inorganic chemicals (i.e., cobalt, copper, lead, mercury, nickel, tin, and vanadium) occurred at sampling location 2EWS01, which is the southernmost sampling location. Consequently, the extent of contamination of these chemicals in estuarine sediments has not been fully characterized. All seven of these inorganics should be retained for further sampling and analysis unless additional justification can be provided. See also Specific Comment 21 regarding tin.

    Navy Response*: The Navy partially agrees with this comment. The statistical evaluations presented in Table 4-68 demonstrated that cobalt, lead, mercury, nickel, tin, and vanadium concentrations in estuarine wetland sediment are statistically equivalent to background levels. As stated elsewhere in this response letter, elimination of chemicals from further evaluation in Step 3a of the baseline ERA based on statistical comparisons to background levels is consistent with Navy policy. However, lead and mercury were identified as potential risk drivers for upgradient surface soil and subsurface soil. Furthermore, as indicated in Specific Comment No. 42 above, maximum, mean, and 95 percent UCL concentrations in estuarine wetland sediment downgradient from SWMU 2 exceeded background concentrations. For these reasons, The Navy aggress that additional evaluation is warranted.*

    The Navy is in disagreement with this comment in regard to cobalt, nickel, tin, and vanadium. In addition to estuarine wetland sediment, the distribution of vanadium and cobalt concentrations in

SWMU 1 surface soil and subsurface soil were statistically equivalent to background levels (see Tables 4-65 and 4-67). Furthermore, the descriptive statistics presented in Table 4-69 show that maximum concentrations for these two metals occurred within the background data set. Based on the absence of any evidence suggesting that a release in upgradient media has occurred, as well as the statistical evaluation presented inTable 4-69, the Navy does not believe additional evaluation of cobalt and vanadium is warranted. With regard to nickel and tin, the descriptive statistics presented in Table 6-69 show that maximum tin and nickel concentrations in estuarine wetland sediment downgradient from SWMU 2 (6 J mg/kg and 17 mg/kg, respectively) were only slightly elevated above maximum background concentrations (4.2 J mg/kg and 10 mg/kg, respectively.). The distributional statistics presented in Table 6-69 also showed that the SWMU 2 estuarine wetland data sets are statistically equivalent to background concentrations. In addition to the statistical evaluation presented in Table 4-69, other lines of evidence were provided that support the recommendation for no additional evaluation (e.g., mean HQ values, frequency and magnitude of exceedences above sediment screening values, and/or comparison of the maximum detected concentrations to literature-based toxicity values). Based on the lines of evidence provided, including the statistical evaluation, the Navy does not believe that additional evaluation of nickel and tin is warranted. It is noted that recommendations for copper include the collection of sediment for acid volatile sulfide/simultaneously extracted metal (AVS/SEM) analysis. Because nickel is an SEM metal, nickel will be indirectly evaluated as part of the recommendation made for copper.

Copper was identified as a potential risk driver for estuarine wetland sediment. As discussed in the response to Specific Comment No. 23, it was not the intention within the ERA to introduce detailed information with regard to the additional sampling that was recommended. For example, the recommendation for copper involved the collection of estuarine wetland sediment samples for AVS/SEM analysis. Specific sampling locations were not identified, but will include areas downgradient from the location of maximum detection. As part of this evaluation, bulk sediment analyses for copper will be performed.

In summary, the Navy does not believe that additional sampling for cobalt, vanadium, nickel, and tin are warranted. However, the Navy agrees that additional evaluation of lead and mercury is necessary. Sediment samples will be collected downgradient from the location of maximum detections for bulk sediment analyses. Samples also will be analyzed for AVS/SEM (lead is an SEM metal). Again, specific details on the sampling program will be provided in a future sampling and analysis plan.

43. See Specific Comment 23 regarding SEM/AVS analysis.

Navy Response: *The Navy disagrees with this comment. Please see the response to Specific Comment No. 23.*

Section 4.7.2.4, Refined Risk Calculation and Risk Evaluation for Ensenada Honda Surface Water

44. The maximum detected concentration for copper occurred at sampling location 2OW01, which is the southernmost sampling location in Ensenada Honda. Consequently, the extent of copper contamination has not been fully characterized. Copper should be retained for further sampling and analysis unless additional justification can be provided.

The Navy disagrees with this comment. The statistical evaluations presented in Table 4-71 demonstrated that both total recoverable and dissolved copper concentrations in Ensenada Honda surface water downgradient from SWMU 1 are statistically equivalent to background levels. The descriptive statistics also demonstrated that the two datasets are similar. Given that elimination of

this metal from additional evaluation based on the statistical evaluations presented in Table 4-51 is consistent with Navy policy (CNO, 2004), the Navy does not believe that additional evaluation is warranted.

One additional point of clarification is offered. As discussed in Section 4.7.2.4, the concentration of dissolved copper at each Ensenada Honda surface water sampling location was less than the USEPA CCC value.

Section 4.7.2.5, Refined Risk Calculation and Risk Evaluation for Ensenada Honda Sediment

45. On page 4-92, NSRR indicates that arsenic concentrations in Ensenada Honda sediment are statistically equivalent to background concentrations. This statement conflicts with Table 4-73, which shows that arsenic concentrations in Ensenada Honda sediment are significantly greater than background concentrations. Revise the text to correct the error, and retain arsenic for further evaluation unless additional justification can be provided.

Navy Response: *The Navy agrees with this comment (i.e., arsenic was shown to be statistically elevated above background levels). However, this metal will not be recommended for further evaluation for the following reasons:*

- *The range of arsenic detections in upgradient surface soil (1.1 mg/kg to 19.6 mg/kg), subsurface soil (3.3 mg/kg to 18.7 mg/kg), and estuarine wetland sediment (2 mg/kg to 14 mg/kg) were very consistent. This is not indicative or a release at SWMU 2.*

- *With the exception of surface soil, arsenic concentrations in upgradient sediment and soil were statistically equivalent to background levels (see Tables 4-65, 4-67, and 4-68).*

- *Arsenic was detected in two of nine samples above the screening value. As evidenced by the maximum HQ value (HQ = 1.52), the magnitude of these detections was low.*

The text in Section 4.7.2.5 (Page 4-92) will be revised to reflect the statistical evaluation presented in Table 4-73. The text will also be revised to include the information presented in the bullet items above.

46. See Specific Comment 21.

Navy Response: *As discussed in the response to Specific Comment No. 21, the sediment screening value used in the Step 2 and Step 3a risk calculations for tin was an Apparent Effects Threshold (AET) value (Buchman, 1999). The AET value was reported as >3.5 mg/kg. This toxicological benchmark does not represent a threshold concentration. As such, there is uncertainty associated with its use in the Step 2 and Step 3a risk calculations. Section 4.7.1.3 presented literature-based toxicity values from a study (Kristin et al., 1998) that investigated the chronic effect of tributyltin (TBT) on four benthic invertebrate species. The minimum effect concentration, a median inhibition concentration (IC_{50}) based on mayfly (Hexagonia sp.) growth (600 mg/kg), is over one order of magnitude greater than the maximum detected tin concentration expressed as mg TBT/kg (i.e., 5.2 J mg Sn/kg is equivalent to 12.7 mg TBT/kg [Note: the ADCR did not provide a conversion from mg Sn/kg to mg TBT/kg prior to comparison to the literature-based toxicity values; the ADCR will be revised to reflect the proper comparison]). Although toxicity data from a single study was used as the primary line of evidence for a recommendation of no further evaluation, the value used was the minimum reported value for four species. Many of the literature-based toxicological thresholds commonly used in ERAs, including the ERA at SWMUs 1 and 2, are based on a similar number of*

data points or a fewer number of data points. Examples include the AET values reported in Buchman (1999), many of the USEPA Region 4 chronic surface water screening values (USEPA, 2001), and several toxicological thresholds for earthworms reported in Efroymson et al. (1997).

The AET value used in the Step 2 and Step 3a risk calculations, as well as the toxicity data reported by Kristin et al. (1998) are based on the most toxic form of tin (USEPA, 2002). Given that all detected tin was assumed to be present as tributyltin, and the comparison of the maximum tin concentration (expressed as mg TBT/kg) to available tributyltin toxicological thresholds or literature-based toxicity data did not indicate that detected levels are impacting benthic macroinvertebrate communities, the absence of data on the form of tin present is not relevant.

Based on the discussion presented above, the Navy believes sufficient evidence was presented to justify the recommendation.

Section 4.7.2.6, Refined Risk Calculation and Risk Evaluation for Terrestrial and Aquatic Food Web Exposures

47. See Specific Comment 27

Navy Response: *The Navy partially agrees with this comment. Please see the response to Specific Comment No. 27.*

Section 4.7.2.6.1, Terrestrial Food Web Exposures

48. On page 4-94, the ADCR cites a mean foraging range of 956 ha for the mourning dove, which is substantially greater than documented foraging areas for other herbivorous birds (e.g, 4 to 17 ha for the northern bobwhite, EPA 1993). NSRR should ensure that any discussion of foraging range uses an area that would be protective of the herbivorous bird feeding guild, which the mourning dove has been selected to represent. Furthermore, it is unclear what site area would be appropriate for comparison, considering that metals have been detected above background in a number of SWMUs. Revise this section to consider a more protective foraging area and a facility-wide area of contamination, or else eliminate discussion of mourning dove foraging area altogether.

Navy Response: *The Navy agrees with this comment. The Navy also believes that sufficient evidence is presented in Section 4.7.2.6.1 (Page 4-94) that a line of evidence regarding AUFs is unnecessary. As such, the discussion of foraging areas will be deleted from the text.*

49. See Specific Comment 28 regarding dioxins and furans. Note that a sample size of eleven is too small to eliminate a chemical from further evaluation with a high degree of confidence based on low frequency of detection. Dioxins and furans should be retained for further evaluation unless additional justification can be provided.

Navy Response: *The Navy agrees with this comment. Dioxin/furan compounds will be retained for further evaluation. This evaluation will initially involve the collection of additional surface soil samples in the vicinity of 2SB03 (location where dioxin/furan compounds were previously detected). Samples will be analyzed for the following congeners:*

2,3,7,8-TCDD
1,2,3,7,8-PeCDD
1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-HxCDD

1,2,3,7,8,9-HxCDD
1,2,3,4,6,7,8-HpCDD
OCDD
2,3,7,8-TCDF
1,2,3,7,8-PeCDF
2,3,4,7,8-PeCDF
1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-HpCDF
OCDF

It is noted that surface soil samples previously collected at SWMU 2 were not analyzed for the specific congeners listed above. The congener-specific analyses will determine if the toxic dioxin/furan compounds are present in SWMU 2 surface soil. If dioxin/furan compounds are not detected or not detected at ecologically significant concentrations, they will be dropped from the list of potential risk drivers. If detected at ecologically significant concentrations, they will be carried through the ERA process.

50. See Specific Comment 40 regarding sampling recommendations for risk drivers.

Navy Response: *Please see the response to Specific Comment No. 40.*

Section 4.7.2.6.2, Aquatic Food Web Exposures

51. On page 4-98, lead and mercury are eliminated from consideration for further evaluation based on comparison to background concentrations. It should be noted, however, that the maximum and 95 percent upper confidence limit on the mean (UCL) values of these chemicals were greater at SWMU 2 than in background. This section should be revised to include this point of information, and discuss the frequency of detected concentrations exceeding wildlife risk-based levels for lead and mercury. Decisions regarding whether these chemicals should be eliminated from further consideration should be re-evaluated taking these factors into account.

Navy Response: *The Navy partially agrees with this comment. As stated elsewhere in the response letter, elimination of chemicals in Step 3a of the baseline ERA based on a statistical comparison to background levels is consistent with Navy policy (CNO, 2004). However, the Navy agrees to provide a discussion of the spatial distribution and magnitude of detected concentrations in relation to population-based risk estimates.*

52. See Specific Comments 7 and 8 regarding exposure and effects characterization for the West Indian manatee. Risks to the manatee must be re-evaluated once these comments are addressed. Note that it is not appropriate to discuss mean doses for this receptor; decisions regarding its further evaluation must be made based on maximum exposure point concentrations.

Navy Response: *The Navy agrees with this comment. Please see the response to Specific Comment Nos. 7 and 8.*

Section 4.7.2.7, Uncertainties Associated with Step 3a of the Baseline Ecological Risk Assessment for SWMU 2

53. See Specific Comments 35 and 36.

Navy Response: *Please see the responses to Specific Comment Nos. 35 (Navy agreement) and 36 (Navy partial agreement).*

Section 4.7.2.8, Step 3a Decision Point and Recommendations for SWMU 2

54. NSRR should revise this section in accordance with the comments detailed above. EPA will re-evaluate this section when a revised draft is submitted.

Navy Response: *Please see the responses to general and specific comments that relate to SWMU 2. Section 4.7.2 will be revised in accordance with Navy responses to these general and specific comments.*

Section 5.0, Conclusions and Recommendations

55. NSRR should revise this section in accordance with the comments detailed above. EPA will re-evaluate this section when a revised draft is submitted.

Navy Response: *Please see the responses to the General Comments and Specific Comments for Section 4.0. Section 5.0 will be revised in accordance with the Navy responses to these general and specific comments.*

Tables 4-10 and 4-11, Ingestion-Based Screening Values for Birds and Mammals

56. For some chemicals (e.g. arsenic in Table 4-10), toxicity test data are summarized for more than one study. In these instances, it is unclear which NOAEL and LOAEL values were ultimately used in the risk calculations. Revise Tables 4-8 and 4-9 to indicate which values were selected for use in the ecological risk assessment.

Navy Response: *The Navy disagrees with this comment and offers the following point of clarification. The last column in Tables 4-8 and 4-9 lists the specific ecological receptors assigned to a given chemical-screening value combination. Using arsenic in Table 4-8 as an example, two sets of screening values are listed. One set of screening values is from a study with brown-headed cowbirds, while a second set of screening values is from a study with mallard ducks. As evidenced by the last column, the NOAEL and LOAEL values from the study using brown-headed cowbirds were selected for use as ingestion-based screening valued for the American robin, mourning dove, red-tailed hawk, belted kingfisher, and double crested cormorant. It is noted that the great blue heron and spotted sandpiper are mistakenly listed within the last column of Table 4-8 in error since these two species were not selected as ecological receptors for the ecological risk assessment (see the discussion presented in Section 4.3.2.1 – Selection of Receptors). Table 4-8 will be revised to eliminate reference to the spotted sandpiper and great blue heron.*

Table 4-12, Calculation of 2,3,7,8-TCDD Equivalents: Surface Soil, Surface Water, and Sediment at SWMU 1

57. Although this table is useful for showing TCDD equivalents calculations and should be included in this report, the sum of TCDD equivalents should also be compared to appropriate screening values in Tables 4-20,4-22,4-23,4-24, and 4-25. Revise these tables, and if appropriate the tables presenting comparisons to mean concentrations, accordingly to ensure that risk managers do not overlook potential risks due to dioxins and furans.

    Navy Response: *The Navy disagrees with the comment. The table showing TCDD equivalents is adequately referenced within applicable sections. As such, the Navy does not believe the recommended table revisions are necessary.*

Table 4-18, Conservative Exposure Parameters for Upper Trophic Level Receptors

58. Two of the food ingestion rate values (i.e., values for American robin and red-tailed hawk) presented in Table 4-14 are less than the values presented in August 2001 Screening-Level Ecological Risk Assessment Problem Formulation (Step 1) and Exposure Estimate for SWMUs 1 and 2. Explain this discrepancy and justify the use of less protective values.

    Navy Response: *With regard to the American robin, food ingestion rates were weighted by dietary component. This approach is based on data from Levy and Karasov (1989), who reported that robins fed a diet of fruit have a much higher food ingestion rate than robins fed a diet of invertebrates (0.31 g/g-day for an invertebrate diet and 0.59 g/g-day for a fruit diet). The maximum food ingestion rate presented in the Screening-level Ecological Risk Assessment Problem Formulation (Step 1) and Exposure Estimate for SWMUs 1 and 2 (Baker, 2001c) was based on a diet consisting of 51.6 percent terrestrial plants, 43.6 percent terrestrial invertebrates, and 4.8 percent soil [Note: the dietary composition was presented correctly, but the food ingestion rate was based on the dietary composition presented above]. The food ingestion rate used in the ADCR is based on a diet of 12 percent terrestrial plants, 78.9 percent terrestrial invertebrates, and 9.1 percent soil. Given that the ADCR used a higher percentage of invertebrates in the American robin diet, the corresponding ingestion rate is lower.*

    With regard to the red-tailed hawk, the food ingestion rate presented in the problem formulation and exposure estimate document (Baker, 2001c) is based on a maximum ingestion rate reported by Craighead and Craighead (1956) and cited in Sample and Sutter II (1994) and USEPA (1993). The reported ingestion rate (0.136 kg/day), expressed on a wet weight basis, was converted to a dry weight value (0.04352 kg/day) by multiplying the wet weight value by 0.32 (solids content of small mammals [USEPA, 1993]). The maximum ingestion rate is based on a feeding study conducted during fall and winter months. Craighead and Craighead (1956) reported a second ingestion rate (0.117 kg/day wet weight) for fall and winter months, as well as a third ingestion rate (0.073 kg/day wet weight) for spring and summer months. The three ingestion rates indicate that the red tailed hawk has a higher food ingestion rate during fall and winter months. Given that Puerto Rico does not exhibit seasonal changes, the use of a maximum ingestion rate based on a feeding study conducted during fall and winter (i.e., 0.136 mg/kg, wet weight) was not deemed appropriate. Instead, body weights (reported in USEPA, 1993) corresponding to each seasonal ingestion rate were used to derive percentages of the total body weight consumed on a daily basis. The average of this percentage (10 percent) was then used to estimate an ingestion rate based on a maximum body weight of 1.235 kg (USEPA, 1993). This results in a value of 0.1235 kg/day (wet weight). Multiplying this value by

0.32 (solids content of small mammals) gives a final food ingestion rate of 0.03952 kg/day (dry weight).

Table 4-26, Summary of Hazard Quotients for Terrestrial Food Web Exposures: Surface Soil

59. Add a footnote to Table 4-26 to explain the "NA" designations (e.g., toxicity data not available), and revise this table to clarify which chemicals were never detected. This comment also applies to Tables 4-27,4-28, 4-29,4-35, 4-36,4-37,4-38,4-59,4-60,4-61, 4-62, 4-74,4-75, 4-76, and 4-77.

    Navy Response*. The Navy disagrees with this comment. While it is agreed that this information would enhance the tables, revisions have no bearing on conclusions or recommendations. Furthermore, these revisions represent an unnecessary budgetary burden. In summary, the tables will not be revised based on the discussion presented above.*

Table 4-41, Less Conservative Soil Bioconcentration Factors Used for Terrestrial Plants and Soil Bioaccumulation Factors (BAF) Used for Terrestrial Invertebrates

60. The origin of the soil-invertebrate values listed in this table is unclear. The values listed here are different from both the median BAFs in Table 11 and the mean BAFs in Table 16 of Sample et al. (1998). For example, the mercury BAF used by NSRR (i.e., 1.186) is less than both the mean and median values reported by Sample et al. (1998). Revise this table to clarify the technical basis of the values, and provide justification for any BAFs that are less than Sample et al. (1998) values.

    Navy Response*: The Navy offers the following point of clarification. As indicated in Table 11 of Sample et al. (1998), the distribution of chromium and mercury soil-to-earthworm BAF values that were used to derive the summary statistics followed a lognormal distribution. Therefore, the mean chromium and mercury BAFs listed in Table 4-22 were derived from the mean of the natural log-transformed values listed in Table 11 of Sample et al. (1998).*

Table 4-63, Summary of Ecological Chemicals of Potential Concern and Potential Risk Drivers, SWMU 1

61. Chemicals that were never detected but that had mean detection limits exceeding screening values were retained as chemicals of potential concern in this assessment. These chemicals should be listed within a separate category in Table 4-63. This revision is necessary to ensure that uncertainties resulting from these chemicals are not overlooked by risk managers.

    Navy Response*: The Navy has considered this comment. Specific chemicals identified as ecological COPCs in the Step 2 of the screening-level ERA will not be listed; however, the number of chemicals in a specific chemical class will be identified. Table 4-63 also will be revised to include references to tables elsewhere within the ADCR where these chemicals are listed (media-specific screening tables).*

Table 4-78, Summary of Ecological Chemicals of Potential Concern and Potential Risk Drivers, SWMU 2

62. See Specific Comment 61.

    Navy Response*: Please see the response to Specific Comment No. 61.*

Figure 1-2, SWMU/AOC Location Map

63. Revise this figure to clearly identify the location of Los Machos National Forest.

Navy Response: *The Navy disagrees with this comment. Revision of this figure is an unnecessary budgetary burden that has no bearing on conclusions or recommendations given its location (the forest is North of SWMU 9 [Area C]; upper right hand of Figure 1-2). In summary, revisions to Figure 1-2 are not deemed necessary.*

Appendix F, Habitat Characterization Report

64. Appendix F refers the reader to the August 2001 Draft Screening-Level Risk Assessment for the Habitat Characterization Report. Because this ADCR should be a stand-alone document, all relevant habitat characterization reports (i.e., both upland and marine) should be included in Appendix F. Revise the ADCR accordingly.

Navy Response: *The Navy disagrees with this comment. The habitat characterization at SWMUs 1 an 2 was conducted to support the development of the screening-level problem formulation for SWMUs 1 and 2 (including the development of the preliminary conceptual model), which was presented in the Draft Screening-level Ecological Risk Assessment Problem Formulation and Exposure Estimate, SWMUs 1 and 2, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2001c). As such, inclusion of this document, which contains many color maps and photographs, would be an unnecessary budgetary burden. In summary, the Navy does not believe that the habitat characterization report is a necessary component of the ADCR.*

Additional Comment

65. The work plan for SWMUs 1 and 2 specified that surface water samples would be collected from the estuarine wetlands at SWMU2. According to Section 2.2.3.1 of the ADCR., however, too little standing water was present in this area at the time of the filed event to permit collection of samples. The Navy should discuss the hydrologic regime of these wetlands. If standing water periodically occurs in this area, the Navy should make a second attempt to collect surface water samples.

Navy Response: *The Navy disagrees with this comment and offers the following points of clarification. Surface water and sediment sampling locations were selected without knowledge of the hydrologic regime of the estuarine wetland system. Based on observations during the field sampling event, it became apparent that the portion of the wetland adjacenet to upland habitat associated with SWMU 2 does not contain standing water, nor is it influenced by tidal cycles. The lack of surface water data for the estuarine wetland system is not considered a significant data gap requiring additional evaluation. Chemicals that may be migrating from SWMU 2 to the estuarine wetland (e.g., metals) will likely patition to sediment. This is supported by the analytical data for estuarine wetland surface water collected downgradient from SWMU 1. Similar chemicals were identified as potential ecological risk drivers for SWMU 1 surface soil; however, these chemicals were not detected at ecologically important concentrations or concentrations greater than background in estuarine wetland surface water collected downgradient from SWMU 1. For this reason, the The Navy does not believe the lack of surface water data for estuarine wetland surface water downgradient from SWMU 2 represents a significant data gap that warrants additional action.*

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NAVY RESPONSES TO USEPA COMMENTS DATED APRIL 9, 2004 ON THE DRAFT ADDITIONAL DATA COLLECTION REPORT AND SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT AND STEP 3A OF BASELINE ECOLOGICAL RISK ASSESSMENT AT SWMU 45 NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO

I. GENERAL COMMENTS

1. Review of the January 30, 2004 Draft Additional Data Collection Report and Screening Level Ecological Risk Assessment and Step 3A of the Baseline Ecological Risk Assessment at SWMU 45 (hereafter referred to as the ADCR) revealed a number of technical inadequacies. As detailed in the comments below, key deficiencies include: unprotective food web model assumptions for the West Indian manatee, a threatened and endangered (T&E) species; elimination of all non-detected chemicals from further evaluation without adequate justification; potential errors in calculations; and use of background concentrations from locations that have not been documented. Naval Station Roosevelt Roads (NSRR) should address the comments below and submit a revised draft ADCR.

   Navy Response: *Navy Responses to the issues identified in General Comment No. 1 are presented below. Please note that the ecological risk assessment (ERA) at SWMU 45 was prepared in accordance with previous documents approved by the USEPA and agreements reached between the Navy and USEPA. As such, many of the comments listed below contradict methodology that was previously considered acceptable to the USEPA. Comments regarding the use of background levels in the ERA also contradict Navy policy. These issues are noted where appropriate.*

2. Analysis of inorganics in Solid Waste Management Unit (SWMU) 45 surface soil was limited to the eight RCRA metals. Because other inorganics (e.g., copper) were detected at concentrations exceeding background in downgradient Puerca Bay sediments, EPA is concerned that soil contamination at SWMU 45 has not been adequately characterized. NSRR should address this issue in the ecological risk assessment, and propose additional sampling and analysis.

   Navy Response: *The Navy has considered this comment and agrees that the lack of surface soil analytical data for the entire suite of Appendix IX metals represents an uncertainty (as was discussed in Section 4.6.2, Page 4-28). However, the Navy does not believe that the lack of Appendix IX metals data for surface soil at SWMU 45 represents a significant data gap that warrants the collection and analysis of additional surface soil samples for the reasons discussed below.*

   Building 45 (i.e., Building 38) operated as a power plant from the early 1940s to 1949). The facility used Bunker C fuel, which was stored in two 50,000-gallon undegrounhd storage tanks. The absence of PAH detections in SWMU 45 surface soil collected in the vicinity of the USTs provides evidence that a release to surface soil has not occurred (see Appendix F.3). From 1956 to 1964, transformer maintenance was performed at Building 38. Metals are not associated with this activity. Based on the historical activities conducted at Building 38, releases of metals to surface soil would not be expected. As such, the conceptual model for SWMU 45 provides no indication that Appenidx IX metals would be present in surface soil at ecologically important concentrations.

   As discussed in Section 4.3.1.2 (Page 4-9), the migration of chemicals with surface soil via surface runoff to downgradient surface water and sediment does not represent a potential complete transport pathway at SWMU 45. The only current mechanism of contaminant transport from the site to

downgradient surface water and sediment is leaching of chemicals from surface soil and/or subsurface soil by infiltrating precipitation and transport with groundwater. Identical to surface soil, groundwater samples collected at SWMU 45 were analyzed for RCRA metals (Baker, 1999). Two RCRA metals detected within the dissolved fraction of SWMU 45 groundwater were identified as ecological COPCs for embayment sediment in the Step 2 screening-level risk calculation (arsenic and cadmium). Arsenic was detected in the dissolved fraction at a maximum concentration of 39.2 J ug/L, while cadmium was detected at a maximum concentration of 5 J ug/L. Although these two metals were not detected in background groundwater samples (Baker, 1999), their maximum detected dissolved concentrations in SWMU 45 groundwater are less than dissolved saltwater CCC values (36 ug/L and 8.3 ug/L, respectively [USEPA, 2002]). These data indicate that arsenic and cadmium are not migrating with groundwater from SWMU 45 to the embayment at ecologically significant concentrations.

Subsurface soil samples collected at SWMU 45 were analyzed for the full suite of Appendix IX metals (Baker, 1999). As discussed in Section 4.7.1.3 (Page 4-37), arsenic, beryllium, cadmium, copper, mercury, thallium, tin, and vanadium were identified as ecological COPC for embayment sediment in the Step 2 screening-level risk calculation. Maximum detected beryllium, copper, mercury, tin, and vanadium concentrations in SWMU 45 subsurface soil (0.28 J ug/kg, 131 J ug/kg, 0.04 mg/kg, 2.7 J ug/kg, and 158 ug/kg) are less than maximum basewide background subsurface soil concentrations (0.74 J ug/kg, 144 mg/kg, 0.17 J ug/kg, 3.4 J ug/kg, and 373 mg/kg, respectively [Baker, 1999]). Maximum arsenic and cadmium concentrations in SWMU 45 subsurface soil (5.4 J mg/kg and 0.86 mg/kg, respectively) are only slightly elevated above maximum background subsurface soil concentrations (2.4 J mg/kg and 0.62 mg/kg, respectively). Thallium was not detected in either dataset. Based on the comparisons presented above, there is not indication that a release of arsenic, beryllium, cadmium, copper, mercury, tin, or vanadium to subsurface soil has occurred at SWMU 45.

In summary, the Navy does not believe that the lack of surface soil analytical data for the full suite of Appendix IX metals represents a significant data gap that warrants collection of additional surface soil samples. This conclusion is based on the conceptual site model for the facility, which does not indicate that a release of metals to surface soil has occurred, and the information presented above. Section 4.3.1.1 will be revised to include a more clear discussion of the conceptual site model in regard to metals. The surface soil and groundwater discussion presented above also will be incorporated into the existing discussion of uncertainties associated with the lack of surface soil analytical data for Appendix IX metals (Section 4.6.2, Page 4-28).

3. Many chemicals of potential concern (COPCs) are eliminated from further evaluation based on comparisons to background concentrations. Complete descriptions and maps of all background locations, however, are not presented. This information must be included in the ADCR to justify the use of background data (see Specific Comment 12).

   Navy Response: *The Navy disagrees with this comment. Background sampling locations, sampling procedures, laboratory and field quality assurance/quality control (QA/QC), and background analytical data have previously been presented and discussed in documents approved by the USEPA. Inclusion of this information in every document generated is an unnecessary budgetary burden. It is further noted that the ADCR included figures showing background locations. Background surface soil sample locations are depicted on Figures 4-11 (basewide background surface soil sampling locations) and 4-12 (SWMU 9 background surface soil sampling locations), while open water surface water and sediment background sampling locations are depicted on Figure 4-13. Background*

analytical dataThe specific documents where background information was previously presented and discussed are identified in the paragraph below.

The basewide background surface soil sampling locations and associated analytical data were previously presented and discussed in the Revised Draft RCRA Facility Investigation Report for Operable Unit 3/5, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 1999; approved by the USEPA September 9, 1999). The SWMU 9 background surface soil sampling locations and associated analytical data were previously presented and discussed in the Draft Corrective Measures Study Investigation Report for SWMU 9, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2001a; approved by a the USEPA February 19, 2003). This USEPA approved document also contained an evaluation that justified a unified basewide and SWMU 9 background surface soil dataset. Open water surface water and sediment background sampling locations were previously presented and discussed in the Draft Additional Data Collection Work Plan in Support of Ecological Risk Assessment at SWMU 45, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2001b; approved by the USEPA October 4, 2001). A discussion of the sampling locations, including the associated analytical data also was presented in the Final Additional Data Collection Investigation Report, Tow Way Fuel Farm, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2003a; approved by the USEPA June 10, 2003)

Based on USEPA approval of the aforementioned documents, which contained descriptions of background sampling locations, sampling procedures, laboratory and field QA/QC, and associated analytical data, the Navy does not believe that justification for use of the background data is warranted. Furthermore, as discussed above, figures showing the location of background sampling locations were included in the ADCR as Figures 4-11, 4-12, and 4-13. It is worth noting that recent documents have presented the background samples in a similar fashion without comment, including the Final Corrective Measures Study Task 1 Report, Tow Way Fuel Farm, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2003b; approved by the USEPA June 10, 2003) and the Final Corrective Measures Study Report for SWMU 53, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2003c; approved by the USEPA January 30, 2004). It is acknowledged that text within the last bullet item in Section 4.7 (location were use of background data is introduced) did not include the references for several documents identified above. The text will be revised to include references to these documents. Appendices also will be added to the ADCR summarizing the background data used in the ERA.

In addition to the revisions identified in the preceding paragraph, text will be added to the document to provide 1) a clear description of the decision framework for using descriptive statistics, box plots, statistical comparisons of the means, and statistical comparisons of the right-tail of the distribution; (2 descriptions of how outliers and non-detects were evaluated; and 3) all relevant statistical parameters used in the evaluations (e.g., alpha level).

4. NSRR has not tabulated prey exposure concentrations or calculated doses for wildlife receptors. These values should be tabulated and attached to the ADCR to ensure that the results presented can be reproduced by readers.

   Navy Response: *Unlike USEPA human health guidance (USEPA, 1997), which contains specific requirements for reporting, USEPA and Navy ERA guidance and policy (USEPA, 1997 and CNO, 1999, respectively) does not include recommendations or requirements regarding the tabulation of estimated prey tissue concentrations and receptor doses. It is noted that the requested information was not included in previous ERAs approved by the USEPA. Regardless, components of the food web model that were used to derive upper trophic level risk estimates will be included as an appendix*

to the document for a sample of chemicals. However, the model output pages will not be formatted in a manner consistent with USEPA (1998) human health requirements, nor will they be manipulated to show input parameters linked from other worksheets within the model (i.e., food ingestion rates, body weights, dietary proportions, bioconcentration [BCF] factors, and bioaccumulation factors [BAFs]).

II. SPECIFIC COMMENTS

Sections 2.2 and 2.3, Surface Water Investigation and Sediment Investigation

1. These sections do not describe the open water background samples that were planned in the August 10, 2001, Draft Additional Data Collection Work Plan in Support of Ecological Risk Assessment at SWMU 45. Based on data presented in the risk assessment, it appears that these samples were collected. Revise the text and tables to include information regarding the background samples analogous to the information provided for the site samples. Additionally, revise the text to provide the rationale for the selected locations of the background samples, and add a figure depicting the locations of the background samples to the ADCR.

   Navy Response: *The Navy disagrees with this comment and offers the following points of clarification. A detailed description of the open water background samples, including location and associated analytical results, was previously presented in the document entitled Final Additional Data Collection Investigation Report, Tow Way Fuel Farm, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2003a; approved by the USEPA). The text in Section 2.0 will be revised to include a reference to this document. As discussed in the response to General Comment No. 3, the ADCR included a figure in Section 4.0 showing the location of the background surface water and sediment sampling locations taken from an open water marine habitats (Figure 4-12). The text in Section 2.0 also will be revised to include a reference to the ADCR figure showing open water background locations.*

Section 3.0, Investigation Results

2. Section 3.0 does not include results of the background samples collected. Revise the text and tables to present these results in addition to site sample results.

   Navy Response: *The Navy disagrees with this comment. Please see the response to Specific Comment No. 1. Note that Section 3.0 of the ADCR will be revised to include a reference to the document where open water background analytical results were previously presented and discussed (i.e., Baker, 2003a).*

Section 4.3.1.3, Exposure Pathways and Routes

3. The final paragraph on page 4-11 states, "although this represents an uncertainty in the assessment it is assumed that terrestrial reptile and amphibians are not likely to be more sensitive to chemical exposures than the other receptor groups that are included in the screening-level ERA." It is likely that sufficient toxicity data for amphibians, and perhaps, reptiles exist to permit a more rigorous analysis. EPA suggests examining recent publications that review herpetofauna toxicity data (e.g., Sparling et al. 2000) to evaluate whether herpetofauna are more sensitive than other receptors for detected constituents at SWMU 45. If this analysis suggests that risks may be significantly underestimated by omitting herpetofauna as receptors in the risk assessment, then a quantitative analysis of risks may be required.

Navy Response: *The Navy has considered this comment and offers the following points of clarification. The approach used to evaluate terrestrial amphibians and reptiles and aquatic reptiles is consistent with previous ERAs conducted at NSRR. Therefore, the approach used has historically been acceptable to the USEPA. It is worth noting that the approach used also is consistent with USEPA Region III BTAG policy regarding reptiles and amphibians (USEPA, 2004). Furthermore, the USEPA (2003), during development of Ecological Soil Screening Levels (Eco-SSLs), initially considered seven ecological receptor groups, including reptiles and amphibians. However, the available toxicity data for amphibians and reptiles were deemed insufficient to derive Eco-SSLs. Given that the USEPA guidance document for Eco-SSL development post-dates the reference provided above (Spalding et al., 2000), it can be concluded that information within this referenced document was reviewed during Eco-SSL development and deemed insufficient for Eco-SSL development. At this time, the Navy does not believe revisions to the document are necessary; however, the Navy will review the literature to determine if any relevant data are available for amphibians and reptiles. If relevant toxicity data are identified from the literature, this information will be presented and discussed within the Step 3b baseline risk assessment problem formulation for SWMU 45.*

Section 4.4.2, Ingestion-Based Screening Values

4. This section indicates that mammalian no observed adverse effect level (NOAEL) values were not scaled based on body weights of the test species and the receptor species, but does not provide rationale. NOAEL values are appropriately scaled in Step 3a of the risk assessment according to Equation 4-5. Analysis of this equation indicates that the scaled NOAEL value will be less than the original value if the receptor species is larger than the test species. Considering that the receptor species (i.e., West Indian manatee) is likely to be larger than all test species, it is more protective, and therefore necessary, to use the scaled toxicity values in the screening-level risk assessment. Revise the ADCR text and relevant tables accordingly. Additionally, the scaled NOAEL values should be tabulated somewhere in the document.

   Navy Response: *The Navy agrees with this comment. Mammalian NOAEL values used in the Step 2 screening-level risk calculation will be scaled to reflect differences in body weight between the test species and the receptor species (West Indian manatee). The text in Section 4.0 also will be revised as necessary to reflect this change. The scaled NOAELs will be incorporated into the text either as a new table, part of an existing table, or as a new appendix.*

Section 4.6.2, Uncertainties Associated with the Screening-Level Risk Assessment

5. Several of the uncertainties listed in this section may result in an underestimation of potential risk, but NSRR has not explicitly identified them as such. In contrast, NSRR specifically states that certain uncertainties are expected to result in overestimates of risk. To provide a more balanced discussion, revise this section to specifically state which uncertainties may result in underestimation of risk (e.g., omission of inhalation and adsorption pathways for upper trophic level receptors, omission of herpetofauna from quantitative risk analysis).

   Navy Response: *The Navy agrees with this comment. Section 4.6.2 will be revised accordingly to provide a more balanced discussion of uncertainties. With regard to the omission of inhalation and adsorption pathways for upper trophic level receptors, Section 4.3.1.3 (Page 4-10) included a detailed discussion that presented rational for the exclusion of dermal and inhalation exposure pathways for terrestrial receptors. Based on the information presented from the scientific and regulatory community (see Section 4.6.2), as well as the physical and chemical properties of the chemicals*

detected at SWMU 45, the uncertainty associated with the exclusion of these two pathways from the upper trophic level dose calculations is minimal. Clearly, the inhalation and dermal adsorption pathways are insignificant relative to ingestion exposures.

6. See Specific Comment 3 regarding risks to amphibians and reptiles. This section should also include discussion of whether the evaluated exposure pathways are likely to be protective of threatened and endangered (T&E) species of sea turtles that may use Puerca Bay.

   Navy Response: *The Navy agreess with this comment. Please see the response to Specific Comment No. 3.*

7. NSRR states that common laboratory contaminants detected in site samples may not be related to site releases. This issue should be discussed in greater detail, giving consideration to whether the relevant common lab contaminants were used in historical operations, and whether they were detected in quality control samples. As the bullet is now written, there is not enough information to evaluate whether or not detection of these constituents is due to laboratory contamination or site release.

   Navy Response: *The Navy agrees with the comment. As part of the data validation process, analytical data for site media were compared to field and laboratory blanks, including field blanks, equipment rinsate blanks, and laboratory control samples. When the maximum detected concentration of a common laboratory contaminant was less than ten times the maximum associated blank concentration, positive detections reported by the laboratory were qualified as non-detected, "U" by the data validator. Several common laboratory contaminants (e.g., acetone and 2-butanone) were either not detected in associated blanks or detected in site media at concentrations greater than ten times the maximum associated blank concentrations. Although these common laboratory contaminants were not qualified as non-detected, "U" due to blank contamination, their presence in site media does not necessarily imply environmental contamination, especially when one considers the time frame between cessation of operation activities at the SWMU (i.e., 1972) and collection of abiotic media (1996, 1997, and 2003) in conjunction with the physical and chemical properties of the contaminants in question (e.g., high volatilization rates and short half-lives). However, consistent with USEPA guidance (USEPA, 1992), it was assumed that they were present in environmental media and quantitatively evaluated in Step 3a of the baseline ERA. Because the analytical data were formally validated, and validation activities did not result in the qualification of data as non-detect, "U", due to blank contamination, the discussion of uncertainties regarding common laboratory contaminants will be removed from Section 4.6.2.*

8. NSRR should discuss uncertainties associated with extrapolating NOAEL and lowest observed adverse effect level (LOAEL) values from the test organisms to the wildlife receptors. Particularly, it is important to discuss this uncertainty with respect to the West Indian manatee, which requires extra protection. NSRR should list chemicals that would be retained as COPCs for the West Indian manatee if an interspecies extrapolation factor of 5 or 10 had been applied to the NOAEL.

   Navy Response: *The Navy partially agrees with this comment. A discussion of uncertainties associated with the extrapolation of NOAEL and LOAEL values from the test organisms to the wildlife receptors will be added to Section 4.6.2. The Navy also agrees to list specific detected chemicals that would be retained as ecological COPCs for West Indian manatee food web exposures if an interspecies uncertainty factor was applied to scaled NOAEL values; however, the specific uncertainty factor used (a factor of 2) will be based on recommendations in Wentsel et al. (1996).*

Section 4.7, Step 3a of the Baseline Ecological Risk Assessment

9. Most of the methodological refinements described on pages 4-33 and 4-34 are not appropriate for the West Indian manatee, a T&E species that must be protected at the individual level.

   Specifically:
   - Maximum, not mean, chemical concentrations should be used in calculating exposures;
   - Uptake factors should be based on 90th percentile, not central tendency, values;
   - Maximum or high-end estimates for body weight and food ingestion rate should be used in favor of central tendency estimates; and
   - NOAEL toxicity values should be used exclusively.

   Revise the ADCR accordingly to ensure that methodologies used are adequately protective.

   Navy Response: *The Navy agrees with this comment. Recommendations regarding West Indian manatee aquatic food web exposures will be based on the Step 2 screening-level risk calculation. Refined risk calculations for the West Indian manatee and associated text also will be deleted from Section 4.7. However, in accordance with Navy policy (CNO, 2004), chemicals identified as ecological COPCs in Step 2 of the screening-level ERA for West Indian manatee aquatic food web exposures will not be identified as a potential risk drivers in Step 3a if statistical evaluations demonstrate that the concentration distribution of ecological COPCs in embayment sediment are statistically equivalent to background concentrations. In addition to this discussion, please see the response to Specific Comment No. 24.*

10. See Specific Comment 4 regarding scaled screening values for the West Indian Manatee. Note that, as discussed in EPA's June 2003 letter, NOAEL values should be used exclusively, for the West Indian manatee. Revise this section and applicable tables accordingly.

    Navy Response: *The Navy agrees with this comment. Please see the response to Specific Comment No. 9 above.*

11. This section does not include discussion of non-detected chemicals with reporting limits greater than screening values, but NSRR appears to be eliminating these chemicals from possible further investigation in the baseline risk assessment. Considering the large number of chemicals (e.g., >60 chemicals in sediment) with mean reporting limits exceeding screening values, and the large magnitude of exceedence (e.g., mean hazard quotient (HQ)>100 for many chemicals in sediments), it is not clear that it is appropriate to eliminate all of these chemicals from further evaluation at this time. The ADCR should consider the following points for these chemicals: 1) the magnitude of the mean HQ; 2) whether the chemicals are expected to be present based on historical site operations and chemical-specific fate and transport considerations; 3) the proportion of samples for which detection limits exceeded screening values; and 4) whether lower detection limits are practicably achievable. Revise this section to justify eliminating these chemicals from further evaluation.

    Navy Response: *The Navy has considered this comment and offers the following points of clarification and discussion. First of all, it would not be reasonable or appropriate to recommend further investigation for chemicals with analytical data that do not suggest a source is present or a release has occurred. Secondly, the ADCR identified a potential risk driver for embayment sediment (i.e., Aroclor-1260), and recommended that SWMU 45 should proceed to Step 3b of the Navy ERA process. Although not discussed at this stage of the ERA process, further evaluation of this potential*

risk driver likely will involve the collection and submittal of embayment sediment samples to an appropriate laboratory for chronic sediment toxicity testing for purposes of establishing a site-specific NOAEL value. This evaluation also will address the uncertainty related to all chemicals identified as ecological COPCs for embayment sediment in Step 2 of the screening-level ERA, as well as mixtures of ecological COPCs. Thirdly, the manner in which non-detected chemicals with maximum reporting limits greater than screening values were evaluated in the ADCR is consistent with previous documents approved by the USEPA.

The Navy will revise Sections 4.7.1.2, 4.7.1.3, and 4.7.1.4 to include a qualitative evaluation of chemicals identified as ecological COPCs in Step 2 of the screening-level ERA because maximum reporting limits exceeded screening values. This evaluation will be limited to a discussion of mean HQ values and a review of upgradient media to determine if there is any evidence that a release has occurred. For example, if a non-detected chemical identified as an ecological COPC for embayment sediment was not detected in upgradient abiotic media, it will be assumed that the chemical is not site-related. If detected in upgradient media, the ecological significance of the detection will be evaluated. No additional evaluation beyond this assessment will be performed. If the evaluation of upgradient media indicates that a non-detected chemical with mean reporting limit greater than screening values may be site-related, that non-detected chemical will be retained as a potential risk driver. Section 3.0 of the document also will be revised to include a discussion of why detection limits specified in the work plan were not achieved.

12. Although a number of chemicals have been eliminated from further consideration based on comparison to background concentrations, a complete description of the background data set is not included in the report. NSRR should append to the ADCR text that provides the rationale for the selected background, locations and figures depicting the locations of the all the background samples. The statistical sampling procedure (e.g., random sampling), and the potential for impacts from NSRR or any other anthropogenic sources to the background locations, should also be discussed. This section of the text should refer the reader to the added background information. Chemicals eliminated from further evaluation based on background will be re-evaluated by EPA once this information is made available.

    Navy Response: *The Navy disagrees with this comment. Please see the response to General Comment No. 2.*

Section 4.7.1.2, Refined Risk Calculation of Risk Evaluation for Surface Water

13. NSRR should strengthen the argument that tin is unlikely to present risks to aquatic receptors by noting that detected concentrations are well below the EPA Region 5 Ecological Screening Level of 180 ug/L (EPA 2003).

    Navy Response: *The Navy disagrees with this comment and offers the following point of clarification. As discussed in Section 4.7.1.2 (Page 4-37), the statistical evaluation of the tin datasets demonstrated that the distribution of tin concentrations in embayment surface water are statistically equivalent to background concentrations (see Table 4-30). The descriptive statistics presented in Table 4-30 support the conclusion of the distributional statistics (maximum tin concentration occurred within the background dataset). Therefore, it can be concluded that that this metal is not likely to be site-related and not presenting risks to aquatic receptor populations above background levels. The elimination of chemicals based on comparisons to background levels is consistent with Navy policy (CNO, 2004). In summary, the Navy believes that the results of the statistical evaluations are sufficient information supporting a recommendation of no further evaluation, and changes to the document are not warranted.*

Section 4.7.1.3, Refined Risk Calculation of Risk Evaluation for Sediment

14. EPA is unable to reproduce the sediment quality guideline (SQG, based on Di Toro and McGrath 2000) values (e.g., 4,427 ug/kg for 2-hexanone) presented in this section. NSRR should submit example calculations to clarify.

    Navy Response: *The Di Toro and McGrath (2000) Sediment Quality Guidelines (SQGs) are expressed in units of umole/g OC (concentrations normalized for organic carbon). They were converted to ug/kg dry weight in accordance with the example calculation shown below for 2-hexanone.*

    2-Heaxanone Sediment Quality Guideline = 4.42 umole/g OC (Di Toro and McGrath, 2000)
    Organic Carbon Content = 1 percent (assumed by Di Toto and McGrath, 2000)
    2-Hexanone Molecular Weight = 100.16 g/mole (Di Toro and McGrath, 2000)

    Step 1 (Convert umole/g OC to umole/g dry weight assuming one percent OC):

    (4.42 umole/g OC)(1% OC /100) = 0.0442 umole/g dry weight

    Step 2 (Convert umole/g dry weight to ug/kg dry weight):

    (0.0442 umole/g) x (100.16 g/mole) x (1mole/1,000,000 umole) x (1,000 ug/mg) x (1,000 mg/g) x (1000 g/kg) = 4,427 ug/kg dry weight

15. The discussion of the various sediment screening levels (e.g., threshold effect level (TEL), Effects Range-Low (ER-L) presented on page 4-40 is not sufficiently descriptive to allow the reader to interpret the meaning of these different screening values. Revise this section to more clearly define the effect levels associated with all screening values.

    Navy Response: *The Navy agrees with this comment. Although sources for the various screening values are adequately identified, the Navy will provide descriptions of those screening values used as lines of evidence in the Step 3a risk calculation and risk evaluation for embayment sediment (see Specific Comment No. 22).*

16. Due to the prevalence of tin concentrations in excess of background concentrations at SWMU 45, the limited toxicity data available for tin, and the absence of data regarding the form of tin present in sediment at NSRR, it is not defensible to eliminate tin from further evaluation at this time. Unless additional justification can be provided, tin should be retained for further evaluation.

    Navy Response: *The Navy disagrees with this comment and offers the following points of clarification. As discussed in Section 4.7.1.3, the sediment screening value used in the Step 2 and Step 3a risk calculations for tin was an Apparent Effects Threshold (AET) value (Buchman, 1999). The AET value was reported as >3.5 mg/kg. This toxicological benchmark does not represent a threshold concentration. As such, there is uncertainty associated with its use in the Step 2 and Step 3a risk calculations. Section 4.7.1.3 presented literature-based toxicity values from a study (Kristin et al., 1998) that investigated the chronic effect of tributyltin (TBT) on four benthic invertebrate species. The minimum effect concentration, a median inhibition concentration (IC_{50}) based on mayfly (Hexagonia sp.) growth (600 mg/kg), is over one order of magnitude greater than the maximum detected tin concentration expressed as mg TBT/kg (i.e., 6.4 J mg Sn/kg is equivalent to 15.6 mg TBT/kg TBT [Note: the ADCR did not provide a conversion from mg Sn/kg to mg TBT/kg prior to*

comparison to the literature-based toxicity values; the ADCR will be revised to reflect the proper comparison]). Although toxicity data from a single study was used as the primary line of evidence for a recommendation of no further evaluation, the value used was the minimum value reported for four species. Many of the literature-based toxicological thresholds commonly used in ERAs, including the ERA at SWMU 45, are based on a similar or fewer number of data points. Examples include the AET values reported in Buchman (1999), many of the USEPA Region 4 chronic surface water screening values (USEPA, 2001), and several toxicological thresholds for earthworms reported in Efroymson et al. (1997).

The AET value used in the Step 2 and Step 3a risk calculations, as well as the toxicity data reported by Kristin et al. (1998) are based on the most toxic form of tin (USEPA, 2002). Given that all detected tin was assumed to be present as tributyltin, and the comparison of the maximum tin concentration (expressed as mg TBT/kg) to available tributyltin toxicological thresholds or literature-based toxicity data do not indicate that detected levels are impacting benthic macroinvertebrate communities, the absence of data on the form of tin present is not relevant. A copy of the Kristin et al. (1998) paper is attached to this response letter.

While the Navy believes sufficient evidence (based on available literature) was presented to justify the recommendation, a comparison of upgradient subsurface soil concentrations to background subsurface soil supports the original conclusion. As discussed in the response to General Comment No. 2, the only current mechanism of contaminant transport from the site to downgradient surface water and sediment is leaching of chemicals from surface soil and/or subsurface soil by infiltrating precipitation and transport with groundwater. Therefore, SWMU 45 subsurface soil can represent a potential source area for tin detections in embayment sediment. The maximum tin concentration detected in upgradient subsurface soil was 2.7 J mg/kg. This compares to a maximum background subsurface soil concentration of 3.4 J ug/kg (Baker, 1999). These data clearly indicate that tin is not likely to leach from subsurface soil and migrate with groundwater to embayment sediment above concentrations that would be expected under background conditions. These data also indicate that a release of tin to subsurface soil has not occurred at SWMU 45. Although a historical transport pathway (i.e., discharge through cooling water intake tunnel) represents a historical transport pathway, activities associated with the SWMU (former power plant and transformer maintenance area) do not indicate that tin is a site-related chemical. The text in Section 4.7.1.3 (Page 4-41) will be revised to include the discussion presented above. Beyond inclusion of this text, the Navy does not believe any additional action is warranted.

17. NSRR should strengthen the argument that beryllium and thallium are not risk drivers for benthic macroinvertebrates by noting that a comparison of surface water screening values, which are developed based on toxicity tests with a variety of aquatic organisms, indicates that beryllium and thallium are less toxic to aquatic organisms than cadmium, copper, mercury, and vanadium. The detected concentrations of beryllium and thallium in sediments are less than or roughly equivalent to the sediment screening values for these other metals.

Navy Response: *The Navy partially agrees with the comment. With regard to thallium, the maximum background concentration (0.91 J mg/kg) exceeded the maximum embayment sediment concentration (0.12 J mg/kg). The distributional statistics performed on the embayment and background datasets (slippage test and quantile test [see Table 4-33) also demonstrated that thallium concentrations in embayment sediment are statistically equivalent to background concentrations. Elimination of chemicals from further consideration in Step 3a of the baseline ERA based on a comparison to background levels is consistent with Navy policy (CNO, 2004). In summary, the Navy believes that the results of the statistical evaluations provide sufficient justification for a recommendation of no further evaluation for thallium, and changes to the document are not warranted.*

With regard to beryllium, a statistical evaluation of the SWMU 45 and background datasets could not be performed due to the absence of detection in the background dataset. Therefore, the Navy agrees to supplement the arguments presented in Section 4.7.1.3 for beryllium with the recommendation presented in Specific Comment No. 17 above.

Section 4.7.1.4.2, Aquatic Food Web Exposures

18. It appears that Equation 4-6 is incorrect. Assuming the hazard quotient (i.e., 0.99) is the calculated dietary Intake (DI) divided by the NOAEL, when Equation 4-4 is substituted for DI and the terms are rearranged to solve for the soil concentration, Equation 4-6 is not the correct result. It is also unclear how the concentrations in food items are calculated (i.e., what soil/sediment exposure point concentration is used to model the food item concentrations?). Furthermore, additional discussion should be added to better explain the purpose and the rationale behind this analysis; it is unlikely that the uninitiated reader will understand this analysis as it is currently described. NSRR should correct any errors in Equation 4-6 and make the requested clarifications. Chemicals that were eliminated from further evaluation based on comparison of maximum detected concentrations to the calculated "sediment concentrations resulting in a mean exposure dose greater than or equal to the NOAEL-based screening value" must be re-evaluated once this comment is addressed.

    Navy Response: *The Navy partially agrees with this comment. The equation, as presented, does contain an error. The input parameter "FC_{xi}" (concentration of chemical x in food item i) should be replaced by a chemical specific bioconcentration factor (BCF) or bioaccumulation factor (BAF). However, this had no bearing on derived sediment concentrations since this formula was presented for illustrative purposes only (actual calculations were performed with the food web model by manually entering sediment concentrations until an HQ of 0.99 was derived). Therefore, re-evaluation of Aroclor-160, vanadium, and cobalt are not necessary. The Navy agrees to provide clarification of the calculations, including their purpose and meaning. It is noted that the discussion presented in Section 4.7.1.4.2 (Page 4-43) for the West Indian manatee will be removed based on previous Navy agreements regarding this receptor (see responses to Specific Comment No 9).*

19. For reasons discussed in Specific Comment 9, it is not appropriate to consider mean exposure concentrations in the process of identifying risk drivers for the West Indian manatee. Because maximum concentrations of arsenic and mercury resulted in modeled doses exceeding NOAEL values, these chemicals must be considered risk drivers for the West Indian manatee unless additional justification can be provided. It is also worth noting that the manatee occasionally feeds on fish (http://endangered.fws.gov/i/a/saa0c.html), which would likely have higher tissue concentrations of mercury than aquatic vegetation, and which is not included as a dietary component in the exposure models. This consideration should be discussed in this section or Section 4.7.2.

    Navy Response: *The Navy partially agrees with this comment. The Navy agrees with that portion of the comment related to use of mean exposure concentrations for the West Indian manatee (please see the response to Specific Comment No. 9). The Navy disagrees that fish should be considered a component of the West Indian manatee diet. The linked document provided in Comment No. 19 above simply states that, "Although primarily herbivorous, they will occasionally feed on fish." A description of the feeding ecology of the West Indian manatee contained in the USFWS document entitled Florida Manatee Recovery Plan (USFWS, 2001) makes no reference to the consumption of fish. This document states that, "Manatees are herbivores that feed opportunistically on a wide variety of submerged, floating, and emergent vegetation." Reference to the consumption of fish is also absent from the USFWS document entitled Recovery Plan for the Puerto Rican Population of the*

West Indian (Antillean) Manatee (Trichechus Manatus Manatus L.) (USFWS, 1986). Reference to the consumption of fish was found in the document entitled Multi-Species Recovery Plan for South Florida (USFWS, 1999), which states that, "They may also feed on algal complexes attached to rocks, piling, and dams, and may occasionally eat fish or invertebrates while feeding on floating or submerged vegetation." Based on this statement, any ingestion of fish is purely accidental and would not warrant consideration as a dietary food item. In summary, the Navy does not believe that fish consumption warrants consideration in the West Indian manatee food web model. As such, revisions to the document regarding the West Indian manatee diet are not deemed necessary.

20. NSRR claims that Puerca Bay is small relative to the foraging range for the belted kingfisher, purportedly 400-800 ha. It is unclear how this foraging range was derived. NSRR should consider the foraging ranges presented in EPA's *Wildlife Exposure Factors Handbook* (EPA 1993), which are more appropriately presented in terms of kilometers of shoreline (i.e., about 1 km on average). NSRR should compare the length of shoreline available at Puerca Bay to the 1 km shoreline foraging range cited by EPA (1993) for a more protective evaluation of risks to the belted kingfisher. If, based on this revised analysis, an area use factor can be applied for the kingfisher, the ADCR should discuss resulting changes in the NOAEL-based hazard quotient. Additional justification is required to eliminate mercury from further evaluation for the belted kingfisher.

Navy Response: *The Navy has considered this comment and offers the following points of clarification and discussion. Appendix A of the USEPA's Wildlife Exposure Factors Handbook (USEPA, 1993) lists belted kingfisher foraging ranges in units of area (i.e., hectares) or distance (i.e., foraging radius or kilometers of shoreline). The foraging range of 200 to 800 hectares was derived from Cornwell (1963; as cited in USEPA, 1993), who reported a minimum and maximum foraging radius of 0.8 to 8.0 kilometers and a mean foraging radius of 1.6 kilometers [Note: the minimum foraging range of 400 hectares reported in Section 4.7.1.4.2 will be revised to reflect the correct minimum foraging range]. The minimum foraging radius was converted to a unit of area (i.e., square kilometers) by calculating the area of a circle with a radius of 0.8 kilometers. The resultant value (8.04 square kilometers) was then converted to hectares (201 hectares). The mean foraging radius of 800 hectares was derived in an identical manner.*

Territory sizes reported by the USEPA (1993) as kilometers of shoreline were derived from studies that investigated belted kingfisher foraging ranges along streams, rivers, and lakes. The shallow water zones associated with these surface water bodies (especially streams) offer preferred feeding habitat for belted kingfishers (belted kingfishers seem to prefer water depths less than 60 centimeters when foraging [USEPA, 1993]). As discussed in Section 4.3.2, riprap is present from above Mean High Water (MHW) to approximately three feet below Mean Low Water along both sides of the embayment. Given the physical features of the embayment, limited feeding habitat is available for the belted kingfisher (approximately 375 feet of shoreline located along the front end of the embayment). In addition to foraging ranges reported as kilometers of shoreline, the USEPA (1993; see Appendix A) reported a foraging range of 14.2 hectares from a study conducted by Salyer and Langler (1948) in an aquatic system consisting of pond and marsh habitat. Again, this foraging range was not considered appropriate for SWMU 45 given the differences between the embayment and aquatic habitat evaluated by Salyer and Langler (1948). The foraging range reported by Cornwell (1963) was considered most appropriate given the limited preferred feeding habitat within the embayment and the availability of suitable habitat elsewhere at NSRR (e.g., mangrove forests).

Even if it were assumed that the embayment offered suitable foraging habitat along its entire shoreline (approximately 1,275 feet or 0.39 kilometers), the mean HQ value based on belted kingfisher exposures to mercury in sediment would be less than 1.0. The average foraging area, expressed as kilometers of shoreline, for studies reported by the USEPA (1993) is 1.47 kilometers.

Based on an embayment shoreline of approximately 0.39 kilometers, this corresponds to an Area Use Factor (AUF) of 0.27. The Mean HQ for belted kingfisher exposures to mercury in sediment was 2.81 based on an AUF of 1.0. Use of an AUF of 0.27 would result in a mean exposure dose less than the NOAEL-based screening value (i.e., HQ = 0.76). Given that the actual length of embayment shoreline that offers preferred feeding habitat for the belted kingfisher is approximately 375 feet (0.11 kilometers), an HQ value of 0.76 is considered a conservative risk estimate for belted kingfisher populations. A factor not considered in the Step 3a risk calculation and risk evaluation was the assumption that belted kingfishers are year-round residents, when in fact they are non-breeding migrates common to the island from October to April (Raffaele, 1989).

Based on the discussion presented above, the Navy believes that adequate information is provided to justify the elimination of mercury as a potential risk driver for belted kingfisher aquatic food web exposures. Section 4.7.1.4.2 will be revised to include this information. Section 4.7.2 also will be revised to include an uncertainty statement regarding the assumption that belted kingfishers are year-round residents of Puerto Rico.

Section 4.7.2, Uncertainties Associated with the Refined Screening-Level Risk Characterization

21. The first bullet on page 4-45 does not present a balanced view of the uncertainties associated with NOAEL, LOAEL, and maximum acceptable toxicant concentration (MATC) values. While the statements made regarding NOAEL values are true, it should also be pointed out that it is possible for actual effect levels to be less than LOAEL or MATC values. Use of these values presents some potential for underestimation of risk. Revise this section accordingly.

    Navy Response: *The Navy agrees with this comment. The first bullet item on Page 4-45 will be revised to present a more balanced view of the uncertainties associated with NOAEL, LOAEL, and MATC values.*

22. This section should discuss uncertainty associated with toxic effect levels in sediments and note those chemicals which were identified as preliminary COPCs based on one screening value, but then eliminated from further evaluation based on other screening values. There is uncertainty regarding the potential for effects in the range of concentrations bracketed by the various screening values cited (e.g., TEL and ER-L). Revise this section accordingly.

    Navy Response: *The Navy agrees with this comment. Section 4.7.2 will be revised in accordance with the recommendations presented in Specific Comment No. 22 above.*

23. See Specific Comment 8. NSRR should discuss what hazard quotient values for the West Indian manatee would be if interspecies extrapolation factors were applied to the NOAEL.

    Navy Response: *The Navy agrees with this comment. Please see the response to Specific Comment No. 9.*

Section 4.7.3, Step 3a Decision Point and Recommendations

24. NSRR's proposed approach for addressing copper contamination in Puerca Bay sediments should be revised. Sampling sediments in a background location impacted by storm water drainages will not provide adequate evidence to determine with a high degree of certainty that copper in Puerca Bay is not site related. In the absence of evidence that copper is not site related, NSRR must assume that the copper is site related and identify it as a risk driver. Any analysis designed to determine whether the

copper contamination in Puerca Bay is site related must take into consideration the presence of copper in other areas/media that may be transported to Puerca Bay. See also General Comment 2.

Navy Response: *The Navy disagrees with this comment. Navy policy on the use of background chemical levels (CNO, 2004) dictates that naturally occurring and anthropogenic chemicals below background levels must be eliminated from consideration in Step 3a of the baseline risk assessment.*

The available analytical data for upgradient media were previously discussed in the response to General Comment No. 2. The available data (subsurface soil) do not indicate that copper is a site-related chemical. The conceptual site model for SWMU 45 also indicates that this metal is not associated with historical activites at the SWMU. Also, as discussed in the response to Specific Comment No. 11, future baseline ERA evaluations (evaluation of Aroclor-1260 in embayment sediment using sediment toxicity tests) will address all ecological COPCs identified in the Step 2 screening-level risk calculation, including copper. Finally, a geochemical correlation of copper with zinc in embayment sediment and background sediment (see attached figures) clearly show that copper is not a site-related metal. Based on the geochemical correlation, it in fact is not necessary to demonstrate that concentrations detected in embayment sediment are related to anthropogenic inputs. In summary, the Section 4.7.1.3 of the document will be revised to include the geochemical correlation, which provides an important line of evidence for not identifying copper as a pottnial risk driver. Since the geochemical correlation shows that copper is not related to SWMU 45, the document also will be revised to eliminate language discussing the need to collect background sediment samples from an area that receives anthropogenic inputs.

25. EPA will re-evaluate this section once the issues outlined above are resolved. Revision is likely necessary.

Navy Response: *Please see the responses to general and specific comments that relate to Section 4.0. The ADCR will be revised in accordance with Navy responses to these general and specific comments.*

Section 5.0, Conclusions and Recommendations

26. EPA will re-evaluate this section once the issues outlined above are resolved. Revision is likely necessary.

    Navy Response: *Please see the responses to general and specific comments that relate to Section 4.0. Section 5.0 will be revised in accordance with Navy responses to these general and specific comments.*

Tables 4-8 and 4-9, Ingestion-Based Screening Values for Birds and Mammals

27. For some chemicals (e.g. arsenic in Table 4-8), toxicity test data are summarized for more than one study. In these instances, it is unclear which NOAEL and LOAEL values were ultimately used in the risk calculations. Revise Tables 4-8 and 4-9 to indicate which values were selected for use in the ecological risk assessment.

    Navy Response: *The Navy disagrees with this comment and offers the following point of clarification. The last column in Tables 4-8 and 4-9 lists the specific ecological receptors assigned to a given chemical-screening value combination. Using arsenic in Table 4-8 as an example, two sets of screening values are listed. One set of screening values is from a study with brown-headed cowbirds, while a second set of screening values is from a study with mallard ducks. As evidenced by the last column, the NOAEL and LOAEL values from the study using brown-headed cowbirds were selected for use as ingestion-based screening valued for the American robin, mourning dove, red-tailed hawk, belted kingfisher, and double crested cormorant. It is noted that the great blue heron and spotted sandpiper are mistakenly listed within the last column of Table 4-8 in error since these two species were not selected as ecological receptors for the ecological risk assessment (see the discussion presented in Section 4.3.2.1 – Selection of Receptors). Table 4-8 will be revised to eliminate reference to the spotted sandpiper and great blue heron.*

Table 4-14, Conservative Exposure Parameters for Upper Trophic Level Receptors

28. Two of the food ingestion rate values (i.e., values for American robin and red-tailed hawk) presented in Table 4-14 are less than the values presented in August 2001 Screening-Level Ecological Risk Assessment Problem Formulation (Step 1) and Exposure Estimate for SWMU 45. Explain this discrepancy and justify the use of less protective values.

    Navy Response: *With regard to the American robin, food ingestion rates were weighted by dietary component. This approach is based on data from Levy and Karasov (1989), who reported that robins fed a diet of fruit have a much higher food ingestion rate than robins fed a diet of invertebrates (0.31 g/g-day for an invertebrate diet and 0.59 g/g-day for a fruit diet). The maximum food ingestion rate presented in the Screening-level Ecological Risk Assessment Problem Formulation (Step 1) and Exposure Estimate for SWMU 45 (Baker, 2001b) was based on a diet consisting of 51.6 percent terrestrial plants, 43.6 percent terrestrial invertebrates, and 4.8 percent soil [Note: the dietary composition was presented correctly, but the food ingestion rate was based on the dietary composition presented above]. The food ingestion rate used in the ADCR is based on a diet of 12 percent terrestrial plants, 78.9 percent terrestrial invertebrates, and 9.1 percent soil. Given that the ADCR used a higher percentage of invertebrates in the American robin diet, the corresponding ingestion rate is lower.*

With regard to the red-tailed hawk, the food ingestion rate presented in the problem formulation and exposure estimate document (Baker, 2001c) is based on a maximum ingestion rate reported by Craighead and Craighead (1969) and cited in Sample and Sutter, II (1994) and USEPA (1993). The reported ingestion rate (0.136 kg/day), expressed on a wet weight basis, was converted to a dry weight value (0.04352 kg/day) by multiplying the wet weight value by 0.32 (solids content of small mammals [USEPA, 1993]). The maximum ingestion rate is based on a feeding study conducted during fall and winter months. Craighead and Craighead (1969) reported a second ingestion rate (0.117 kg/day wet weight) for fall and winter months, as well as a third ingestion rate (0.073 kg/day wet weight) for spring and summer months. The three ingestion rates indicate that the red tailed hawk has a higher food ingestion rate during fall and winter months. Given that Puerto Rico does not exhibit seasonal changes, the use of a maximum ingestion rate based on a feeding study conducted during fall and winter (i.e., 0.136 mg/kg, wet weight) was not deemed appropriate. Instead, body weights (reported in USEPA, 1993) corresponding to each seasonal ingestion rate were used to derive percentages of the total body weight consumed on a daily basis. The average of this percentage (10 percent) was then used to estimate an ingestion rate based on a maximum body weight of 1.235 kg (USEPA, 1993). This results in a value of 0.1235 kg/day (wet weight). Multiplying this value by 0.32 (solids content of small mammals) gives a final food ingestion rate of 0.03952 kg/day (dry weight).

Table 4-19, Summary of Hazard Quotients for Food Web Exposures - Terrestrial Habitat

29. Add a footnote to Table 4-19 to explain the "NA" designations. Also, revise this table to clarify which chemicals were never detected.

Navy Response: *The Navy disagrees with this comment. While it is agreed that this information would enhance the table, revisions have no bearing on conclusions or recommendations. Furthermore, these revisions represent an unnecessary budgetary burden. In summary, the tables will not be revised based on the discussion presented above.*

Table 4-20, Summary of Hazard Quotients for Food Web Exposures - Aquatic Habitat

30. See Specific Comment 29.

Navy Response: *The Navy disagrees with this comment. While it is agreed that this information would enhance the table, revisions have no bearing on conclusions or recommendations. Furthermore, these revisions represent an unnecessary budgetary burden. In summary, the tables will not be revised based on the discussion presented above.*

Table 4-22, Less Conservative Soil Bioconcentration Factors Used for Terrestrial Plants and Soil Bioaccumulation Factors (BAF) Used for Terrestrial Invertebrates

31. The origin of the soil-invertebrate values listed in this table is unclear. The values listed here are different from both the median BAFs in Table 11 and the mean BAFs in Table 16 of Sample et al. (1998). The mercury BAF used by NSRR (i.e., 1.186) is less than both the mean and median values reported by Sample et al. (1998). Revise this table to clarify the technical basis of the values, and provide justification for a mercury BAF that is less than Sample et al. (1998) values.

Navy Response: *The Navy offers the following point of clarification. As indicated in Table 11 of Sample et al. (1998), the distribution of chromium and mercury soil-to-earthworm BAF values that were used to derive the summary statistics followed a lognormal distribution. Therefore, the mean*

chromium and mercury BAFs listed in Table 4-22 were derived from the mean of the natural log-transformed values listed in Table 11 of Sample et al. (1998).

Table 4-35, Summary of Refined Hazard Quotients for Food Web Exposures – Aquatic Habitat

32. Based on text in Sections 4.6.1.4.2 and 4.7.1.4.2, it appears that two chemicals (i.e., styrene and xylene) have been inadvertently omitted from Table 4-35. Revise the table or the text to correct this discrepancy.

    Navy Response: *The Navy agrees with the comment and offers the following points of clarification. The text in Section 4.6.1.4.2 states, "Ethylbenzene, styrene, toluene, xylene, and beryllium were also identified as ecological COPCs based on the lack of ingestion-based screening values for aquatic avian receptors". However, as evidenced by Table 4-8, an ingestion-based screening value for xylene was identified from the literature. Furthermore, as evidenced by Table 4-20 (Summary of Hazard Quotients for Food Web Exposures – Aquatic habitat), xylene HQ values for each of the upper trophic level receptors evaluated by the screening-level ERA were less than 1.0. Therefore, the text in Section 4.6.1.4.2 incorrectly identified xylene as an ecological COPC. As such, Section 4.6.1.4.2 will be revised to eliminate text that identified xylene as an ecological COPC for aquatic food web exposures. Section 4.7.1.4.2 also will also revised to eliminate any reference and discussion of xylene since a conclusion of negligible risk can be made based on the HQ values derived in Step 2 of the screening-level ERA. Finally, Table 4-36 will be revised to eliminate xylene from the list of ecological COPCs not recommended for further evaluation in the baseline risk assessment for upper trophic level food web exposures.*

    Styrene was detected in surface water (two of nine samples) and correctly identified as an ecological COPC in Section 4.6.1.4.2 based on the lack of ingestion-based screening values for birds. However, this VOC was inadvertently omitted from Table 4-35. Table 4-35 will be revised to include styrene.

Table 4-36, Summary of Ecological Chemicals of Potential Concern and Potential Risk Drivers

33. Chemicals that were never detected but that had mean detection limits exceeding screening values were retained as chemicals of potential concern in this assessment. These chemicals should be listed within a separate category in Table 4-36. This revision is necessary to ensure that uncertainties resulting from these chemicals are not overlooked by risk managers.

    Navy Response: *The Navy has considered this comment. Specific chemicals identified as ecological COPCs in the Step 2 of the screening-level ERA will not be listed; however, the number of chemicals in a specific chemical class will be identified. Table 4-36 also will be revised to include references to tables elsewhere within the ADCR where these chemicals are listed (media-specific screening tables).*

Appendix E, Habitat Characterization Report

34. Appendix E refers the reader to the August 2001 Draft Screening-Level Risk Assessment for the Habitat Characterization Report. Because this ADCR should be a stand-alone document, all relevant habitat characterization reports (i.e., both-upland and marine) should be included in Appendix E. Revise the ADCR accordingly.

    Navy Response: *The Navy disagrees with this comment. The habitat characterization at SWMU 45 was conducted to support the development of the screening-level problem formulation for SWMU 45 (including the development of the preliminary conceptual model), which was presented in the Draft*

Screening-level Ecological Risk Assessment Problem Formulation and Exposure Estimate, SWMU 45, Naval Station Roosevelt Roads, Ceiba, Puerto Rico (Baker, 2001c). As such, inclusion of this document, which contains many color maps and photographs, would be an unnecessary budgetary burden. In summary, the Navy does not believe that the habitat characterization report is a necessary component of the ADCR.

References for Navy Responses

Baker Environmental, Inc. (Baker). 2003a. Final Additional Data Collection Investigation Report, Tow Way Fuel Farm, Naval Station Roosevelt Roads, Ceiba, Puerto Rico. Coraopolis, Pennsylvania. April 22, 2003.

Baker. 2003b. Final Corrective Measures Study Task 1 Report, Tow Way Fuel Farm, Naval Station Roosevelt Roads, Ceiba, Puerto Rico. Coraopolis, Pennsylvania. April 22, 2003.

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Baker. 2001b. Draft Additional Data Collection Work Plan in Support of Ecological Risk Assessment at SWMU 45, Naval Station Roosevelt Roads, Ceiba, Puerto Rico. Coraopolis, Pennsylvania. August 10, 2001.

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ATTACHMENT 2
ADDITIONAL DATA COLLECTION EFFORT WORK PLAN
SWMUs 1 AND 2

ATTACHMENT 2
ADDITIONAL DATA COLLECTION EFFORT
SWMUs 1 AND 2
NAVAL ACTIVITY PUERTO RICO
CEIBA, PUERTO RICO
JULY 23, 2004

Purpose

This brief work plan provides the proposed sample locations and sample analyses for the additional data collection effort at SWMUs 1 and 2 in support of the baseline ecological risk assessment. The information provided in this document is compiled from the information provided in the Draft Screening Level Ecological Risk Assessment and Step 3a of the Baseline Ecological Risk Assessment for SWMUs 1 and 2 (Baker, 2004) and the Navy Responses to EPA Comments Dated April 9, 2004 on the Draft Additional Data Collection Report and Screening Level Ecological Risk Assessment and Step 3a of the Baseline Ecological Risk Assessment at SWMUs 1 and 2 dated February 13, 2004.

The objective of this additional data collection effort is listed in the following bulleted items:

- Establish nature and extent,
- Establish and/or verify that maximum concentrations have been captured,
- Reduce uncertainties with existing analytical data,
- Establish a final list of potential ecological risk drivers for evaluation in the baseline ERA, and
- Collect data for evaluation of chemical bioavailability.

All of the work proposed in this document will be conducted in accordance with the procedures outlined in the EPA approved Additional Data Collection Work Plan in Support of Ecological Risk Assessment at SWMUs 1 and 2 (Baker, 2001). The proposed sample locations and analysis for the collection of soil and sediment samples at SWMUs 1 and 2 for this additional data collection effort is provided below. The following sections identify the steps to be performed in the field to address these data needs in the following subsections.

Proposed Sampling

The sampling methodology to be employed at these sites consist of obtaining surface soil samples from a depth of 0 to 1 foot bgs utilizing a stainless steel hand auger and/or stainless steel spoon. The subsurface soil samples are to be collected from a depth of 1 to 2 feet bgs utilizing a stainless steel spoon and stainless steel hand auger. All sediment samples will be obtained from a depth of 0 to 4” bgs utilizing either an acetate sediment core liner and/or stainless steel spoon. Detailed sampling procedures are provided in the above referenced work plan for inclusion into this data collection effort.

SWMU 1

It is proposed that eleven surface soil and 3 subsurface soil samples be collected from SWMU 1 to assist in meeting the objectives described above. Figure 1 shows the proposed locations for obtaining these soil samples. Table 1 provides the requested analysis for each of the samples along with the QA/QC samples.

Sediment sampling is proposed from the estuarine wetland sediment system from SWMU 1. A total of eleven sediment samples are proposed to be collected for analysis from the top 4 inches of sediment as shown in Table 1. Figure 2 shows the proposed sampling locations from the estuarine wetland system.

Three open water sediment sample locations are identified on Figure 3 to address data needs from open water sediment sample location 1OW05. These samples are to be analyzed for seven different SVOCs as listed in Table 1 and total organic carbon.

SWMU 2

It is proposed that 14 surface soil and 8 subsurface soil samples be collected from SWMU 2 to assist in meeting the objectives described above. Figure 4 shows the proposed locations for obtaining these soil samples. Table 1 provides the requested analysis for each of the samples along with the QA/QC samples.

Sediment sampling is proposed from the estuarine wetland sediment system from SWMU 2. A total of ten sediment samples are proposed to be collected for analysis from the top 4 inches of sediment as shown in Table 1. Figure 5 shows the proposed sampling locations from the estuarine wetland system.

QA/QC

QA/QC samples are proposed for this investigation in accordance with the procedures outlined in the above referenced work plan. Duplicate, matrix spike, matrix spike duplicates, field blanks, and equipment rinsate samples are listed on Table 1 along with the requested analysis.

Reporting

Upon receipt of the validated analytical data from this additional data collection effort the Draft Screening Level Ecological Risk Assessment and Step 3a of the Baseline Ecological Risk Assessment for SWMUs 1 and 2 (Baker, 2004) will be revised to include all the new data and other modifications as outlined in the Navy Response to EPA Comments on April 9, 2004.

References

Baker Environmental, Inc. (Baker). 2004. Draft Screening Level Ecological Risk Assessment and Step 3a of the Baseline Ecological Risk Assessment for SWMUs 1 and 2, Naval Station Roosevelt Roads, Ceiba, Puerto Rico. Moon Township, Pennsylvania. February 13, 2004.

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TABLE 1
PROPOSED SAMPLE MATRIX
SWMUs 1 AND 2 ADDITIONAL DATA COLLECTION

		Solid Samples										Aqueous Samples					
		Analysis Reguested										Analysis Reguested					
Sample ID	Sample Depth (bgs)	Cu, Sn	Pb, Hg, Cu, An, Zn	An, Cd, Cu, Pb, Hg, Ni, Sn, Zn	Pb, Hg, Cu	Copper	SVOCs[1] (8270)	TOC (9060)	Pesticides[2] (8081A)	Dioxins/Furans (8290)	AVS/SEM	Metals	SVOCs[1] (8270)	Pesticides[2] (8081A)	Dioxins/Furans (8290)	Previous Sample Location Reference	Comments
SWMU 1																	
Soil																	
1SS09	0-1'			X					X	X						1SD02	Surface Soil
1SS09D	0-1'			X					X	X						1SD02	Duplicate
1SS09MS/MSD	0-1'			X					X	X						1SD02	Matrix Spike/ Matrix Spike Duplicate
1SS10	0-1'			X					X	X						1SD02	Surface Soil
1SS11	0-1'			X					X	X						1SD02, 1SS07	Surface Soil
1SS12	0-1'			X						X						1SD01	Surface Soil
1SS13	0-1'			X					X	X						1SD01, 1SS07	Surface Soil
1SS14	0-1'			X					X	X						1SD01, 1SS07	Surface Soil
1SS15	0-1'								X							05SS101	Surface Soil
1SB15-01	1-2'								X							05SS101	Subsurface Soil
1SS16	0-1'								X							05SS101	Surface Soil
1SB16-01	1-2'								X							05SS101	Subsurface Soil
1SS17	0-1'								X							05SS101	Surface Soil
1SB17-01	1-2'								X							05SS101	Subsurface Soil
1SS18	0-1'								X							1SB03, 1SS06	Surface Soil
1SS18D	0-1'								X							1SB03, 1SS06	Duplicate
1SS19	0-1'								X							1SB03, 1SS06	Surface Soil
Open Water System Sediment																	
1OWSD10	0-4"						X	X								1OWSD05	
1OWSD10D	0-4"						X	X								1OWSD05	Duplicate
1OWSD10MS/MSD	0-4"						X	X								1OWSD05	Matrix Spike/ Matrix Spike Duplicate
1OWSD11	0-4"						X	X								1OWSD05	
1OWSD12	0-4"						X	X								1OWSD05	
Estuarine Wetland System Sediment																	
1EWSD10	0-4"	X						X	X		X					1EWSD01	
1EWSD10D	0-4"	X						X	X		X					1EWSD01	Duplicate
1EWSD10MS/MSD	0-4"	X						X	X		X					1EWSD01	Matrix Spike/ Matrix Spike Duplicate
1EWSD11	0-4"	X						X	X		X					1EWSD01	
1EWSD12	0-4"	X						X	X		X					1EWSD01	
1EWSD13	0-4"					X		X	X		X					1EWSD02	
1EWSD14	0-4"					X		X	X		X					1EWSD02	
1EWSD15	0-4"					X					X					1EWSD05	
1EWSD16	0-4"					X					X					1EWSD05	
1EWSD17	0-4"					X					X					1EWSD05	
1EWSD18	0-4"					X					X					1EWSD05	
1EWSD19	0-4"					X					X					1EWSD05	
1EWSD19D	0-4"					X					X					1EWSD05	Duplicate
1EWSD20	0-4"					X					X					1EWSD05	

Notes:

(1) - 2,4-dinitrotoluene, 2 -nitroaniline, 4-chlorophenyl ether, 4-nitroaniline, di-n-butylphthalate, di-n-octylphthalate, and phenol.

(2) - 4,4'-DDT, 4,4'-DDE, and 4,4'-DDD

TABLE 1
PROPOSED SAMPLE MATRIX
SWMUs 1 AND 2 ADDITIONAL DATA COLLECTION

		Solid Samples										Aqueous Samples					
		Analysis Reguested										Analysis Reguested					
Sample ID	Sample Depth (bgs)	Cu, Sn	Pb, Hg, Cu, An, Zn	An, Cd, Cu, Pb, Hg, Ni, Sn, Zn	Pb, Hg, Cu	Copper	SVOCs[1] (8270)	TOC (9060)	Pesticides[2] (8081A)	Dioxins/Furans (8290)	AVS/SEM	Metals	SVOCs[1] (8270)	Pesticides[2] (8081A)	Dioxins/Furans (8290)	Previous Sample Location Reference	Comments
SWMU 2																	
Soil																	
2SS01	0-1'		X							X						2SB03	Surface Soil
2SS01D			X							X						2SB03	Duplicate
2SS01MS/MSD			X							X						2SB03	Matrix Spike/ Matrix Spike Duplicate
2SS01-01	1-2'		X													2SB03	Subsurface Soil
2SS02	0-1'		X							X						2SB03	Surface Soil
2SS02-01	1-2'		X													2SB03	Subsurface Soil
2SS03	0-1'		X							X						2SB03	Surface Soil
2SS03-01	1-2'		X													2SB03	Subsurface Soil
2SS04	0-1'		X							X						2SB03	Surface Soil
2SS04-01	1-2'		X													2SB03	Subsurface Soil
2SS05	0-1'		X													2SB03	Surface Soil
2SS05-01	1-2'		X													2SB03	Subsurface Soil
2SS06	0-1'		X													2SB03	Surface Soil
2SS06D	0-1'		X													2SB03	Duplicate
2SS06-01	1-2'		X													2SB03	Subsurface Soil
2SS07	0-1'		X													2SB03	Surface Soil
2SS07-01	1-2'		X													2SB03	Subsurface Soil
2SS08	0-1'		X													2SB03	Surface Soil
2SS08-01	1-2'		X													2SB03	Subsurface Soil
2SS09	0-1'		X													2SD02, 2SD05	Surface Soil
2SS010	0-1'		X													2SD02, 2SD05	Surface Soil
2SS011	0-1'		X													2SD02, 2SD05	Surface Soil
2SS012	0-1'		X													2SD02, 2SD05	Surface Soil
2SS013	0-1'		X													2SD02, 2SD05	Surface Soil
2SS013D	0-1'		X													2SD02, 2SD05	Duplicate
2SS013MS/MSD	0-1'		X													2SD02, 2SD05	Matrix Spike/ Matrix Spike Duplicate
2SS014	0-1'		X													2SD02, 2SD05	Surface Soil
Estuarine Wetland System Sediment																	
2EWSD10	0-4"					X					X					2EWSD03	
2EWSD11	0-4"					X					X					2EWSD03	
2EWSD12	0-4"				X						X					2EWSD02	
2EWSD13	0-4"				X						X					2EWSD02	
2EWSD13D	0-4"				X						X					2EWSD02	Duplicate
2EWSD13MS/MSD	0-4"				X						X					2EWSD02	Matrix Spike/ Matrix Spike Duplicate
2EWSD14	0-4"				X						X					2EWSD02, 2EWSD06, 2EWSD01	
2EWSD15	0-4"				X						X					2EWSD06, 2EWSD01	
2EWSD16	0-4"				X						X					2EWSD06, 2EWSD01	
2EWSD17	0-4"				X						X					2EWSD06, 2EWSD01	
2EWSD18	0-4"				X						X					2EWSD06, 2EWSD01	
2EWSD19	0-4"				X						X					2EWSD06, 2EWSD01	

Notes:

[1] - 2,4-dinitrotoluene, 2 -nitroaniline, 4-chlorophenyl ether, 4-nitroaniline, di-n-butylphthalate, di-n-octylphthalate, and phenol.

[2] - 4,4'-DDT, 4,4'-DDE, and 4,4'-DDD

TABLE 1
PROPOSED SAMPLE MATRIX
SWMUs 1 AND 2 ADDITIONAL DATA COLLECTION

		Solid Samples										Aqueous Samples					
		Analysis Reguested										Analysis Reguested					
Sample ID	Sample Depth (bgs)	Cu, Sn	Pb, Hg, Cu, An, Zn	An, Cd, Cu, Pb, Hg, Ni, Sn, Zn	Pb, Hg, Cu	Copper	SVOCs[1] (8270)	TOC (9060)	Pesticides[2] (8081A)	Dioxins/Furans (8290)	AVS/SEM	Metals	SVOCs[1] (8270)	Pesticides[2] (8081A)	Dioxins/Furans (8290)	Previous Sample Location Reference	Comments
QA/QC																	
Field Blanks																	
2005FB01												X	X	X	X		Lab Grade D.I. Water
Equipment Rinsates																	
2005ER01												X	X	X	X		S.S. Spoon
2005ER02												X		X	X		S.S. Hand Auger
2005ER03												X	X	X	X		Al Pie Pan
2005ER04												X	X	X			Sediment Core Liner

Notes:

[1] - 2,4-dinitrotoluene, 2 -nitroaniline, 4-chlorophenyl ether, 4-nitroaniline, di-n-butylphthalate, di-n-octylphthalate, and phenol.

[2] - 4,4'-DDT, 4,4'-DDE, and 4,4'-DDD

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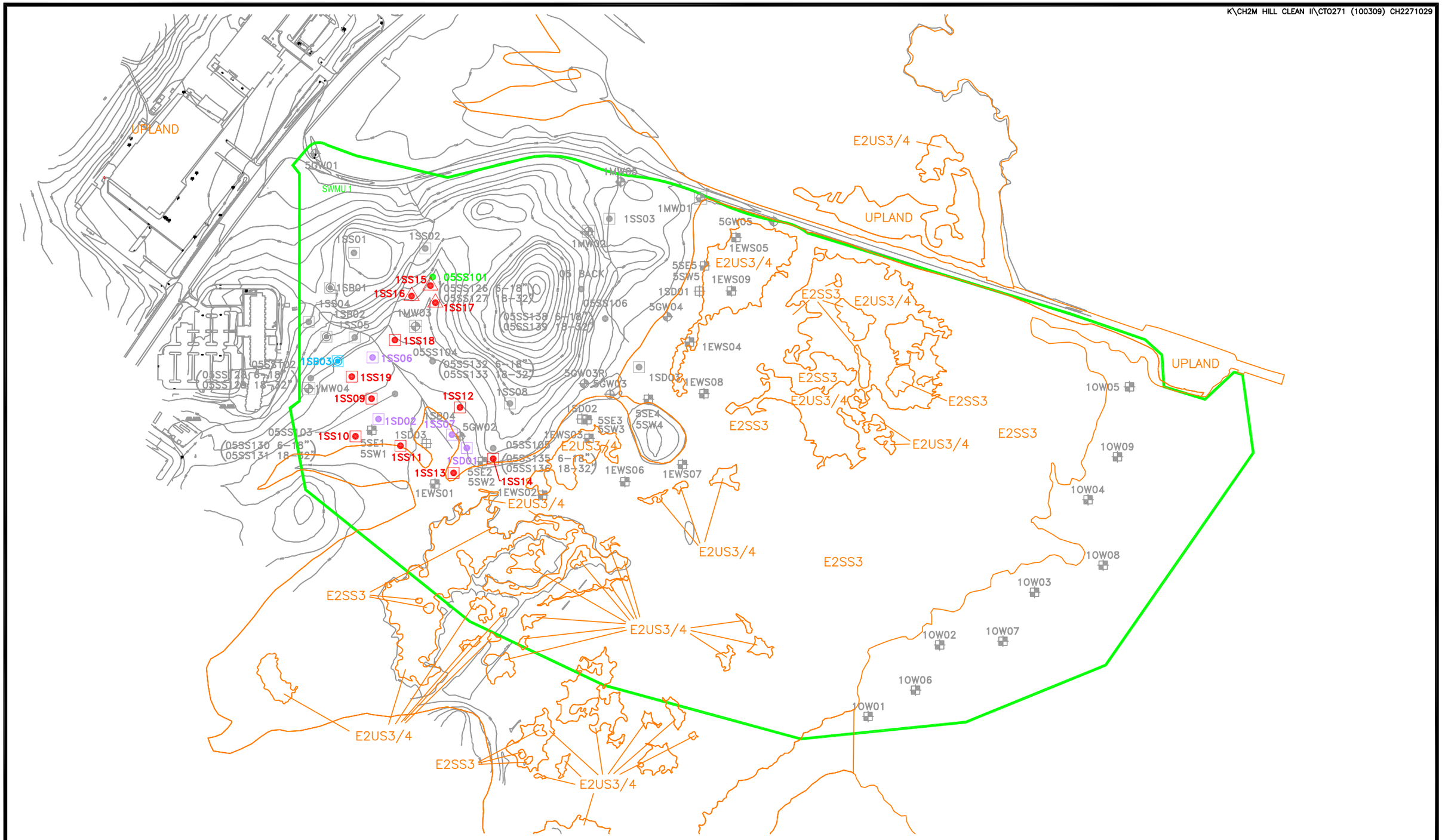


LEGEND

- SWMU
- E2SS3 WETLANDS BOUNDARIES (SEE FIGURE 4-4 FOR CLASSIFICATIONS)
- REPORTED LOCATION OF 5GW03 (NOT LOCATED DURING 1996 RFI FIELD INVESTIGATION)
- SEDIMENT SAMPLE LOCATION (RELATIVE RISK RANKING)
- SURFACE WATER/SEDIMENT SAMPLE LOCATION (CONFIRMATION STUDY)
- SOIL SAMPLE LOCATION (SUPPLEMENTAL INVESTIGATION)
- SOIL BORING LOCATION (1996 RFI)
- MONITOR WELL LOCATION (1996 RFI)
- EXISTING MONITOR WELL LOCATION (CONFIRMATION STUDY)
- SURFACE SOIL SAMPLE LOCATION (1996 RFI)
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- PROPOSED SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

ESTUARINE WETLAND SYSTEM
- SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)

OPEN WATER MARINE
- SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)

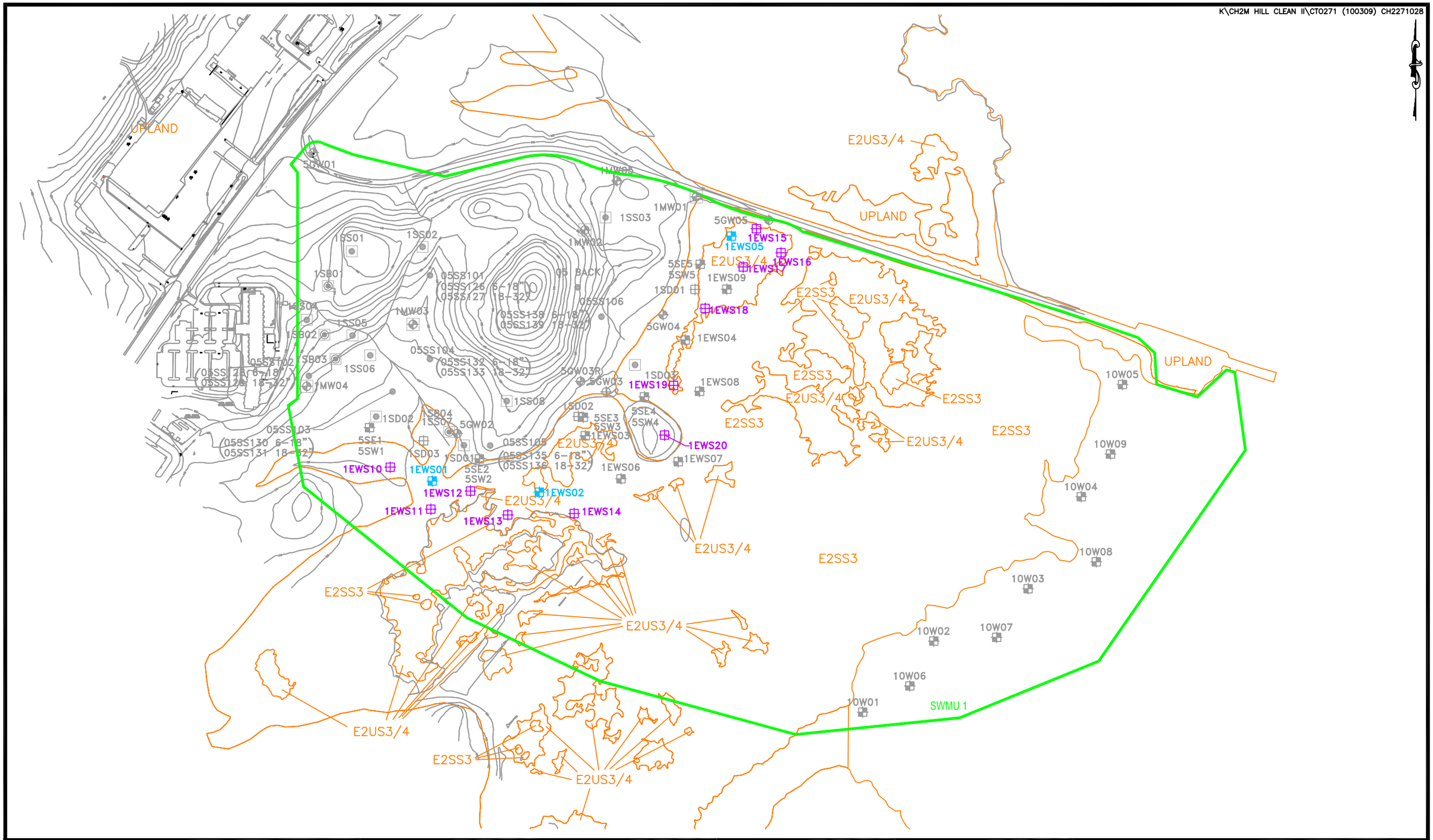
SOURCE: GEO-MARINE, INC., SEPTEMBER 8, 2000.

350 0 175 350
1 inch = 350 ft.

Baker

FIGURE 1
PROPOSED SOIL SAMPLING LOCATIONS
SWMU 1 – ARMY CREMATOR DISPOSAL SITE
NAVAL ACTIVITY PUERTO RICO
CEIBA, PUERTO RICO

K\CH2M HILL CLEAN II\CTO271 (100309) CH2271028



1 – SWMU

E2SS3 – E2SS3 WETLANDS BOUNDARIES (SEE FIGURE 4-4 FOR CLASSIFICATIONS)

– REPORTED LOCATION OF 5GW03 (NOT LOCATED DURING 1996 RFI FIELD INVESTIGATION)

– SEDIMENT SAMPLE LOCATION (RELATIVE RISK RANKING)

SOURCE: GEO-MARINE, INC., SEPTEMBER 8, 2000.

LEGEND

– SURFACE WATER/SEDIMENT SAMPLE LOCATION (CONFIRMATION STUDY)

– SOIL SAMPLE LOCATION (SUPPLEMENTAL INVESTIGATION)

– SOIL BORING LOCATION (1996 RFI)

– MONITOR WELL LOCATION (1996 RFI)

– EXISTING MONITOR WELL LOCATION (CONFIRMATION STUDY)

– SURFACE SOIL SAMPLE LOCATION (1996 RFI)

ESTUARINE WETLAND SYSTEM

– SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)

– PROPOSED SEDIMENT SAMPLE LOCATION

OPEN WATER MARINE

– SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)

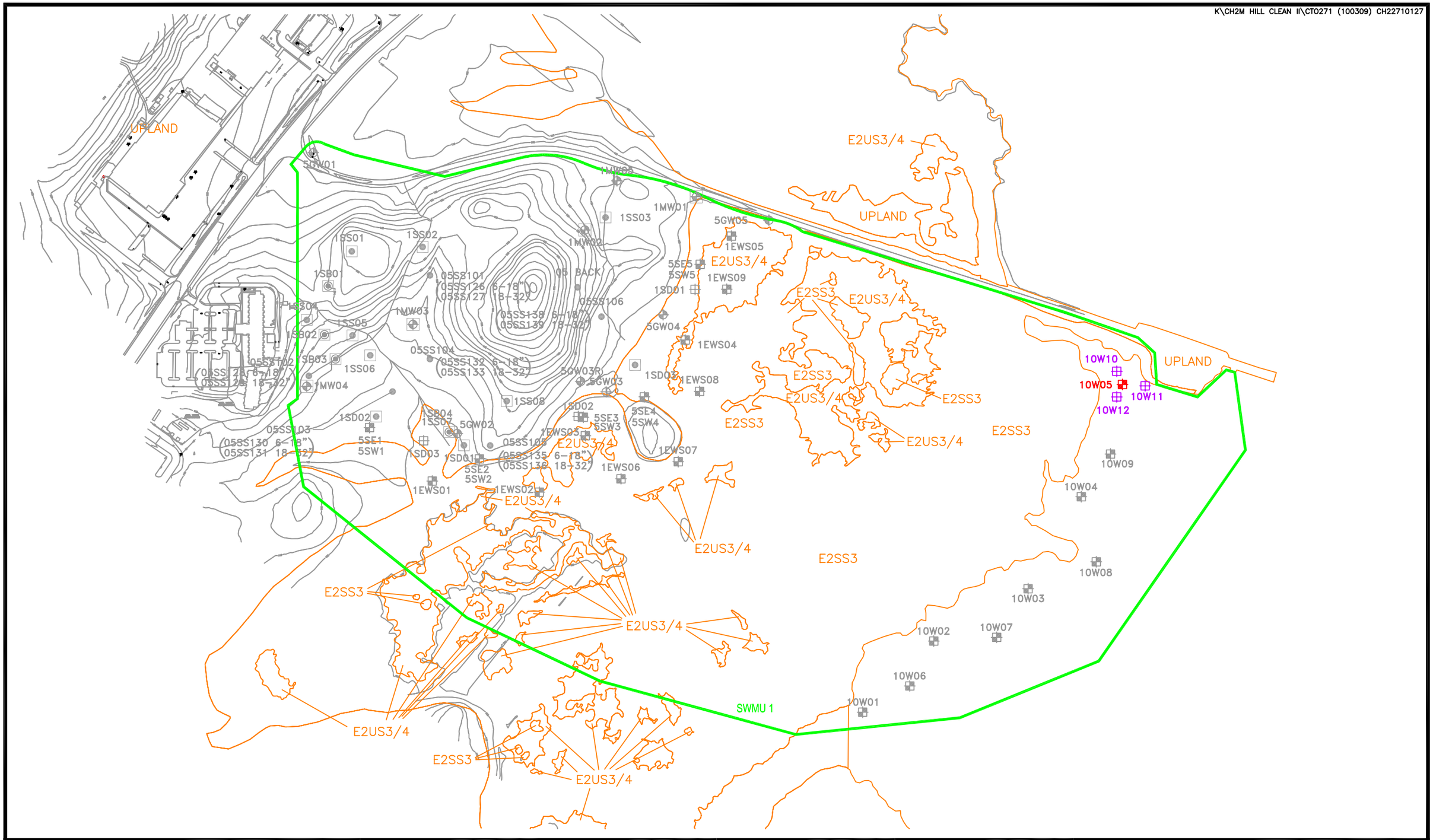
350 0 175 350

1 inch = 350 ft.

Baker

FIGURE 2
PROPOSED ESTUARINE WETLAND SYSTEM SEDIMENT SAMPLING LOCATIONS
SWMU 1 – ARMY CREMATOR DISPOSAL SITE
NAVAL ACTIVITY PUERTO RICO
CEIBA, PUERTO RICO

K\CH2M HILL CLEAN II\CTO271 (100309) CH22710127



1 – SWMU

E2SS3 – E2SS3 WETLANDS BOUNDARIES (SEE FIGURE 4-4 FOR CLASSIFICATIONS)

– REPORTED LOCATION OF 5GW03 (NOT LOCATED DURING 1996 RFI FIELD INVESTIGATION)

– SEDIMENT SAMPLE LOCATION (RELATIVE RISK RANKING)

SOURCE: GEO-MARINE, INC., SEPTEMBER 8, 2000.

LEGEND

– SURFACE WATER/SEDIMENT SAMPLE LOCATION (CONFIRMATION STUDY)

– SOIL SAMPLE LOCATION (SUPPLEMENTAL INVESTIGATION)

– SOIL BORING LOCATION (1996 RFI)

– MONITOR WELL LOCATION (1996 RFI)

– EXISTING MONITOR WELL LOCATION (CONFIRMATION STUDY)

– SURFACE SOIL SAMPLE LOCATION (1996 RFI)

ESTUARINE WETLAND SYSTEM

– SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)

OPEN WATER MARINE

– SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)

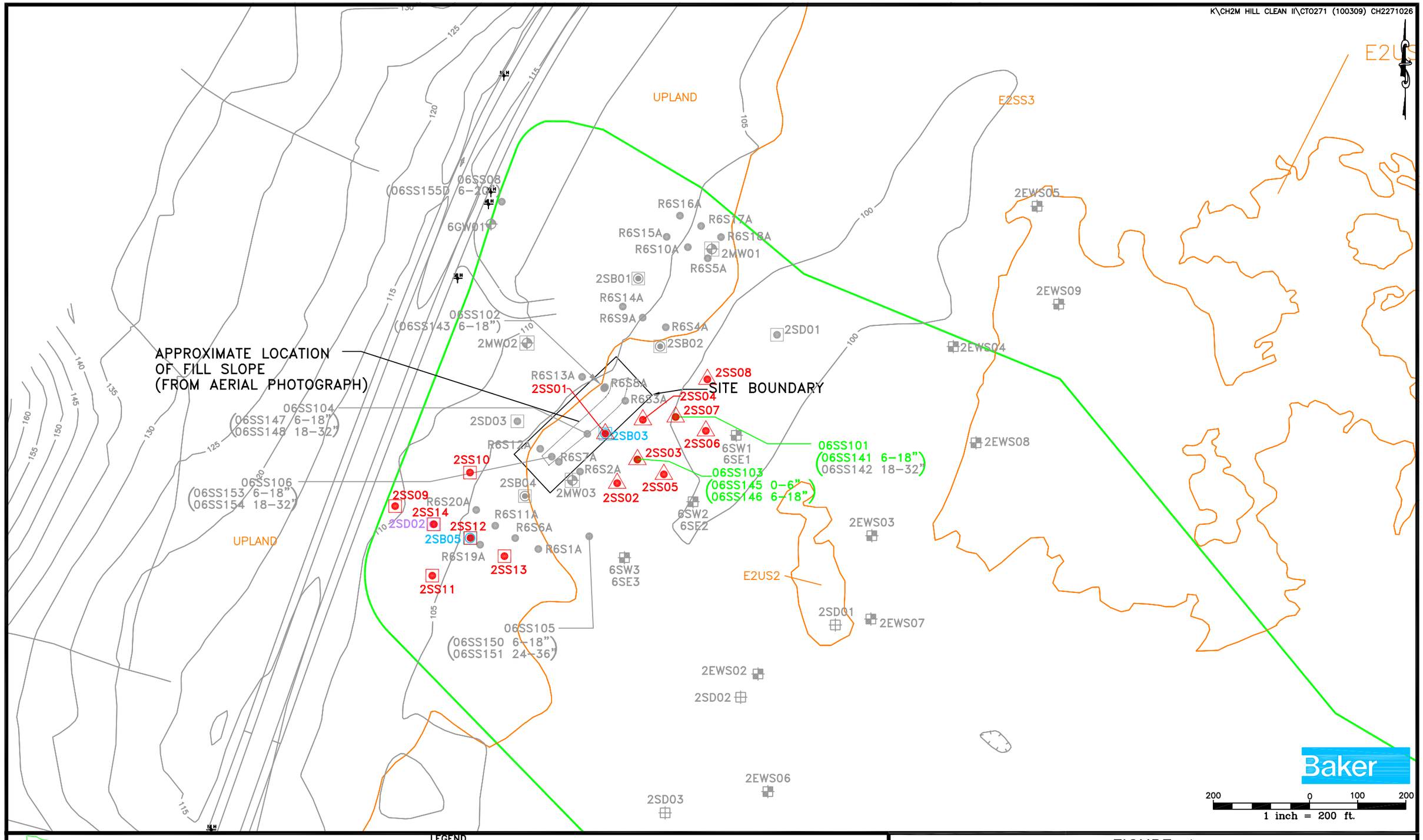
– PROPOSED SEDIMENT SAMPLE LOCATION

350 0 175 350

1 inch = 350 ft.

Baker

FIGURE 3
PROPOSED OPEN WATER MARINE SEDIMENT SAMPLING LOCATIONS
SWMU 1 – ARMY CREMATOR DISPOSAL SITE
NAVAL ACTIVITY PUERTO RICO
CEIBA, PUERTO RICO



LEGEND

- SWMU
- E2SS3 WETLANDS BOUNDARIES (SEE FIGURE 4-4 FOR CLASSIFICATIONS)
- SURFACE SOIL SAMPLE LOCATION (1996 RFI)
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- PROPOSED SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION (RELATIVE RISK RANKING)
- SURFACE WATER/SEDIMENT SAMPLE LOCATION (CONFIRMATION STUDY)
- SOIL SAMPLE LOCATION (APPROXIMATE) (SUPPLEMENTAL INVESTIGATION)
- SOIL BORING LOCATION (1996 RFI)
- SOIL SAMPLE LOCATION (APPROXIMATE) (CONFIRMATION STUDY)
- MONITOR WELL LOCATION (1996 RFI)
- EXISTING MONITOR WELL LOCATION (CONFIRMATION STUDY)

ESTUARINE WETLAND SYSTEM

- SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)

OPEN WATER MARINE

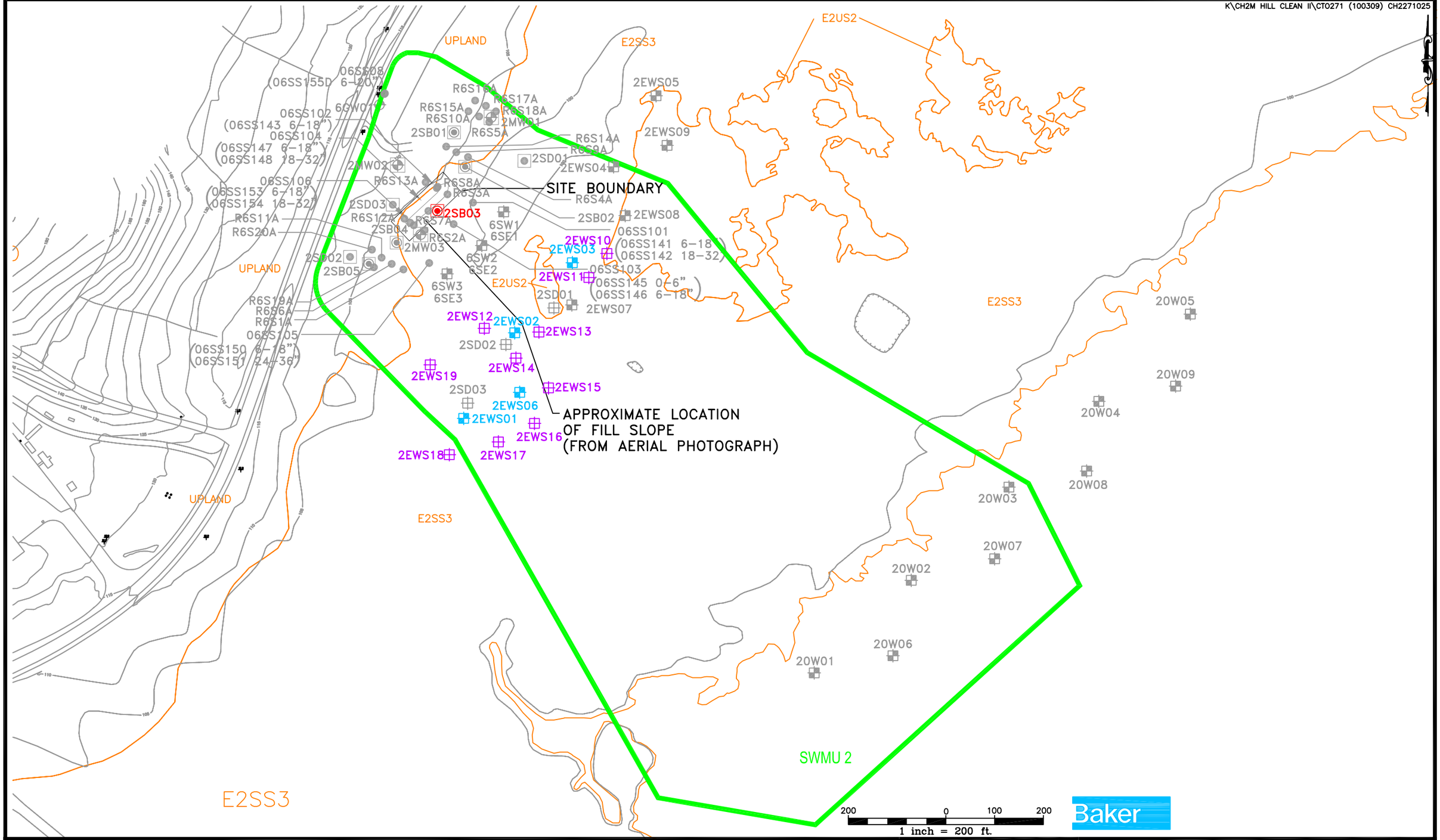
- SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)

SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

FIGURE 4
PROPOSED SOIL SAMPLING LOCATIONS
SWMU 2 – LANGLEY DRIVE DISPOSAL SITE

NAVAL ACTIVITY PUERTO RICO
CEIBA, PUERTO RICO

K\CH2M HILL CLEAN II\CTO271 (100309) CH2271025



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LEGEND

- SWMU
- E2SS3 — E2SS3 WETLANDS BOUNDARIES (SEE FIGURE 4-4 FOR CLASSIFICATIONS)
- SURFACE SOIL SAMPLE LOCATION (1996 RFI)
- SEDIMENT SAMPLE LOCATION (RELATIVE RISK RANKING)
- SURFACE WATER/SEDIMENT SAMPLE LOCATION (CONFIRMATION STUDY)
- SOIL SAMPLE LOCATION (APPROXIMATE) (SUPPLEMENTAL INVESTIGATION)
- SOIL BORING LOCATION (1996 RFI)
- SOIL SAMPLE LOCATION (APPROXIMATE) (CONFIRMATION STUDY)
- MONITOR WELL LOCATION (1996 RFI)
- EXISTING MONITOR WELL LOCATION (CONFIRMATION STUDY)

ESTUARINE WETLAND SYSTEM

- SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)
- PROPOSED SEDIMENT SAMPLE LOCATION

OPEN WATER MARINE

- SURFACE WATER/SEDIMENT SAMPLE LOCATION (ADDITIONAL DATA COLLECTION INVESTIGATION)

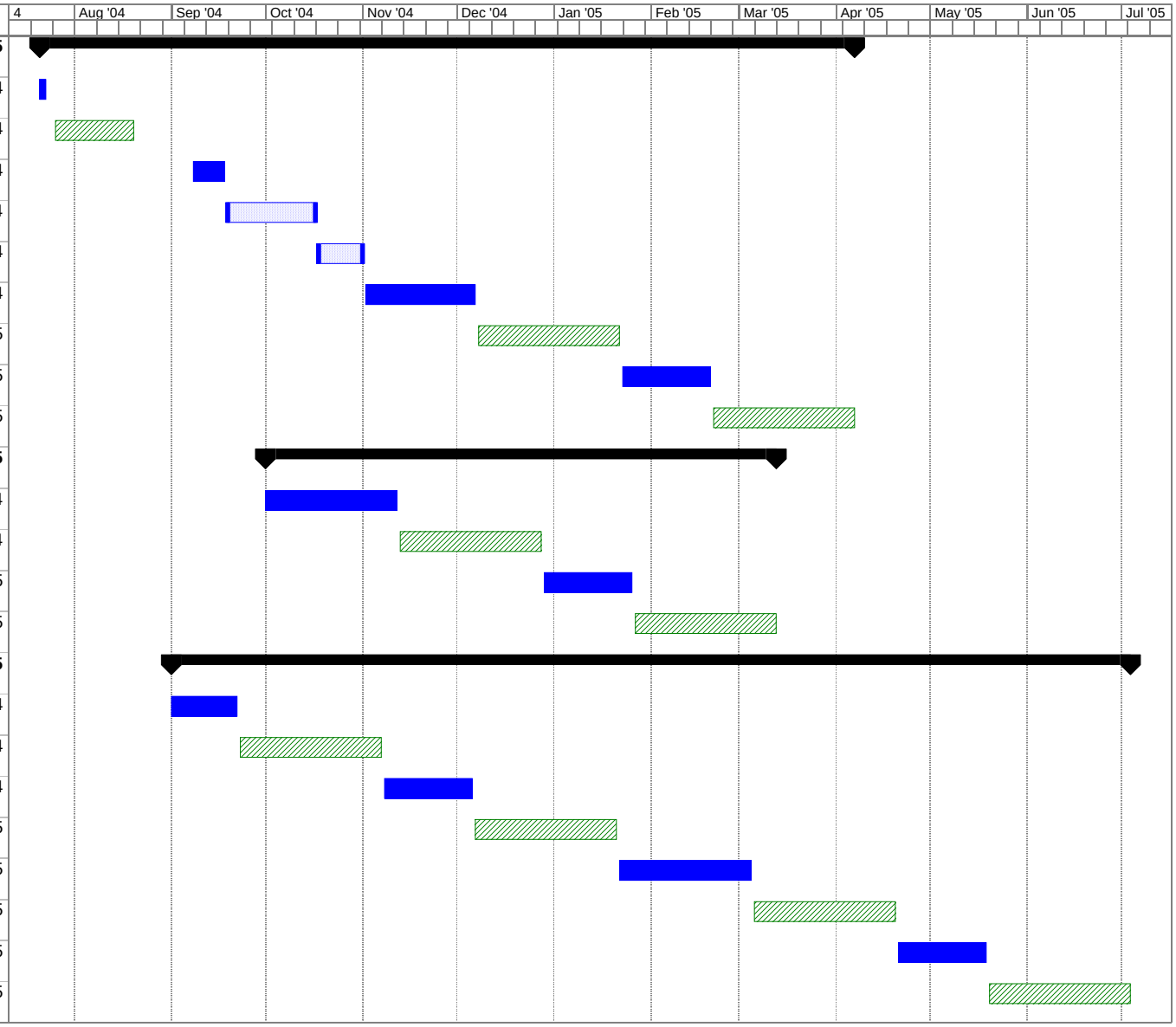
SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

FIGURE 5
PROPOSED ESTUARINE WETLAND SYSTEM SEDIMENT SAMPLING LOCATIONS
SWMU 2 – LANGLEY DRIVE DISPOSAL SITE
NAVAL ACTIVITY PUERTO RICO
CEIBA, PUERTO RICO

ATTACHMENT 3
PROPOSED SCHEDULE FOR ECOLOGICAL WORK
SWMUs 1, 2, 9 AND 45

Attachment 3
Proposed Schedule for Ecological Work at SWMUs 1, 2, 9, and 45
Naval Activity Puerto Rico
Ceiba, Puerto Rico

ID	Task Name	Duration	Start	Finish
1	**SWMUs 1 and 2**	**186 days**	**7/21/04**	**4/7/05**
2	Additional Data Collection Work Plan/Letter	2 edays	7/21/04	7/23/04
3	EPA Review and Approval	25 edays	7/26/04	8/20/04
4	Field Data Collection	10 edays	9/8/04	9/18/04
5	Laboratory Analysis	28 edays	9/19/04	10/17/04
6	Data Validation	14 edays	10/18/04	11/1/04
7	Revised Draft Step 3a ERA	35 edays	11/2/04	12/7/04
8	EPA Review	45 edays	12/8/04	1/22/05
9	Final Step 3a ERA	28 edays	1/23/05	2/20/05
10	EPA Review and Approval	45 edays	2/21/05	4/7/05
11	**SWMU 9**	**116 days**	**10/1/04**	**3/13/05**
12	Draft Step 3b/4 ERA	42 edays	10/1/04	11/12/04
13	EPA Review	45 edays	11/13/04	12/28/04
14	Final Step 3b/4 ERA	28 edays	12/29/04	1/26/05
15	EPA Review and Approval	45 edays	1/27/05	3/13/05
16	**SWMU 45**	**218 days**	**9/1/04**	**7/4/05**
17	Revised Draft Step 3a ERA	21 edays	9/1/04	9/22/04
18	EPA Review	45 edays	9/23/04	11/7/04
19	Final Step 3a ERA	28 edays	11/8/04	12/6/04
20	EPA Review and Approval	45 edays	12/7/04	1/21/05
21	Draft Step 3b/4 ERA	42 edays	1/22/05	3/5/05
22	EPA Review	45 edays	3/6/05	4/20/05
23	Final Step 3b/4 ERA	28 edays	4/21/05	5/19/05
24	EPA Review and Approval	45 edays	5/20/05	7/4/05



Project: ERA Timeline
Date: 7/22/04

Task EPA Review Summary