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NSWC CRANE
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DEPARTMENT OF THE NAVY
CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE INDIANA 47522-5001

IN REPLY REFER TO:

5090/S4.7.1
Ser 095/3131

8 APR 2003

U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Illinois, Indiana, and Michigan Section
ATTN: Mr. Peter Ramanauskas (DW-8J)
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center (NSWC Crane) submits the Final RCRA Facility Investigation (RFI) Report for Solid Waste Management Units (SWMUs) 04/02 (McComish Gorge), 05/03 (Old Burn Pit), 09/05 (Pesticide Control Area - R150 Tank), and 10/15 (Rockeye). Due to the extensive nature of the comments and responses, the Final RFI Report now consists of four volumes. Enclosure (1) contains the replacement items for the May 2002 Draft RFI Report. Enclosure (2) details the actions necessary to revise the May 2002 Draft RFI Report into the Final Report. Response to comments are also provided as enclosure (3). Two copies of enclosures (1) and (3) are furnished. The permit required Certification Statement is provided as enclosure (4).

NSWC Crane point of contact is Mr. Thomas J. Brent, Code 09510, telephone 812-854-6160.

Sincerely,

James M. Hunsicker

JAMES M. HUNSICKER
Director, Environmental
Protection Department
By direction of the Commander

Encl:
(1) Final RFI Report for SWMUs 4, 5, 9, & 10
(2) Replacement Pages Instruction Table
(3) Response to U.S. EPA Comments
(4) Certification Statement

5090/S4.7.1
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Copy to:
ADMINISTRATIVE RECORD
SOUTHNAVFACENGCOM (Code ES32) (w/o encl)
IDEM (Doug Griffin)
TTNUS (Ralph Basinski) (w/o encl)

RESPONSE TO:
U.S. EPA COMMENTS (EXCLUDING HUMAN HEALTH RISK ASSESSMENT COMMENTS) ON RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) FACILITY INVESTIGATION (RFI) REPORT FOR SWMUs 4 (McCOMISH GORGE), 5 (OLD BURN PIT), 9 (PESTICIDE CONTROL/R-150 TANK AREA), AND 10 (ROCKEYE) DATED 09/03/02; AND ASSOCIATED U.S. EPA HUMAN HEALTH RISK ASSESSMENT COMMENTS DATED FEBRUARY 12, 2003
NSWC CRANE, CRANE, INDIANA

PART I, Responses to All but Human Health Risk Assessment Comments, dated September 09, 2002

GENERAL RFI COMMENTS:

1. **The RCRA Facility Investigation (RFI) report does not provide a detailed discussion on the recommendations for further actions at the site. Table ES-1 indicates that a Corrective Measures Study (CMS) should be implemented for groundwater at all four solid waste management units (SWMUs) and soils at SWMU 5. However, the RFI report does not provide a detailed discussion of these CMS measures or what specifically will be included in the study. In order to fully evaluate the RFI report and/or focus the CMS, detailed information on subsequent investigations or actions should be provided. In addition, as noted in several of the General and Specific Comments to follow, it is not apparent that the "nature and extent" of contamination has been fully delineated. Therefore, the lack of detail regarding future CMS activities becomes even more important if any additional investigations, or data gap completions, are necessary. Revise the RFI report to provide additional information regarding the need for future investigations and the CMS.**

RESPONSE:

NSWC Crane disagrees that detailed remedial recommendations should be provided in the RFI report. Detailed recommendations for potential remedies are not typically included in the RFI report because that function is normally addressed in the CMS. However, NSWC Crane does agree that any RFI data gaps (e.g., nature and extent of contamination) should be addressed before proceeding to the CMS phase or that these gaps should be identified as action items for address in the CMS.

NSWC Crane believes the RFI objectives were achieved; there have been no revisions to the RFI report based upon this comment.

2. **A detailed discussion on the nature and extent of contamination at the SWMUs is not provided. The RFI report simply summarizes the analytical data and identifies the sample location(s) where the maximum concentrations of the constituents were detected. However, the RFI report does not provide sufficient explanation regarding the extent of contamination or whether the contamination is considered to be adequately defined. Revise the RFI report to include additional detail (if available) about the extent of contamination.**

RESPONSE:

Additional text has been added to Sections 4.0, 5.0, 6.0, and 7.0 to better explain why the nature and extent was adequately defined to support a risk assessment. Where additional sampling may be helpful to support a risk assessment or corrective action, it is identified. Because the amount of reviewed text is extensive, it is not being recounted here, but is provided as Attachments 1 through 4 to this document.

3. **For example, at several SWMUs, the maximum concentrations of certain constituents were detected at the most downgradient sample locations or the sample locations closest to the site boundaries. Many of these maximum detected concentrations exceed the corresponding screening criteria and, therefore, the extent of the contamination may not be fully defined. Several examples are included in the Specific Comments below. However, please note that these do not identify every instance where the extent of contamination is not fully defined.**

Since the RFI report does not include any discussion about recommendations for further action at the site, it is unclear if further investigations are anticipated which will further characterize the extent of contamination or if the CMS measures implemented for groundwater (as indicated in Table ES-1) will address other media as well. Revise the RFI report to include additional detail (if available) about the extent of contamination.

RESPONSE:

The RFI Report summary sections on nature and extent have been revised to better describe to what degree the contamination is bounded at each SWMU. Where appropriate, the impact of not having completely bounded the contamination is also described. The updated text is presented in Attachments 1 through 4 of this document. As necessary, additional updated text has been developed for individual nature and extent discussions by SWMU for particular chemical classes in the media.

Due to technical errors, the inorganic chemical tag maps have been regenerated for surface and subsurface soils for each of the four SWMUs. The technical errors included:

- Corrections on soil tag maps for various metals that were identified as exceeding background concentrations where the concentrations did not actually exceed background concentrations for their respective soil groups. For these items, the "BACK" exceedance flags have been removed.
- Inclusion of exceedances in human health risk-based concentration criteria not included in the original tag maps.
- Correction of exceedances in ecological data quality levels which were incorrectly flagged on subsurface soil tag maps for inorganic chemicals.

4. **The second paragraph in each Surface Soil section (Sections 4.4.1, 5.4.1, 6.4.1 and 7.4.1) indicates that the summary table for each SWMU (Tables 4.3, 5.3, 6.3 and 7.3) presents a summary of information for the samples, including a "comparison to background." However, while the Nature and Extent of Contamination section for each SWMU states that "no background samples were collected for groundwater, surface water and sediment...", it is not known exactly how background soil concentrations have been established, nor has it been presented in sufficient detail to determine whether the methodology used is adequate. Clarify how background soil levels were determined and how subsequent comparisons to background demonstrate its adequacy.**

RESPONSE:

Section 3.1.6 references the "appropriate facility wide background data set" as the data to which site soil data were compared. This reference has been expanded with information from the background report. The following text has been added to the end of the second paragraph in Section 3.1.6:

"To generate the background data set, more than 200 soil samples that were judged to be unaffected by site operations were collected from across NSWC Crane. From these 200 samples that spanned four geological depositional environments each containing two depths (surface and subsurface) and three subsurface soil grain sizes (sand, silt, and clay), 20 surface and 47 subsurface samples were randomly selected for the analysis of 27 metals on each sample. The results were compared statistically, with consideration of the sample geochemistries and were determined to represent nine distinct soil groups representative of background soils across NSWC Crane. Summary statistics for the nine individual soil groups and summary statistics for all soils together are presented in Appendix F."

Appendix F has been updated to contain the background soil data summary tables for the soil groups encountered at SWMUs 4, 5, 9, and 10.

SPECIFIC RFI COMMENTS:

5. **Section 2.6.2, Soil Sampling. Both surface and subsurface soil sampling appears to have been limited to the general areas proposed in the RFI work plan. However, the RFI work plan indicated that at each SWMU, if field observations warrant, additional samples may be collected. Revise the RFI report to include a discussion regarding whether any additional samples were collected and the reasons supporting why additional samples were or were not collected.**

RESPONSE:

The RFI Work Plan included contingent additional samples for SWMUs 4 and 5, only. NSWC Crane cannot locate and is not aware of any discussion in the RFI Work Plan regarding additional soil sampling at SWMUs 9 and 10. Responses specific to SWMUs 4 and 5 are presented below:

SWMU 4 Discussion

The additional soil sampling at SWMU 4 was detailed in the last paragraph of Section 3.1.1 of the Field Sampling Plan located in Appendix A of the RFI Work Plan. The soil sampling was intended to support further delineation of disposal areas, if needed, based upon the outcome of geophysical investigation activities. Consequently, four additional soil boring locations (04SB09 through 04SB12) were drilled and sampled to support these delineations. The last sentence of Section 4.2 presents the results of the geophysical investigation activities as follows:

"Four sample locations (04SB09 through 04SB12) were based on the results of a geophysical survey conducted during December 2000."

Additionally, Section 2.3 also references the geophysical surveys. Therefore, NSWC Crane believes that the RFI report adequately addresses the additional soil sampling at SWMU 4.

There have been no revisions to the RFI report for SWMU 4 based upon this comment.

SWMU 5 Discussion

Initially, as detailed in the final paragraph of Section 3.2.1 of the Field Sampling Plan located in Attachment A of the RFI Work Plan, potentially up to four additional soil sample locations were proposed for SWMU 5. This provisional soil sampling was proposed as a way to refine the northern boundary of the site based on a site reconnaissance. During the site reconnaissance there was insufficient evidence of disposal activities to warrant sampling at the provisional locations. No changes have been made to the RFI report in response to this comment.

6. **Section 2.6.2.1, Surface Soil Sampling. The RFI report indicates that the surface soil samples to be analyzed for volatile organic compounds (VOCs) were collected from the one to two foot below ground surface (bgs) interval, whereas the surface soil samples to be analyzed for the remaining parameters were collected from the zero to two foot bgs interval. It is unclear why the surface soil samples collected for VOC analysis were collected from a different sampling interval range than the subsequent surface soil samples. The one to two foot bgs interval range may not be representative of the exposure scenarios presented in the risk assessment evaluations. Revise the RFI report to explain the selection of this sampling interval range.**

RESPONSE:

The aliquot for volatile organic analyses in surface soils was collected along the 1- to 2-foot interval in accordance with the approved RFI Work Plan. TtNUS experience for similar sites indicates that organic compounds, especially volatile organic compounds, typically volatize in the approximately 0- to 1-foot depth interval but may still be present in the deeper 1- to 2-foot interval. Therefore, organic analyses focused on the 1- to 2-foot interval, whereas the remaining sample aliquots that are not subject to volatilization were collected along the 0- to 2-foot interval. Previous experiences with

similar sites indicated that the resultant data would be higher in concentration with this approach, thus yielding conservative risk results. The paragraph in Section 2.6.2.1 has been revised as follows to address this comment:

"A total of 43 surface soil samples were collected during the field investigation. The samples were collected from the ground surface to a maximum depth of 2 feet using DPT sampling techniques, a stainless-steel trowel, or a single-use, dedicated plastic trowel at all soil boring locations. Upon sample retrieval, all samples were monitored for the presence of volatile organics with a PID or FID and then collected for lithologic and chemical analysis. Samples to be analyzed for organic parameters were taken first along the 1- to 2-foot soil interval, because near surface organic contaminants in the 0- to 1-foot interval may have volatized. Samples for volatile organic compound (VOC) analysis were collected with EnCore® samplers, labeled, returned to the resealable bags, and placed in a cooler at 4°C immediately after collection. Sample aliquots for the other analyses were homogenized and collected from the remaining soil core material within the 0- to 2-foot depth interval, and placed in a cooler at 4°C immediately after collection. All surface soil sampling information was recorded on the soil sample log sheet (included in Appendix B)."

7. **<u>Section 2.6.2.3, Subsurface Soil Sampling.</u> Clarify the procedures used for collecting subsurface soil samples for VOC analysis using an EnCore sampler. The procedures included in Sections 2.6.2.1 (Surface Soil Sampling), 2.6.2.3 (Subsurface Soil Sampling) and 2.6.4 (Sediment Sampling) appear different. For surface soil and sediment sampling, it appears that the samples were collected using an EnCore sampler and then placed directly in a cooler. Whereas for subsurface soil sampling, the "soil to be analyzed for VOCs was collected first using EnCore samplers, placed in sealable plastic bags, labeled, placed in a cooler..." Revise the RFI report to describe why these sampling procedures differ. It is understood that the sampling interval for subsurface soils was not pre-defined and may have been chosen based on instrument readings, which may account for these differences, however these differences may have an impact on the VOC sample results. Clarify the procedures used to ensure that the VOC sample results are truly representative of subsurface soil conditions.**

RESPONSE:

The EnCore® sampling procedure used during the field investigation was similar for all solid matrices. However, NSWC agrees that the document text does not adequately define the procedures in a uniform manner. All EnCore® samplers were labeled, placed into the resealable bags, and placed into a cooler immediately after collection. Those subsurface soil samples that were not selected for VOC analyses based on screening were ultimately discarded. The document text has been revised as follows:

The text in Section 2.6.2.1 has been revised as detailed in the response to "SPECIFIC RFI COMMENTS " Comment Number 6.

Section 2.6.2.3 was numbered incorrectly and has been renumbered as Section 2.6.2.2. The text in the second paragraph of Section 2.6.2.2 has been revised as follows:

"Subsurface soil samples were collected from soil borings using direct-push 4-foot long, 2-inch *diameter macro-core samplers. All subsurface soil sampling was done in accordance with CTO 10 SOP 7. Upon sample retrieval, the soil to be analyzed for VOCs was collected first using EnCore® samplers, labeled, returned to the resealable bags, and placed into a cooler at 4°C immediately after collection. The remaining soil core was then mixed. Samples were then collected for other parameters (i.e., semivolatile organic compounds [SVOCs], metals, etc.) and mixed, placed into the required containers, immediately sealed, labeled, and placed into a cooler at 4°C. The 4-foot-long clear plastic sleeves inside the direct-push samplers were disposed of as described in Section 2.13. Any soil samples not selected for laboratory analyses based on field screening were discarded as described in Section 2.13. All pertinent field data were recorded on a soil sample log sheet and in the field logbook (copies of both can be found in Appendix B)."*

For further clarification, the text in the second paragraph of Section 2.6.4 has been revised as follows:

"After the surface water sample was collected at a location, a sediment sample was collected in the *same vicinity in a depositional area. Depositional areas had slow moving water with predominantly fine (clay and silt) particles present in the streambed. Sediment samples were collected to a maximum depth of 6 inches. Decontaminated stainless steel or disposable plastic trowels were used to collect sediment samples with care taken to capture fines. Samples for VOC analysis were taken first using EnCore® samplers directly filled from the depositional area, labeled, returned to the resealable bags, and placed into a cooler at 4°C immediately after collection. Samples for the other parameters were mixed in-situ using stainless-steel or disposable plastic trowels, placed into the required containers, immediately sealed, labeled, and placed into a cooler at 4°C. At the completion of sampling, all locations were marked with labeled, wooden survey stakes. Fluorescent flagging was tied to the stakes and to nearby trees to facilitate identification of the sample locations for surveying. All pertinent field data, including sample method, depth, description, and location, were recorded on a soil and sediment sample log sheet and in the field logbook (copies of both can be found in Appendix B)."*

8. **<u>Section 4.2, Site Investigation.</u> It is previously stated in Section 1.4.1, SWMU 4 (page 11-1), that small arms ammunition may have been buried at this site, and Section 1.6.1, indicates that two explosives were detected in subsurface soil samples in past sampling activities. However, explosives are not included on the analyte list for environmental media for the most recent site investigation. Revise the RFI report to discuss the lack of investigation of explosives at SWMU 4 as a data gap, or provide sound rationale for not sampling media for explosives.**

RESPONSE:

Explosives analyses were not performed on soil samples collected at SWMU 4 because migration from soil to ground water was unlikely based on historical ground water analytical results, which did not detect explosives constituents. Explosives were eliminated from further consideration as detailed in the third paragraph of Section 5.4.1 of the approved RFI Work Plan as follows:

"Two explosives, 2,4-dinitrotoluene and 2,6-dinitrotoluene, and N-Nitrosodiphenylamine were found in subsurface soils at concentrations greater than the lowest screening criteria. The presence of these chemicals may be attributable to small arms munitions disposed at the site. Migration of these constituents from soil to ground water is not supported by the historical data, because they were not detected in the ground water samples collected from the site."

No text changes have been made to the report to address this comment.

9. **<u>Section 4.2, Site Investigation (Surface Water and Sediment).</u> In the RFI report, sample location 04SW/SD04 is located along the eastern edge of the marsh/wet area. However, in the RFI work plan, this sample location was to be located in the center of the marsh/wet area. Revise the RFI report to include an explanation for this change in sample location and whether the resulting data would be expected to be of comparable quality and usability.**

RESPONSE:

NSWC Crane anticipated, based on the relatively small size of this area (less than 100 feet in diameter), that one sample located anywhere within the confines of the feature would yield representative results of the area of interest. The sample locations depicted in the work plan were only approximate. Subsequently, the field crew identified the actual sample locations. This slight shift in the sample location is within acceptable field approximation standards and the results obtained met the original intent of the sampling approach.

No text revisions to the report are necessary to address this comment.

10. <u>Section 4.4.3, Groundwater.</u> **The RFI report indicates that Sample 04GW0101, which was collected from monitoring well 04-01, is the SWMU 4 upgradient groundwater sample. However, Section 5.5.2 of the RFI work plan indicates that monitoring well 04T01 was to be installed to establish water quality conditions upgradient of the site due to its location to the west, and outside of, the SWMU boundary. It appears that monitoring well 04T01 represents a more appropriate upgradient monitoring well location when compared to monitoring well 04-01, which is located within the (estimated) boundaries of the disposal area at SWMU 4. Revise the RFI report to denote Sample 04GWT0101 as the upgradient groundwater sample for SWMU 4, and revise any resulting assumptions accordingly.**

RESPONSE:

As detailed in the work plan, NSWC Crane originally believed that well 04T01 would serve as the upgradient background monitoring well. However, ground water flow directions based upon a comprehensive round of ground water level measurements (see Figure 4-5 in the RFI Report for ground water flow directions) indicated that well 04-01 was better suited as a background monitoring well. This decision has no impact on the outcome of the quantitative risk assessment for the SWMU as stated in the last sentence of the second paragraph of Section 4.6.1.2:

"Note that no chemicals were eliminated from the quantitative risk assessment on the basis of background because maximum concentrations in the site ground water samples were greater than concentrations in the upgradient well."

NSWC Crane acknowledges that well 04-01 is located within the limits of the SWMU boundary; however, the well is located outside of the estimated limits of disposal (see Figure 4-1). As noted in the boring log, there is no evidence of disposal at the well 04-01 location. Furthermore, no evidence of ground water contamination is evident. Therefore, it is appropriate to use well 04-01 as an upgradient background monitoring point for SWMU 4.

However, for clarification, the 1st paragraph in Section 4.6.1.2 has been revised as follows:

"Table 4-16 presents details of the COPC selection process for ground water. The COPC selection for ground water at SWMU 4 is based on analytical data for unfiltered ground water samples collected from monitoring wells installed at the site. One well, 04-01, located on the western side of the site upgradient of the disposal limits, was used as the upgradient well for COPC selection in ground water. It should be noted that, as originally stated in the RFI Work Plan, monitoring well 04T01 was intended to be used as the upgradient well. However, well 04-01 was determined to be a more suitable upgradient monitoring well based upon the ground water flow directions as depicted on the potentiometric surface map (Figure 4-5). The following chemicals were retained as COPCs in ground water"

11. **<u>Section 4.4.3, Groundwater.</u> The extent of iron contamination in groundwater at SWMU 4 does not appear to be defined. Iron was detected in groundwater at a maximum concentration of 33,300 ug/L, which exceeds the maximum detected concentration of 32,300 µg/L from previous investigations. This concentration was detected in the most downgradient sample location (04T03), indicating that at a minimum the extent of iron contamination has not been horizontally defined. Revise the RFI report to delineate and further investigate the full extent of iron contamination in groundwater at SWMU 4.**

RESPONSE:

Section 4.4.6 has been revised to better describe the nature and extent of contamination at SWMU 4, including ground water contamination. The rewritten section is provided in Attachment 1 to this document.

12. **<u>Section 5.4.4, Surface Water.</u> The extent of inorganic and VOC contamination in surface water at SWMU 5 has not been adequately defined. Several of these types of compounds were detected above screening criteria at downgradient sample locations (05SW/SD03 and 05SW/SD04). Revise the RFI report to include determining the nature and extent of surface water contamination at SWMU 5.**

RESPONSE:

Section 5.4, especially subsection 5.4.6, has been rewritten to better describe the nature and extent of contamination at SWMU 5. The rewritten section is provided in Attachment 2 to this document.

13. **<u>Section 6.4.3, Groundwater.</u> The extent of metals contamination in groundwater at SWMU 9 does not appear to be adequately defined. The maximum detected concentrations of select inorganic constituents were identified in two of the most downgradient sample locations (09T02 and 09-02). Revise the RFI report to include contingencies for further characterization of the extent of metals contamination in groundwater at SWMU 9.**

RESPONSE:

Section 6.4, especially subsection 6.4.6, been rewritten to better describe the nature and extent of contamination at SWMU 9. The rewritten section is provided in Attachment 3 to this document.

14. **<u>Section 7.2, Site Investigation (Surface Water and Sediment).</u> Sample location 10SW/SD05 in the RFI report is located further southwest than where it was proposed in the approved RFI work plan. Revise the RFI report to include an explanation for this discrepancy in sample locations and whether the resulting data would be expected to be of comparable quality and usability.**

RESPONSE:

A review of the survey field notes indicated that during the data transfer, an error was made in the data coordinates that resulted in an incorrect location for 10SW/SD05. The correct location, which is the same area as the proposed sample location shown in the Work Plan figure, was re-plotted on the affected figures in Section 7.0. Figure 7-1 and Figures 7-4 through Figure 7-16 have been revised to incorporate the updated coordinate data. Additionally, the survey data coordinates in Appendix D have also been revised to reflect the updated coordinates for this sample location.

15. **<u>Section 7.4.6, Summary.</u> Analytical results from surface soil samples at sample location 10SB09, as well as groundwater, surface water and sediment sample results in the surrounding areas, indicate elevated concentrations of explosives and inorganic compounds exceeding the screening criteria. It appears that the extent of contamination emanating from the "pink water discharge" area has not been fully defined. Revise the RFI report to include**

an evaluation of these noted detections and to allow for determining the extent of contamination surrounding this area.

RESPONSE:

Section 7.4, especially subsection 7.4.6, has been rewritten to better describe the nature and extent of contamination at SWMU 10. The rewritten section is provided in Attachment 4 to this document.

ECOLOGICAL RISK ASSESSMENT COMMENTS:

GENERAL ECOLOGICAL RISK ASSESSMENT COMMENTS:

16. **The process used for selection of chemical of potential ecological concern (COPECs) is not clearly presented and does not appear to provide a conservative methodology recommended by the 1997 EPA Ecological Risk Assessment (ERA) guidance (Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Office of Solid Waste and Emergency Response, EPA/540/R-97/006). For example, the Ecological Screening sections (Sections 4.7.4, 5.7.4, 6.7.4, 7.7.4) present Ecological Effects Quotients (EEQs) for soil, sediment, and surface water (Tables 4-24, 4-25, and 4-26, respectively). The EEQs are based on a comparison of maximum detected concentrations to the EPA Region 5 Environmental Data Quality Levels (EDQLs). It is presumed that if an EEQ is greater than 1, then additional investigation is warranted for this compound. However, Section 3.4.3, Ecological Screening (page 3-72), indicates that inorganic contaminants which have a maximum detected concentration that does not exceed the maximum upstream or upgradient concentrations are not retained as COPECs. Therefore, the COPECs with EEQs that are greater than 1 are actually eliminated from further consideration based on the comparison to an upgradient concentration. It is not evident that the "upgradient" locations are adequate to represent unimpacted conditions. The use of "upgradient" samples is not recommended for use during the screening level ecological risk assessment (SERA). Revise the approach and tables to indicate all chemicals that have EEQs greater than 1 based on a comparison to the EDQLs.**

RESPONSE:

The process for selection of ecological (Chemical of Potential Concern) COPCs as described in the EPA approved RFI Work Plan was followed and is presented in Section 3.4.3 of the RFI report. That plan allows for eliminating inorganics (more specifically, metals) for consideration as chemicals of potential ecological concern based on a comparison of their site concentrations to upgradient or background concentrations. "Upgradient" represents concentrations that are coming onto the site and does not necessarily represent non-impacted areas (i.e., an "upgradient" area may have been impacted by sources other than the site being investigated and is not necessarily a "clean" area). In addition, the planning documents, final report, and database from the background investigation have been made available to the U.S. EPA Region 5, NSWC Crane, and U.S. Navy Southern Division for review. With this database, the site and background concentrations can be reviewed directly. The description of "background" comparisons has been revised in response to several other comments but no change has been made based on this comment.

The screening approach also includes a comparison to "alternative benchmarks" (Section 3.4.4.1) and presents the benchmarks in Appendix H.2. The alternative benchmarks are ultimately used in the "Step 3a refinement process" in order to provide justification for eliminating COPECs that were found to be above Region 5 EDQLs (i.e., EEQs greater than 1). Specific alternative benchmarks for each COPEC identified in Tables 4-24, 4-25, 4-26, are discussed for each SWMU in Sections 4.7.5, 5.7.5, 6.7.5, and 7.7.5. Therefore, if a COPEC concentration is less than the alternative benchmarks, then dose-modeling to evaluate upper trophic level birds and mammals is not performed. The document is not clear for several reasons. First, the text and tables indicate that the comparison to the EDQLs and alternative benchmarks includes assessment of terrestrial birds and mammals. However, in general, review of the benchmarks indicates that they may be associated with protection of invertebrates or plants, and not associated with upper trophic level mammals. While it is recognized that in some cases it may be implied that the generic soil or sediment benchmarks may also be protective of mammals and birds, this is not true for bioaccumulative, persistent, or toxic (PBT) chemicals (e.g., PCBs).

RESPONSE:

Region 5 EDQLs were used as screening values as part of the SERA. Region 5 EDQLs were developed to account for bioaccumulation so if a detected chemical concentration was below the associated EDQL, then dose-modeling to evaluate upper trophic level birds and mammals was not performed. The following sentence has been added after the third sentence in the first paragraph of Section 3.4.2.5 on page 3-71: *"As indicated in U.S. EPA Region 5 (October 1999), the EDQLs provide an initial screening level for chemicals in environmental media which are protective of plants, invertebrates, and mammals."* The comparison to the EDQLs, therefore, includes the assessment of both direct risks to invertebrates and terrestrial vegetation and indirect risks to upper-trophic level vertebrates through bioaccumulation. Section 3.4.4.2 (first paragraph) clearly indicates that the alternate benchmarks are not designed to screen out risks to terrestrial wildlife so in addition to comparing soil concentrations to toxicity values for terrestrial invertebrates and plants, a terrestrial intake model was used to estimate exposure of the COPCs to terrestrial receptors. It is not clear where the text or tables indicate that the comparison to the alternative benchmarks includes the assessment of terrestrial birds and mammals. The comparison to alternate benchmarks in Step 3a includes an assessment of direct risks to invertebrates and vegetation only, as indicated in the first paragraphs in Sections 4.7.5.1, 5.7.5.1, 6.7.5.1, and 7.7.5.1. Bioaccumulative chemicals are further evaluated in Step 3a through food chain modeling in an assessment of risks to upper-trophic level vertebrates as described in section 3.4.4.2. The following sentence has been added to the end of the first paragraph in section 3.4.4.2 on page 3-74: *"Chemicals evaluated in the terrestrial food-chain model were limited to those identified by the U.S. EPA as bioaccumulative (U.S. EPA, February 2000)."* Because some chemicals that are not considered bioaccumulative (U.S. EPA, February 2000) were included in the food chain modeling, the food chain modeling calculations have been revised and resubmitted to include only those chemicals that are considered to be bioaccumulative.

Second, the alternative benchmarks are presented as a second tier of the SERA process with the objective of eliminating COPECs with concentrations below the proposed benchmarks. Thus, each COPEC that was above an EDQL is discussed and if the detected concentration is below the alternative benchmark, the text indicates that the chemical is not considered a COPEC for terrestrial plants and invertebrates. However, the subsequent presentation of dose models presented in Appendix H.5 includes some of the COPECs (e.g., pentachlorophenol, 2,4-D) that were previously discussed as being below the alternative benchmark values. It is noted that the COPECs that are included in Appendix H.5 dose models are PBTs, and it is appropriate to calculate dose exposures for these compounds. However, the screening approach has not been clearly stated. It is recommended that the alternative benchmarks be presented with EDQLs in order to facilitate a relative comparison of each benchmark with its corresponding EDQL. Thus, the document would clearly indicate, in tabular format, which COPECs were above EDQLs, but below alternative benchmarks. The screening process should also be revised to clearly state that all PBT compounds will be retained and evaluated in upper trophic level dose models. Finally, as indicated in the following comments, the Step 3a refinement process should be eliminated from the SERA.

RESPONSE:

The comparison to alternate benchmarks are presented as the first step (Step 3a) of the BERA and not as the second tier of the SERA (Sections 4.7.5, 5.7.5, 6.7.5, and 7.7.5, titled Step 3A refinement). The Step 3a refinement was conducted as indicated above (see also response to comment above). Not all PBT compounds were retained for evaluation to upper trophic level vertebrates. Only those PBTs that exceeded the Region 5 EDQLs were evaluated by dose-modeling because Region 5 EDQLs were developed to account for bioaccumulation (see response to comment above). Finally, the Step 3a refinement has been identified as pertinent and acceptable to be included as an addition to the SERA by the U.S.EPA, the Navy, and TtNUS and has not been eliminated from the ERA. See second response to this comment. In addition, tables have been added to the ERAs for each SWMU that presents the chemical concentrations in surface soil, sediment, and surface water, the EDQLs, and alternate benchmarks (see Attachments 5 (Tables 4-28 through 4-30), 6 (Tables 5-28 through 5-30), 7 (Tables 6-28 through 6-30), and 8 (Tables 7-28 and 7-29)).

17. **It is indicated that the aquatic resources associated with each of the SWMUs are not considered viable aquatic ecosystems, and therefore no hazard quotients (i.e., EEQs) are calculated for surface water and sediment. However, it is noted that surface water from each of the SWMUs either discharges to a viable aquatic ecosystem, or provides a temporal aquatic resource for aquatic receptor. The SERA should be used to evaluate potential impacts to aquatic resources in order to ensure that there are no continuing sources of contamination to the downstream water bodies. It should be noted that temporal systems serve an important function in aquatic ecosystems which certain plants and amphibians specifically require for reproduction. It is recommended that the approach be revised to include a calculation and an evaluation of hazard quotients for surface water and sediment.**

RESPONSE:

EEQs were calculated for surface water and sediment. Tables 4-25, 5-25, 6-25, and 7-25 present the calculated EEQs using the Region 5 EDQLs for sediment. Tables 4-26, 5-26, 6-26, and 7-26 present the calculated EEQs using the Region 5 EDQLs for surface water. Additionally, sections 4.7.4.2, 5.7.4.2, 6.7.4.2, and 7.7.4.2 of the text present discussion of the results for the comparison of sediment chemical concentrations to the EDQLs, while sections 4.7.4.3, 5.7.4.3, 6.7.4.3, and 7.7.4.3 present a discussion of the results for the comparison of the surface water chemical concentrations to the EDQLs. No changes have been made to the document in response to this comment.

Additionally, food chain modeling has been conducted to evaluate upper trophic level birds and mammals. The approach indicates that exposures to birds and mammals through sediment and surface water exposures have not been included in the food chain models since it is assumed that the exposures from surface water and sediment would be negligible. However, it is noted that several chemicals are eliminated as COPECs in soil and only occur in surface water and sediment. The approach used may underestimate exposure and risk to chemicals that may have either been missed during soil sampling, or that may have migrated from soil into surface water and sediment. It is recommended that COPECs detected in surface water and sediment be included in the calculations of dose for birds and mammals.

RESPONSE:

Food chain modeling was performed for piscivorous species including the belted kingfisher (piscivorous bird) and the raccoon (piscivorous mammal). As presented in the exposure calculation equations in section 3.4.4.3 on page 3-76, chemicals detected in the surface water and sediment were included in the food-chain model. Tables 4-28, 5-28, 6-28, and 7-28 present the results of the food chain modeling for the piscivorous species using conservative input assumptions while Tables 4-30, 5-30, 6-30, and 7-30 present the results of the food chain modeling for the piscivorous species using average exposure assumptions. Additionally, sections 4.7.5.4, 5.7.5.4, 6.7.5.4, and 7.7.5.4 of the text present discussions of the results of the food chain modeling for all surrogate species, including piscivorous wildlife. Aside from changes that may have been made in response to other comments, no changes were made relative to this comment.

18. **The Nature and Extent of Contamination sections for each of the SWMUs (Sections 4.4, 5.4, 6.4, 7.4) indicate that no background samples were collected for groundwater, surface water, or sediment; rather a minimum of one "upgradient" sample was collected and used as background to compare analytes detected in sampled media to determine COPECs. However, organic constituents were detected in the background in either sediment or surface water samples, or both, at many of the sites, indicating that the area selected as background might not be representative of unimpacted conditions. The document should be amended to remove the background comparisons for inorganic constituents for surface water and sediment, and all inorganic constituents should be carried forward if they are above corresponding benchmark concentrations.**

RESPONSE:

See the response to comment 16 "SPECIFIC RFI COMMENTS".

19. **Statistical comparisons of background and investigative samples were conducted as specified in Section 3.1.6 (Methodology for Background Comparison, Page 3-13) and non-parametric analysis of variance (ANOVA) was the preferred method of comparison. However, the statistical approach that is currently presented as part of the SERA is more appropriately used in a baseline ecological risk assessment (BERA). The rationale for using statistical comparisons of this nature is not consistent with the conservative approach and recommendations for conducting a SERA. According to the 1997 U.S. EPA ERA guidance, the SERA should use the maximum concentrations present at a site in estimating exposures to ecological receptors. Therefore, in order to determine which chemicals may be COPECs, the maximum detected chemical values must be compared to either minimum or average background concentrations of the chemical, rather than a statistical comparison of data sets. Revise the RFI report to provide this type of comparison, which is consistent with U.S. EPA guidance.**

RESPONSE:

NSWC Crane disagrees that the site data should be compared to minimum or average background data. The maximum site concentrations for surface water or sediment compared to the upgradient concentrations, as was done for this investigation, is a conservative test.

Use of biased data is appropriate if the affect of the bias on the data use is understood and taken into account during analysis. Comparison of biased data results in a biased comparison. Use of the biased data in this case was conservative with a bias toward retaining COPCs.

Per the telephone conference held among representatives of U.S. EPA Region 5, the Navy, Tech Law, and TtNUS on October 9, 2002, no change has been made to the RFI report in response to this comment.

The statistical approach of comparing background and investigative samples may be presented and used for the BERA for the SWMUs. However, based on the 2001 U.S. EPA document, "Guidance for Characterizing Background Chemicals in Soil at Superfund Site - External Review Draft (EPA 540-R-01-003, OSWER 9285.7-41)," statistical testing may not be used for data that has been collected in a judgemental fashion. Therefore, a statistical approach for background comparisons to investigative data should only be used on sites where an unbiased sampling design was used. It is recommended that the determination of COPECs be based on comparisons of maximum investigative concentrations and average or minimum background concentrations at sites where biased sampling occurred. This revision should also be applied to the ERA process for SWMUs 4, 5, 9, and 10.

RESPONSE:

This is addressed in the first response to this comment. Please refer to the response to the first portion of this comment.

20. **The Site Investigation sections for each of the SWMUs (Sections 4.2, 5.2, 6.2, and 7.2), indicate that soil media was sampled at two depths, surface soil from zero to two feet bgs, and subsurface soil from two feet bgs to no greater than ten feet bgs. However, the surface soil interval used to evaluate ecological exposures is typically considered to be within the zero to 0.5 feet bgs. The 0.05 to two feet bgs exposure zone is typically considered as the subsurface soil matrix, which is the assumed maximum depth that mammals will burrow. The combination of data from zero to two feet bgs may underestimate risk by extrapolating a chemical concentration across the entire sampling column. Revise this section and subsequent sections that rely on the soils data to reflect the zero to 0.5 feet bgs and 0.5 to two**

feet bgs exposure zones. If data are lacking, provide a detailed discussion of this information as a data gap.

RESPONSE:

The surface soil samples comply with the definition of surface soil in the approved QAPP. Also, ecological receptors such as worms and plant roots may extend deeper than 0.5 feet into the soil, so risks are not necessarily being underestimated by combining data over the 0 to 2 foot range. The following discussion has been added as the last paragraph in section 1.3.4.2 to discuss some of the uncertainties associated with the interval that was sampled:

"Surface soil was collected from the 0' to 2' bgs depth interval. Background surface soil data were collected from 0' to 1' bgs depth interval as a compromise depth for all NSWC Crane projects for which a variety of surface soil depths may be used. There is uncertainty in this approach depending on the source of contamination and how it was disposed at the site (i.e., deposited on the surface as a result of burning activities, buried, etc.) because the two different depth intervals represent slightly different soil populations. However, the uncertainty was not viewed to be unnecessarily large given all of the other uncertainties associated with environmental investigations."

21. **The Nature and Extent of Contamination sections indicate that historical data for the SWMUs may be available (e.g., second paragraph on page 4-6). However, the data is not used for the discussion of nature and extent, nor does this data appear to be used in the COPC screening or in dose modeling. It is not appropriate to eliminate historical data, as this information can be useful in investigating ecological risk at the site. Revise the RFI report to include a discussion of historical data, and, if the data are acceptable and appropriate, incorporate the data into the SERA to be used with the current data set.**

RESPONSE:

Historical data was not used quantitatively in the ERA because of previously raised U.S. EPA questions regarding historical data quality. When historical data was used, it was used in a qualitative fashion (i.e., is in accord with the Quality Assurance Project Plan and past practices for NSWC Crane investigations involving historical data of questionable or uncertain pedigree) to aid in evaluating the nature and extent of contamination.

SPECIFIC ECOLOGICAL RISK ASSESSMENT COMMENTS:

22. **Section 3.4, Ecological Risk Assessment Methodology. The methodology combines several aspects of a screening-level risk assessment with methods that are more appropriately conducted during a BERA. Most significantly, the objectives SERA have not been clearly established, and the scientific management decision point (SMDP) that is recommended to be presented at the completion of the SERA in both the 1997 EPA ERA guidance and the Navy's ERA method (see Figure 3-1), has not been clearly presented. Revise the document to include a clear presentation of the SMDP that culminates EPA Steps 1 and 2 of the SERA. Also see the subsequent "Step 3a" comment regarding this issue.**

RESPONSE:

In accordance with U.S. EPA and Navy Ecological Risk Assessment Policy, a SMDP can be made after Step 2 to determine the need for additional evaluation of the data. However, it is very rare that a site can exit the ERA process after only the screening steps because the chemical concentrations will almost always be above some of the screening levels. Therefore, the first step of the BERA (the Step 3a re-evaluation) is usually conducted immediately after the SERA and included in the same report as the SERA to expedite the ERA process. That is why the third paragraph in Section 11.0 of the work plan indicated that the "SERA will consist of the first two (plus Step 3a) of eight steps required by the Environmental Protection Agency (EPA) guidance (EPA, 1997 and 1998) and the Navy Policy for Conducting Ecological Risk Assessments (Navy, 1999)." The second paragraph of 3.4.1 (Introduction to the Ecological Risk Assessment Methodology) has been re-worded to say: *"This*

SERA consists of the first two of the eight steps required by the U.S. EPA guidance (U.S. EPA, June 1997 and April 1998) and the Navy Policy for Conducting Ecological Risk Assessments. Figure 3-1 presents the Navy's ecological risk assessment tiered approach. The first two steps are the screening-level assessment. Step 3a is the first step of the Baseline Ecological Risk Assessment (BERA) and consists of refining the list of COPCs that are retained following the SERA This step further refines the screening-level risk assessment and has been included in this ERA." Therefore, the Step 3a refinement has not been eliminated from the ERA. As agreed to in the subsequent conference calls with U.S. EPA (TechLaw), the risk assessment has been modified to include a SMDP section between Step 2 and Step 3a in the ERA (see Attachment 5 (Section 4.7.5), Attachment 6 (Section 5.7.5), Attachment 7 (Section 6.7.5), and Attachment 8 (Section 7.7.5).

23. **Section 3.4.2.4.1, Assessment Endpoints. The fifth paragraph on page 3-69 states that larger carnivorous mammals are not examined in this SERA due to the fact that the sites are small and below the home and feeding ranges typical of carnivorous mammals. However, the consideration of home and feeding ranges, or Area Use Factors (AUFs) are typically addressed within the BERA. While it is agreed that the adjustment of AUFs will result in lower estimated risks to larger carnivorous receptors at specific sites, exposure and potential for risk should still be documented. The SERA should include a conservative examination of a representative for each functional feeding guild that may potentially use the site. Therefore, upper trophic level species (i.e., large carnivorous mammals) should be examined during the SERA using these conservative assumptions (e.g., 100% AUF, 100% consumption of the most contaminated food item) to document if risk to these receptors is possible. Revise the SERA to examine risk to large carnivorous mammals using conservative assumptions.**

RESPONSE:
As indicated during discussions and e-mails with the Navy (TtNUS) and U.S. EPA (TechLaw) the usefulness of the food chain modeling to the hawk and fox is very limited because of the high amount of uncertainty involved in predicting small mammal tissue concentrations and because of the large home range of hawks and foxes compared to the size of the SWMUs. As discussed in the various e-mails between the Navy (TtNUS) and U.S. EPA (TechLaw), a section has been added to the uncertainty analysis sections for the individual SWMUs to discuss the uncertainties associated with not conducting food chain modeling for the upper trophic level receptors (i.e., large carnivorous mammals). See Attachment 5 (Section 4.7.7), Attachment 6 (Section 5.7.7), Attachment 7 (Section 6.7.7), and Attachment 8 (Section 7.7.7).

24. **Section 3.4.4, Step 3a - Refinement of the Screening. This section contains information on the Navy's Step 3a, which is similar to the first step in the BERA as described by the 1997 EPA ERA guidance. The document states that Step 3a is conducted after the completion of the ecological screening using Region 5 EPA EDQLs to determine COPECs. It is indicated that the Step 3a refinement screening process includes an evaluation of the maximum detected and average detected media concentrations compared to benchmark values that present average risk at the SWMUs, an examination of the magnitude of criterion exceedance, frequency of chemical detection, contaminant bioavailablity, and available habitat. However, this approach follows neither the 1997 EPA ERA guidance nor the Figure 3-1 flow chart presented in the document, titled Navy's Ecological Risk Assessment Tiered Approach, NSWC Crane, Crane Indiana (page 3-183). Both the EPA and Navy guidance documents indicate that exposure estimates and risk calculation are completed as part of the SERA (i.e., prior to the refinement of COPECs). Most recent EPA guidance (U.S. EPA 1997) specifically states that the SERA does not provide definitive estimates of actual risk, generate cleanup goals, and is not usually based on site-specific assumptions. It should be noted that the purpose of the SERA is to assess the need, and if required, the level of effort necessary to conduct a BERA. Therefore, the Step 3a refinement of COPECs should only occur as part of the BERA. Revise the screening approach to eliminate the refinement of the screening process, and conduct Steps 1 and 2 in accordance with EPA guidance, using conservative estimates for screening and**

exposure modeling in order to determine potential risk to ecological receptors. The information should be presented in a manner to allow for all risk managers to support the SMDP.

RESPONSE:
TtNUS disagrees that the ERA approach did not follow the 1997 EPA guidance and the Navy's Ecological Risk Assessment Tiered Approach. Both documents were followed in estimating exposure and calculating risks by the comparison of all maximum detected concentrations to the Region 5 EDQLs. Steps 1 and 2 of the ERA, therefore, have been conducted using conservative estimates and exposure modeling in order to determine the potential risks to ecological receptors. Definitive estimates of actual risk and site-specific assumptions were not included as part of Steps 1 and 2 of the ERA process (i.e., SERA). Finally, the Step 3a refinement has been identified as pertinent and acceptable to be included as an addition to the SERA, by the U.S. EPA, the Navy, and TtNUS and has not been eliminated from the ERA. As agreed to in the subsequent conference calls with U.S. EPA (TechLaw), the risk assessment has been modified to include a SMDP section between Step 2 and Step 3a in the ERA (see Attachment 5 (Section 4.7.5), Attachment 6 (Section 5.7.5), Attachment 7 (Section 6.7.5), and Attachment 8 (Section 7.7.5).

25. **Section 3.4.4.2, Terrestrial Food Chain Modeling. A toxicity/body weight extrapolation equation is used for mammals, based on Sample et al., 1996, and involves the use of a metabolic scaling factor of 0.25. More recent publications [Sample, B. and C. Arenal 1999, Allometric Models for Interspecies Extrapolation of Wildlife Toxicity Data (Bull Environ Contam Toxicol 62: 653-663)] indicate that the use of the metabolic scaling factor may not be appropriate for toxicity/body weight extrapolation factors. It is recommended that the toxicity/body weight equation be performed without the use of the scaling factor. Alternately, two equations could be used, one with the scaling factor applied, and one without, for comparison.**

RESPONSE:
The body weight scaling was in the risk assessment because it was agreed upon with the U.S. EPA Region 5 ecological risk assessor and because body weight scaling is used to calculate the EDQLs. However, based on current U.S. EPA region 5 guidance, the ERA has been revised to remove the scaling factor of 0.25 from the toxicity/body weight extrapolation equation used for mammals; the food chain modeling is not presented both with and without the body weight scaling factors.

26. **Section 4.7.5.1, Terrestrial Plants and Invertebrates. It is stated in section 4.7.2 (Potential Ecological Receptors and Exposure Pathways, page 4-41) that soil invertebrates and terrestrial vegetation will be used as assessment endpoints. However, this section does not clarify which benchmark was used for the selection of COPECs, or whether COPEC selection was based on plants or terrestrial invertebrate soil benchmarks. Both receptors are to be used as assessment endpoints, and therefore both EEQs should be presented and discussed for these assessment endpoints. Plants and soil invertebrate EEQs should be calculated for each chemical that was retained in initial COPC selection process. Revise the RFI report to include an evaluation of both plants and soil invertebrates to document any potential risk associated with the plant and terrestrial invertebrate communities at the sites. In addition, provide the plant and invertebrate EEQs in table form with Tables 4-27 through 4-30.**

RESPONSE:
As indicated in the response to Comment Number 16, EDQLs are based on the lower of the potential effects to plants, invertebrates, or wildlife. However, U.S. EPA Region 5 has not indicated the specific endpoint associated with each EDQL. It would not be practical to calculate EEQs for plants and invertebrates for each chemical for the following reasons:

- The endpoints for the soil contact Canadian Soil Quality Guidelines (which are used as alternate benchmarks for plants and invertebrates) are based on effects to either plants or invertebrates. There are not separate values for plants or invertebrates.
- The endpoints for the Dutch values (which are used as alternate benchmarks for plants and invertebrates) are based on ecosystem risks. There are not separate values for plants or invertebrates.
- Many of the alternate benchmark data are values from various toxicity test studies in the literature. These data are specific to plants and invertebrates but often times the concentration range for effects overlaps with the concentration range for non-effects. Therefore, presenting this information in tabular format would be confusing without the accompanying text to describe the toxicity test.
- Oak Ridge National Laboratory does have separate values for plants and invertebrates, however, the values are limited to only a few chemicals. Therefore, it does not appear to be useful to present only these data in tabular format.

In summary, based on the above rationale, the Navy has not provided the plant and invertebrate EEQs in tabular form.

27. **<u>Section 4.8, Conclusions.</u> SWMU 4 is recommended No Further Action (NFA) for all assessment endpoints (see Table ES-1, page ES-7). This conclusions section provides the only justification for this recommendation as follows:**

- **risk to plants and soil invertebrates is expected to be low based on the fact that few alternate guidelines or toxicity data are exceeded**
- **risk to aquatic receptors is expected to be low based on the low chemical concentrations based on comparison to screening levels or alternate benchmarks and poor available habitat based on habitat size**
- **risks to wildlife is expected to be low or negligible**

These statements have been made in support of NFA at the site, however, the proposal of NFA has not been supported by site-specific risk characterization. Neither adequate documentation nor proper discussion is provided on potential impacts to standard or sensitive receptors at the site based on the results of dose modeling and resulting EEQs. Additional site-specific and receptor-specific information should be provided in order to facilitate risk management decisions regarding these sites.

RESPONSE:
The last paragraphs of sections 4.7.5.1 (soil), 4.7.5.2 (sediment), 4.7.5.3 (surface water), and 4.7.5.4 (terrestrial food chain modeling), present the summaries of risks after the step 3a refinement that were used to determine the conclusions in section 4.8. Therefore, this information was not reiterated in section 4.8. However, the discussions in sections 4.7.5.1 through 4.7.5.4 (now renumbered as sections 4.7.6.1 through 4.7.6.4 because of the addition of the SMDP as section 4.7.5) have been revised to provide more justification for the conclusions reached in section 4.8 (now 4.9). See Attachment 5 for the revised ERA for SWMU 4.

For example, risk to the American Robin is present at the site, based on exposure to zinc and on conservative calculations of the EEQ for both a NOAEL (21) and LOAEL (2.4) (Table 4-27). The use of less conservative parameters and assumptions to calculate EEQs shows that risk is still present based on a NOAEL (3.4) (Table 4.29). This trend holds true for additional COPECs and receptors at SWMU 4, and clearly indicates that risk is indeed present at the site. However, no information is provided to indicate where HQ exceedances occurred for the robin within SWMU 4. Revise this section to discuss risk to ecoreceptors with regard to specific hazard quotient exceedances (i.e., HQ greater than 1) at each area sampled at SWMU 4.

RESPONSE:
The risks to the robin, and other wildlife species using less conservative parameters and assumptions are based on average chemical concentrations in the various media. Risks are not calculated for every individual sample location because wildlife species are not only exposed to single points. However, in instances where maximum detections are biasing the average concentrations, average concentrations may be recalculated by removing that sample point to gain some perspective on the overall risks at the site. See response to first part of this comment.

In addition, the line of evidence that aquatic habitats at SWMU 4 are poor due to size has not been supported. The Checklist for Ecological Assessment/Sampling, located in Appendix H, shows that the aquatic system contains very good habitat, with a very heterogeneous mixture of substrates with sufficient depth and width and acceptable water quality parameters. It is stated that no aquatic life was noted, however, no information is given as to how thorough an investigation was conducted in determining the presence/absence of aquatic species. Small order streams can provide ample habitat for aquatic plants, smaller fish species, mussels and other aquatic invertebrates, which both terrestrial and aquatic receptors may use as food resources. It should be noted that the stream was examined in March, which could very well explain why no aquatic life was examined. Therefore, it appears that this aquatic habitat is suitable habitat, and the result of the assessment of risk to aquatic receptors cannot be dismissed based on the size or quality of the habitat present. Revise the RFI report to calculate risk to aquatic receptors, and model the uptake of aquatic receptors by terrestrial receptors for SWMU 4.

RESPONSE:
As discussed in Section 4.7.6.2.1, the poor habitat is referring to the southern drainageway, which is intermittent, not to Culpepper Branch which is located on the northern side of the site. The checklist for Ecological Assessment/Sampling in Appendix H indicates that surface water flow would probably only occur during extended periods of heavy rain and spring thaw in the intermittent drainageway in the southern portion of the site. This would therefore be considered fairly poor habitat for benthic invertebrates because the natural stressors such as drying out would likely cause more harm to the benthic receptors than the chemicals in the drainageway. Although some of the drainageways adjacent to SWMU 4 are small, risks to aquatic receptors were calculated for SWMU 4. See response to Comment 17 "SPECIFIC RFI COMMENTS."

28. **<u>Section 5.8, Conclusions.</u> SWMU 5 is recommended NFA for all assessment endpoints with the exception of the plant and soil invertebrate pathway (see Table ES-1 page ES-8). This conclusions section provides the only justification for this recommendation as follows:**

- **risk to aquatic receptors is expected to be low based on the low chemical concentrations based on comparison to screening levels or alternate benchmarks and poor available habitat based on habitat size**
- **risks to wildlife is expected to be low or negligible**

These statements have been made in support of NFA at the site for all receptors with the exception of plants and terrestrial invertebrates, however, the proposal of NFA has not been supported by site-specific risk characterization. Neither adequate documentation nor proper discussion is provided on potential impacts to standard or sensitive receptors at the site based on the results of dose modeling and resulting EEQs. Additional site-specific and receptor-specific information should be provided in order to facilitate risk management decisions regarding these sites.

RESPONSE:
The last paragraphs of sections 5.7.5.1 (soil), 5.7.5.2 (sediment), 5.7.5.3 (surface water), and 5.7.5.4 (terrestrial food chain modeling), present the summaries of risks after the Step 3a refinement that

were used to determine the conclusions in section 5.8. Therefore, this information was not reiterated in section 5.8. However, the discussions in sections 5.7.5.1 through 5.7.5.4 (now renumbered as sections 5.7.6.1 through 5.7.6.4 because of the addition of the SMDP as section 5.7.5) have been revised to provide more justification for the conclusions reached in section 5.8 (now 5.9). See Attachment 6 for the revised ERA for SWMU 5.

For example, risk to the short-tailed shrew is present at the site, based on exposure to antimony, based on conservative calculations of the EEQ for both a NOAEL (26,000) and LOAEL (2,600) (Table 5-27). The use of less conservative parameters and assumptions to calculate EEQs shows that risk is still present based on a NOAEL (260) and a LOAEL (26) (Table 5.29). This trend holds true for additional COPECs and receptors at SWMU 5, and clearly indicates that risk is indeed present at the site. However, no information is provided to indicate where HQ exceedances occurred for the shrew and other receptors within SWMU 5. Revise this section to discuss risk to ecoreceptors with regard to specific hazard quotient exceedances (i.e., HQ greater than 1) at each area sampled at SWMU 5.

RESPONSE:
See second response to Comment 27 "SPECIFIC ECOLOGICAL RISK ASSESSMENT COMMENTS." Also, see response to first part of this comment.

In addition, the line of evidence that aquatic habitats at SWMU 5 are poor due to size has not been supported. The Checklist for Ecological Assessment/Sampling, located in Appendix H, shows that the aquatic system contains good habitat, with potential perennial flow, fair substrates, with sufficient depth and width and acceptable water quality parameters. It is stated that no aquatic life was noted, however, no information is given as to how thorough an investigation was conducted in determining the presence/absence of aquatic species. Small order streams can provide ample habitat for aquatic plants, smaller fish species, mussels and other aquatic invertebrates, which both terrestrial and aquatic receptors may use as food resources. It should be noted that the stream was examined in March, which could very well explain why no aquatic life was examined. Therefore, it appears that this aquatic habitat is suitable habitat, and the result of the assessment of risk to aquatic receptors cannot be dismissed based on the size or quality of the habitat present. Revise the document to calculate risk to aquatic receptors, and model the uptake of aquatic receptors by terrestrial receptors for SWMU 5.

RESPONSE:
As discussed in Section 5.7.6.2.2, the summary indicates that "There may be some risks to aquatic organisms from dioxins and vinyl chloride. However, because of the poor habitat in the drainageway, risks to aquatic life are expected to be minor." As indicated from the checklist for Ecological Assessment/Sampling in Appendix H, perennial surface water flow would possibly occur in one area, with the water being intermittent in the other drainageways. Therefore, most of the aquatic habitat would be considered fairly poor for benthic invertebrates because the natural stressors such as drying out would likely cause more harm to the benthic receptors than the chemicals in the drainageways. Although some of the drainageways adjacent to SWMU 5 are small, risks to aquatic receptors were calculated for SWMU 5. See response to Comment 17 "SPECIFIC RFI COMMENTS."

29. **<u>Section 6.8, Conclusions.</u> SWMU 9 is recommended NFA for all assessment endpoints (see Table ES-1 page ES-9). This conclusions section provides the only justification for this recommendation as follows:**

- **risks to plants and invertebrates are expected to be low based on few exceedances of alternate benchmarks**

- **risk to aquatic receptors is expected to be low based on the low chemical concentrations based on comparison to screening levels or alternate benchmarks and poor available habitat based on habitat size**
- **risks to wildlife is expected to be low or negligible**

These statements have been made in support of NFA at the site for all receptors, however, the proposal of NFA has not been supported by site-specific risk characterization. Neither adequate documentation nor proper discussion is provided on potential impacts to standard or sensitive receptors at the site based on the results of dose modeling and resulting EEQs. Additional site-specific and receptor-specific information should be provided in order to facilitate risk management decisions regarding these sites.

RESPONSE:
The last paragraphs of sections 6.7.5.1 (soil), 6.7.5.2 (sediment), 6.7.5.3 (surface water), and 6.7.5.4 (terrestrial food chain modeling), present the summaries of risks after the Step 3a refinement that were used to determine the conclusions in section 5.8. Therefore, this information was not reiterated in section 6.8. However, the discussions in sections 6.7.5.1 through 6.7.5.4 (now renumbered as sections 6.7.6.1 through 6.7.6.4 because of the addition of the SMDP as section 6.7.5) have been revised to provide more justification for the conclusions reached in section 6.8 (now 6.9). See Attachment 7 for the revised ERA for SWMU 9.

For example, risk to the raccoon is present at the site, based on exposure to aroclor-1248, based on conservative calculations of the EEQ for both a NOAEL (130) and LOAEL (13) (Table 6-27). The use of less conservative parameters and assumptions to calculate EEQs shows that risk is still present based on a NOAEL (22) and a LOAEL (2.2) (Table 6-29). This trend holds true for additional COPECs and receptors at SWMU 5, and clearly indicates that risk is indeed present at the site. However, no information is provided to indicate where HQ exceedances occurred for the raccoon and other receptors within SWMU 9. Revise this section to discuss risk to ecoreceptors with regard to specific hazard quotient exceedances (i.e., HQ greater than 1) at each area sampled at SWMU 9.

RESPONSE:
See second response to Comment 27 "SPECIFIC ECOLOGICAL RISK ASSESSMENT COMMENTS." Also, see response to first part of this comment.

In addition, the line of evidence that aquatic habitats at SWMU 9 are poor due to size has not been supported. Although the Checklist for Ecological Assessment/Sampling, located in Appendix H, shows that the aquatic system contains only minimal habitat, the stream does drain to other aquatic habitats and could represent a continuing source of contamination. It is stated that no aquatic life was noted, however, no information is given as to how thorough an investigation was conducted in determining the presence/absence of aquatic species. It should be noted that the stream was examined in March, which could very well explain why no aquatic life was examined. Therefore, although it is agreed that aquatic habitat is minimal at this site and may only support a limited invertebrate population, the site should be examined due to the potential for contaminant migration to larger more complex aquatic habitats. Revise the RFI report to calculate risk to aquatic receptors, and model the uptake of aquatic receptors by terrestrial receptors for SWMU 9.

RESPONSE:
Although some of the drainageways adjacent to SWMU 9 are small, risks to aquatic receptors were calculated for SWMU 9. Based on the results of the ERA it was determined that risks to aquatic receptors would be low, if present. See response to Comment 17 "SPECIFIC RFI COMMENTS."

30. <u>Section 7.8, Conclusions.</u> **SWMU 10 is recommended NFA for all assessment endpoints (see Table ES-1 page ES-10). This conclusions section provides the only justification for this recommendation as follows:**

- **risks to plants and invertebrates are expected to be low based on few exceedances of alternate benchmarks**
- **risk to aquatic receptors is expected to be low based on the low chemical concentrations based on comparison to screening levels or alternate benchmarks and poor available habitat based on habitat size**
- **risks to wildlife is expected to be low or negligible**

These statements have been made in support of NFA at the site for all receptors, however, the proposal of NFA has not been supported by site-specific risk characterization. Neither adequate documentation nor proper discussion is provided on potential impacts to standard or sensitive receptors at the site based on the results of dose modeling and resulting EEQs. Additional site-specific and receptor-specific information should be provided in order to facilitate risk management decisions regarding these sites.

RESPONSE:
The last paragraphs of sections 7.7.5.1 (soil), 7.7.5.2 (sediment), 7.7.5.3 (surface water), and 7.7.5.4 (terrestrial food chain modeling), present the summaries of risks after the Step 3a refinement that were used to determine the conclusions in section 7.8. Therefore, this information was not reiterated in section 7.8. However, the discussions in sections 7.7.5.1 through 7.7.5.4 (now renumbered as sections 7.7.6.1 through 7.7.6.4 because of the addition of the SMDP as section 7.7.5) have been revised to provide more justification for the conclusions reached in section 7.8 (now 7.9). See Attachment 8 for the revised ERA for SWMU 10.

For example, risk to the meadow vole is present at the site, based on exposure to HMX, based on conservative calculations of the EEQ for both a NOAEL (27) and LOAEL (11) (Table 7-27). The use of less conservative parameters and assumptions to calculate EEQs shows that risk is still present based on a NOAEL (4.5) and a LOAEL (1.8) (Table 7-29). This trend holds true for additional COPECs and receptors at SWMU 5, and clearly indicates that risk is indeed present at the site. However, no information is provided to indicate where HQ exceedances occurred for the raccoon and other receptors within SWMU 10. Revise this section to discuss risk to ecoreceptors with regard to specific hazard quotient exceedances (i.e., HQ greater than 1) at each area sampled at SWMU 10.

RESPONSE:
See second response to Comment 27 "SPECIFIC ECOLOGICAL RISK ASSESSMENT COMMENTS." Also, see response to first part of this comment.

In addition, the line of evidence that aquatic habitats at SWMU 10 are poor due to size has not been supported. The Checklist for Ecological Assessment/Sampling has not been submitted in Appendix H for this site. In addition, Section 7.2 (Site Investigation, Page 7-2) indicates that there are several drainages located at SWMU 10. Therefore, it appears that this aquatic habitat is suitable habitat, and the result of the assessment of risk to aquatic receptors cannot be dismissed based on the size or quality of the habitat present. Revise the RFI report to calculate risk to aquatic receptors, and model the uptake of aquatic receptors by terrestrial receptors for SWMU 10.

RESPONSE:
The text does not indicate that the sampling habitats are poor due to size. Although some of the drainageways adjacent to SWMU 9 are small, risks to aquatic receptors were calculated for SWMU 10. See response to Comment 17 "SPECIFIC RFI COMMENTS."

DATA QUALITY COMMENTS:

GENERAL DATA QUALITY COMMENT

1. **Section 3.1.4.2 indicates that "data were qualified based on lab blank contamination, calibration, holding time, linear range exceedance, percent difference between columns, inductively coupled plasma (ICP) serial dilution, and ICP interferences." In addition, only blanks and holding time exceedances are discussed in any detail in Section 3.1.4.2. However, this discussion does not specify the samples affected, extent of the holding time exceedance, etc. Therefore, the information contained in Section 3.1.4.2 of the RFI report is insufficient to evaluate the quality of the analytical data. In order to provide some level of assurance that the data have been validated and qualified correctly, the following information should be provided.**

   - **A complete list of all quality control (QC) parameters evaluated for each analytical method.**
   - **The acceptance criteria used to evaluate all of the required QC parameters. This information should be provided in the data quality discussion and not referenced to another document such as laboratory standard operating procedures (SOPs), analytical methods, National Functional Guidelines for Data Review, quality assurance project plan (QAPP), etc.**
   - **A brief discussion indicating if each of these QC parameters, broken down by method, did or did not meet acceptance criteria.**
   - **The extent of all QC exceedances.**
   - **A discussion of the qualifiers applied based on the QC exceedances or the justification for not qualifying the analytical data.**
   - **A list of samples affected by each QC exceedance.**

   Alternatively, the RFI report could be revised to include the data validation reports (DVRs), providing that they contain this level of detail.

RESPONSE:

1. As discussed on September 27, 2002 via telephone conference, inclusion of data validation (DV) letters would add hundreds of pages to the report while adding little or no value to the RFI report. However, DV letters are kept on file and are available for review upon request. All qualified data, including the rejected data, are identified in the Appendix E tables of the RFI report. Rejected data, in particular, are also tabulated in Section 3.0 of the report.

   There have been no revisions to the RFI report based upon this comment.

2. NSWC Crane disagrees that affected samples referenced in the discussion of Section 3.1.4.2 are not identified. Tables 3-7 through 3-11 identify specific samples, analytical fractions, and analytes that are rejected, the reasons for the rejection, and a summary of the overall data qualification rates and the reasons for qualification. These tables are referenced in Sections 3.1.2.3 and 3.1.4.1 of the RFI report. Tables 3-7 through 3-11 are complementary to Table 3-4, which also presents rates of qualification for reasons not covered in Tables 3-7 through 3-11. The complementary relationship of Tables 3-7 through 3-11 to Table 3-4 is now indicated because the first line of the title of each table (3-7 through 3-11) has been changed to read as follows:

   "RATES OF QUALIFICATION (SUPPLEMENT TO TABLE 3-4)"

In addition, the first paragraph of Section 3.1.4.21 has been revised to read:
"A summary of the data validation results for the analytical data effort is provided in the remainder of this section. Table 3-11 presents the rates of qualification for those parameters not addressed in Section 3.1.2, Table 3-4. Qualification rates in Table 3-11 represent data that were qualified

based on lab blank contamination, calibration, holding time, linear range exceedance, percent difference between chromatographic columns, inductively coupled plasma (ICP) serial dilution, and ICP interferences.

3. NSWC Crane disagrees that the information provided is insufficient to evaluate data quality. Per the September 27, 2002 telephone conference, if the U.S. EPA Region V should have specific data quality concerns, additional information may requested to address the specific concerns, otherwise, the information provided is sufficient to evaluate the data quality.

   No revisions have been made with regard to the level of information provided other than as stated above.

SPECIFIC DATA QUALITY COMMENTS

16. **Section 3.1.2.3, Completeness. The RFI report states that four surface water pesticide/PCB samples from SWMU 4 were rejected due to holding time exceedances. This section should be revised to include a brief statement discussing why these samples were not recollected.**

RESPONSE:

The following text has been added to Section 3.1.2.3 (immediately prior to the second-to-last sentence):

"The impact of this situation is described in more detail in Sections 3.1.4.2 and 4.4.4. "

The following text has also been inserted at the end of the last paragraph of 3.1.4.2:

"Further detail is provided in Section 4.4.4 Surface Water."

Finally, an additional text change was also made to Section 4.4.4 and is described in the response to Comment 20 of "SPECIFIC DATA QUALTITY COMMENTS." Please refer to that comment.

17. **Section 3.1.4.2, Summary. The RFI report states that soil pH was not analyzed within holding times, and the pH values could be incorrect. The report also indicated that if accurate pH values are needed in the future, consideration should be given to re-collecting samples for pH analysis. However, the tables in Appendix E report pH values for several samples that are qualified with a "J", indicating an estimated value. To avoid potential confusion in the future, the pH values contained in Appendix E should be revised and qualified with an "R", indicating that the data is unusable.**

REPONSE:

A holding time for pH in soils is not documented in the literature. The soil pH reading is to be performed as soon as possible after the sample arrives at the laboratory. The aqueous pH holding time of 24 hours has been applied to soils as a guideline for data validation only. Therefore, for clarification, the 5th sentence of the 2nd paragraph in Section 3.1.4.2 has been replaced with the following text:

> *"Nevertheless, the data user should be aware that pH was analyzed from 14 to 17 days after collection and; therefore, the pH values are estimated (J qualifier). The expected effect, if any, would be a depression of pH values from absorption of atmospheric gases such as carbon dioxide. This effect may be insignificant in soil samples, which have a natural pH buffering capacity."*

The sentence after this change has been revised to read as follows:

> "If *more* accurate pH values are needed in the future, consideration should be given to re-collecting samples for pH analysis."

18. **Section 3.1.4.2, Summary. The RFI report states that the laboratory did not analyze the cyanide samples within the required holding time. There is no discussion of the data qualification required due to sample analysis outside of the required holding times. The tables in Appendix E show that a majority of the cyanide results are qualified with a "J". The RFI report should be revised to include a discussion of the cyanide data qualification.**

REPONSE:

The 8th sentence of the 2nd paragraph in Section 3.1.4.2 has been replaced with the following text:

"The U.S. EPA Functional Guidelines for data validation allow for professional judgement during the data validation process in determining the data validation qualifier, especially in cases where sample preparation or analyses are conducted beyond the specified holding time but do not exceed twice the holding time. Aqueous cyanide samples have a 14-day extraction and analysis holding time. The cyanide samples were extracted but not analyzed within the 14-day holding time. All cyanide extracts that exceeded the analysis holding time were analyzed within 20 days (e.g., less than 28-day or twice the holding time). Because all cyanide samples were properly preserved and stored and did not grossly exceed the cyanide sample holding time (e.g., less than twice the holding time), in the professional judgement of the data validator, the cyanide data validation qualifier was 'J' (e.g., the laboratory-reported concentration was considered to be an estimate of the true concentration)."

19. **<u>Section 3.1.4.2, Summary.</u> The RFI report states that surface water samples for semivolatile and pesticide/PCB analysis from SWMU 4 also had a high rate of qualification due to holding time exceedances: 55 percent and 67 percent, respectively. However, there is no discussion of the data qualification required due to the holding time exceedances. The RFI report should be revised to include a discussion of the semivolatile and pesticide/PCB data qualification.**

REPONSE:

The 2nd sentence of the 8th paragraph in Section 3.1.4.2 has been replaced with the following text:

"The U.S. EPA Functional Guidelines for data validation allow for professional judgement during the data validation process in determining the data validation qualifier, especially in cases where sample preparation or analyses are conducted beyond the specified holding time but do not exceed twice the holding time. Aqueous semivolatile and pesticide/PCB samples have a 7-day extraction and 40-day analysis holding time. The semivolatile and pesticide/PCB samples were not extracted within the 7-day holding time but were analyzed within the 40-day holding time. All semivolatile and pesticide/PCB extracts that exceed the extraction holding time were extracted within 14 days (e.g., less than twice the holding time). Because all semivolatile and pesticide/PCB samples were properly preserved and stored and did not grossly exceed the extraction sample holding time (e.g., less than twice the holding time), in the professional judgement of the data validator, the semivolatile and pesticide/PCB data validation qualifier was 'J' (e.g., the laboratory-reported concentration was considered to be an estimate of the true concentration)."

The last two sentences of Section 3.1.4.2 have been replaced with the following text:

"Prioritization of the parameters of interest was used to minimize qualification of the data, thus avoiding the necessity of resampling."

20. **<u>Section 3.1.4.2, Summary.</u> With regard to the holding time exceedances, the RFI report states that Tetra Tech NUS, Inc. (TtNUS) worked with the laboratory to prioritize the parameters of interest and minimize qualification of the data. TtNUS was able to avoid the necessity of resampling the data points by implementing this prioritization. Specifically, the pesticide/PCB data for four surface water samples was qualified "R", unusable. The RFI report should be revised to include a discussion of why resampling was not necessary when the data collected was unusable.**

REPONSE:

Additional text has been added at the end of the 8th paragraph in Section 3.1.4.2 as follows:

"For additional details on resampling prioritization, see Section 4.4.4 of this document."

For further clarification, the text in Section 4.4.4 Subsection Pesticides/PCBs has been revised to read as follows:

"No pesticides or PCBs were detected in SWMU 4 surface water samples. Pesticide/PCB results for one upgradient (04SW0101), two SWMU 4 (04SW0201 and 04SW0301), and one field duplicate surface water (04SW0301-D) samples were rejected because they were extracted after the holding time had expired. However, none of these four samples exhibited detectable concentrations of either pesticides or PCBs (e.g., non-detect). Because pesticides and PCBs are persistent chemicals that are resistant to degradation, this non-detection suggests that had there been any occurrence of these chemicals, it would have been at low concentration (e.g., below detection limits) in the surface water. Furthermore, detection of these compounds only occurred in a few isolated surface and subsurface soil locations that are a far enough distance from or at a sufficient depth that they would not have any effect on Culpepper Branch Creek associated with surface run-off or subsurface migration. It is highly unlikely that pesticides/PCBs that are associated primarily with suspended sediment would be detected in the surface water; therefore, it was not necessary to collect additional surface water samples for pesticide/PCB analysis."

PART II, Responses to Human Health Risk Assessment Comments, dated February 12, 2003

Note: Comment numbers have been added by the Navy to facilitate cross-referencing.

In general, this reviewer found the Report to be clear and comprehensive in its description of the sampling results, the risk-based screening procedures, the selection of COPCs, and the development of the risk assessments.

General Comment GC-1:

Section 3.3.1.2 Determination of Site-Related Chemicals

This Section states that the site-wide soil background studies (2000, 2001) were used as the basis for data on naturally occurring levels of inorganics in several soil types. Inorganic constituents detected at SWMUs at concentrations not significantly different from site background levels were determined to be not SWMU-related. And these constituents were not retained as COPCs for the quantitative risk assessment.

However, recently published U.S. EPA policy no longer supports excluding COPCs from a risk assessment based on a comparison to a background level (*Role of Background in the CERCLA Cleanup Program*; OSWER 9285.6-07P; April 26, 2002; http://www.epa.gov/superfund/programs/risk/role.pdf). This OSWER directive recommends that naturally-occurring constituents present at concentrations exceeding risk-based criteria should be carried forward into the quantitative estimates of risk and hazard. In particular, the Directive states *"....This approach involves addressing site-specific background issues at the end of the risk assessment, in the risk characterization. Specifically, the COPCs with high background concentrations should be discussed in the risk characterization, and if data are available, the contribution of background to site concentrations should be distinguished. COPCs that have both release-related and background-related sources should be included in the risk assessment. When concentrations of naturally occurring elements at a site exceed risk-based screening levels, that information should be discussed qualitatively in the risk characterization."*

U.S. EPA-Region 5 recognizes that NSWC Crane has conducted a site-wide sampling program to establish site-specific background data on the presence of naturally-occurring inorganic constituents (i.e., metals). Consequently, the risk assessments for the four SWMUs in this Report should be revised to provide a qualitative discussion (in the risk characterization section) which identifies all constituents that exceeded risk-based screening levels but were eliminated from the risk assessment based on comparison to site-specific background levels.

Response: The elimination of chemicals from the quantitative risk assessment is required by U.S. Navy policy (Navy Interim Final Policy on the Use of Background Chemical Levels, Department of the Navy, September 2000) which states, "Background chemicals should be considered during the screening portion of the Human Health Risk Assessment (HHRA) and during Step 3a of the Tier 2 Baseline Ecological Risk Assessment (BERA) (CNO Policy April 1999). It is important to establish site contaminants early in the cleanup process and the evaluation of background chemicals during the screening HHRA and Step 3a of the BERA will assist in the identification of those contaminants that are truly the result of a past release. **Once background chemical levels have been established those chemicals should not be carried through the remainder of the baseline risk assessment** (bolding added).

The Navy guidance document further states, "In some cases there may be risk associated with chemical levels below background levels. This risk is outside of the scope of the Navy's Environmental Restoration

Program but it should be communicated to our stakeholders. Elevated chemicals that were lower than background levels and screened out due to background considerations in the data evaluation step of the baseline risk assessment should be compared to the appropriate risk-based benchmark concentrations. The results should be documented in the Risk Characterization section of the baseline risk assessment report."

A discussion of chemicals eliminated due to background was included in the Uncertainty Section of the risk assessment for each SWMU. However, as directed by the Navy guidance and the USEPA reviewer, discussions identifying all constituents that exceeded risk-based screening levels but were eliminated from the risk assessment based on comparison to background levels have been added to the Risk Characterization section of each risk assessment, new Sections 4.6.3.2, 5.6.3.3, 6.6.3.2, and 7.6.3.2. The revised text is included as Attachments 19 through 22 to this response to comments.

Specific Comments

Comment SC-1: Section 1.4.1 SWMU 4

Page 1-12 refers to Figure 1-4 as an aerial photograph. This Figure is actually a site features map. The aerial photographs appear to be Figures 1-7, 1-10, and 1-14.

Response: The third-to-last sentence of Section 1.4.1 has been revised to read as follows: *"Additional site information can be obtained by using the SWMU 4 site map (Figure 1-4) with the location and direction of site photographs (Figure 1-5) in combination with the site photographs taken in March 11, 2002 (Figure 1-6)."*

Comment SC-2:
Section 3.3.2.4.6 <u>Inhalation of Volatiles in Ground Water</u>

This Section states that inhalation exposure to volatile contaminants could occur from household uses of ground water including showering, bathing, dish washing, laundry, etc. The mass transfer model (Foster and Chrostowski) estimates the volatile contaminant intake from showering but not from other uses, which might be significant in some situations. The Report should provide an explanation for why showering is expected to be the dominant exposure pathway.

Response: The Foster and Chrostowski Shower Model was used to estimate risks at SWMU 5 and SWMU 9. This Model was used because it simulates a closed-space environment in which volatile chemicals are continuously emitted from a heated water source over a specified period of time (assumed to be 15 to 20 minutes). The conditions assumed by the model are considered to represent a very conservative or worst-case exposure scenario. Note that the cancer risks calculated for showering with groundwater at SWMU 9 are almost the same as risks from ingestion. Risks derived from the Shower Model appear to be a reasonably conservative and representative estimate of risks from exposure to indoor air.

The following discussion has been added to Section 3.3.2.4.6:
"The Foster and Chrostowski Shower Model is used to estimate risks from domestic use of groundwater because it simulates a closed-space environment in which volatile chemicals are continuously emitted from a heated water source over a specified period of time (assumed to be 15 to 20 minutes). The conditions assumed by the model are considered to represent a very conservative or worst-case exposure scenario and are expected to adequately characterize risks from domestic use of groundwater."

Comment SC-3:
Section 3.3.5.1 <u>COPC Screening Levels</u>

Page 3-53: To further indicate that the risk screening procedure is health protective, the last sentence in this Section should be revised to read: "The elimination of chemicals that are present at concentrations that correspond to an ILCR less than 10^{-6} and an HI less than 0.1 should not affect the final conclusions of the risk assessment because these chemicals are not expected to cause a potential health concern at the concentrations detected or to contribute significantly to cumulative risk due to multiple chemical exposure."

Response: Agreed. The suggested text "**or to contribute significantly to cumulative risk due to multiple chemical exposure**" has been added to Section 3.3.5.1, COPC Screening Levels.

Comment SC-4:
Section 6.6.3 Risk Characterization

Carcinogenic Risks

Page 6-31 and 6-32: The last bullet point describes the ground water sampling for arsenic. It states that arsenic was detected in 12 of 12 ground water samples at SWMU 9. In addition, 8 samples were below the detection limit for arsenic that was achieved when sampling the upgradient well. Are these 8 additional samples from SWMU 9 or are they part of the 12 samples referred to above? If these 8 samples had detectable arsenic concentrations that were lower than the detection limit achieved for the upgradient well, perhaps this means that the data from the upgradient well is not very useful for making comparisons to background or naturally occurring arsenic levels in ground water. The Report should clarify this problem in interpreting the ground water data for arsenic.

Response: The 8 samples below the detection limit in the upgradient well are part of the set of 12 samples. The samples were analyzed by Trace ICP and the detection limit for arsenic in the upgradient well (and all other samples in the groundwater data set) was 1 ug/L. An examination of the validated data for the upgradient well sample indicates that analysis of the sample was not impacted by turbidity or other analytical problems and detection limits were not elevated by sample dilutions. The detection limit for arsenic is also well below the MCL. Based on this evaluation, it appears that the upgradient well sample was adequate for background comparison. Please note that no metals in groundwater were eliminated as COPCs on the basis of concentrations in the upgradient well. The third sentence of the bullet spanning pages 6-31 and 6-32 will be revised as follows:

"In addition, the concentrations of arsenic in eight of the 12 ground water samples were less than the sample quantitation limit for the upgradient well (1 ug/L) and it is likely that the concentrations of arsenic in ground water at the site are within naturally occurring levels."

Comment SC-5:
Section 6.6.5 Summary and Conclusions

Page 6-38: The last bullet has the same interpretation problem for arsenic sampling as described above for Section 6.6.3.

Response: The third sentence of the last bullet page 6-38 has been revised as follows:
"In addition, the concentrations of arsenic in eight of the 12 ground water samples were less than the sample quantitation limit for the upgradient well (1 ug/L) and it is likely that the concentrations of arsenic in ground water at the site are within naturally occurring levels."

Part III, Additional Revisions:

ADDITIONAL TECHNICAL REVISIONS

1. Upon further review of Table ES-1, located in the Executive Summary, it was determined that a recommendation for the collection of hydraulic conductivity data was missing for SWMU 4. The following text has been added to Table ES-1 for the Future Resident (Adult) and (Child) in the Recommendation column.

   "Collect supplemental hydraulic conductivity data to support CMS"

2. The first sentence of Section 4.7.7.3 was revised to read as follows:
   "Toxicological data for a few of the chemicals that were retained as COPCs are limited or do not exist."

3. The last sentence of Section 5.7.5.1 has been changed to read as follows:
   "Consequently, these organic chemicals are likely to be site-related constituents and are further evaluated in Step 3a of the BERA."

4. The third sentence of bullet one in Section 5.8 has been revised to read as follows:
   "These metals are unlikely to be bioavailable (and therefore, toxic) in their present form as fragments, but may be more bioavailable (and toxic) if they dissolved and entered the soil."

5. The second sentence of Section 6.7.6.2.2, 2,4-D, has been revised to read as follows:
   "2,4-D was detected at sample location 09SW02 at 0.18 µg/L. "

6. The last paragraph of Section 6.7.6.2.2, Iron and Manganese has been revised to read as follows:
   "For manganese, the maximum detected concentration was 532 µg/L (for filtered). The ORNL SCV is 120 µg/L (Suter and Tsao, 1996), however, the LCV for all aquatic organisms is 1,100 µg/L (based on daphnids). Therefore, risks to aquatic life from manganese are expected to be low."

7. The fourth sentence of the summary for Section 6.7.6.2.2 has been revised to read as follows:
   "The risks associated with copper lead and manganese are low while the risks associated with 2,4-D and cobalt are negligible."

8. The following sentence was added to the "Ground water (20 samples)" paragraph on page 7-2 (Section 7.2):
   "Ultimately, ground water elevations would show that only well 10C52 was a suitable upgradient well, and only for the Lower Pennsylvanian aquifer. No suitable upgradient samples were collected for other water bearing units."

9. The header of column 2, Table 4-8 has been changed from "04SW0101-F$^{(1)}$" to "04SW0101-F$^{(1)}$ downgradient"

10. In Tables 6-23 and 7-23, the units of measure for dieldrin and arsenic concentrations in ground water have been corrected by changing them from mg/L to ug/L.

11. Footnote 4 of Table 7-25 has been changed to read as follows:

    "As presented in Table 3-14."

12. The "August 2000" reference in the second sentence of the Executive Summary Purpose of RFI Report has been changed to "TtNUS, 2000a."

ADDITIONAL NON-TECHNICAL REVISIONS

All detected typographical errors have been corrected but not necessarily identified in this response to comments.

ADDITIONAL REFERENCES

To support the changes made in response to these comments, additional references have been added as follows:

Information Ventures, Inc., 2002. 2,4-D, Pesticide Fact Sheet. Prepared for the U.S. Department of Agriculture, Forest Service. http://infoventures.com/e-hlth/pestcide/24d.html. Accessed December 30, 2002.

Environment Canada, 2002. Canadian Water Quality Guidelines for the Protection of Aquatic Life. http://www.ec.gc.ca/ceqg-rcqe/English/Pdf/water_summary_table-aquatic_life.htm. Accessed December 30, 2002.

LIST OF ATTACHMENTS

Attachment 1 Revised Text for Sections 4.1 through 4.4 (SWMU 4)
Attachment 2 Revised Text for Sections 5.1 through 5.4 (SWMU 5)
Attachment 3 Revised Text for Sections 6.1 through 6.4 (SWMU 9)
Attachment 4 Revised Text for Sections 7.1 through 7.4 (SWMU 10)
Attachment 5 Revised Text for Sections 4.7 and 4.8 (SWMU 4)
Attachment 6 Revised Text for Sections 5.7 and 5.8 (SWMU 5)
Attachment 7 Revised Text for Sections 6.7 and 6.8 (SWMU 9)
Attachment 8 Revised Text for Sections 7.7 and 7.8 (SWMU 10)
Attachment 9 Revised Tables for Section 4.7 (SWMU 4)
Attachment 10 Revised Tables for Section 5.7 (SWMU 5)
Attachment 11 Revised Tables for Section 6.7 (SWMU 9)
Attachment 12 Revised Tables for Section 7.7 (SWMU 10)
Attachment 13 Revised Tables for Appendix H.5 (SWMU 4)
Attachment 14 Revised Tables for Appendix H.5 (SWMU 5)
Attachment 15 Revised Tables for Appendix H.5 (SWMU 9)
Attachment 16 Revised Tables for Appendix H.5 (SWMU 10)
Attachment 17 Mark-up of RFI Report Text Showing Changes, in Context, for Sections:
1.3.4.2, 2.6.2.1, 2.6.2.2, 2.6.4, 3.1.2.3, 3.1.4.2, 3.1.6
3.4.1, 3.4.2.5, 3.4.4.2, 4.6.1.2
and for Tables:
4-8, 6-23, 7-23, 7-25
Attachment 18 Revised Figures (Tag Maps)
Attachment 19 Revised Text for Section 4.6 Human Health Risk Assessment
Attachment 20 Revised Text for Section 5.6 Human Health Risk Assessment
Attachment 21 Revised Text for Section 6.6 Human Health Risk Assessment
Attachment 22 Revised Text for Section 7.6 Human Health Risk Assessment

5090
Ser 095/3131

08 APR 2003

The letter Ser 095/3131 was for the submittal of response to comments and replacement pages for the Draft RFI Report for SWMUs 4,5,9, and 10. The replacement pages for the Report have been incorporated into the previously submitted Draft Report on 05/29/02, thus changing it to a Final Report.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James M. Hamrick

SIGNATURE

Environmental Protection Department Manager — 4/8/03

TITLE — DATE

Enclosure (~~2~~ 4)