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RESPONSE TO EPA COMMENTS ON ECOLOGICAL ASSESSMENT FOR SITE SCREENING AREAS 3, 4, 5, AND 21 NWS YORKTOWN VA

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Response to USEPA Region III BTAG Comments

Draft Ecological Assessment of Site Screening Areas 3, 4, 5, and 21: Addendum to the Site Screening Process Report
Naval Weapons Station Yorktown, Yorktown, Virginia

The Draft Ecological Assessment of Site Screening Areas 3, 4, 5, and 21: Addendum to the Site Screening Process Report at Naval Weapons Station (WPNSTA) Yorktown was submitted to the United States Environmental Protection Agency (USEPA) Region III Biological Technical Assistance Group (BTAG) for review on October 31, 2003. USEPA Region III provided the comments in a letter dated November 20, 2003. The Navy has evaluated the comments received from USEPA Region III BTAG and presents the following responses to the WPNSTA Yorktown Tier 1 team for consideration and action. The Navy appreciates BTAG's review of the document and their comments submitted in the letter dated November 20, 2003.

1. A number of the following comments may have application in more than one section of this report. Once an issue has been identified, the authors need to follow that issue throughout the entire document.

   Response: **Comments will be followed throughout the entire document.**

2. On page 3-3, Section 3.1.1.2, Exposure Pathways and Routes, indicates that even though complete exposure pathways have been identified for reptiles at each site, a paucity of data renders a quantitative evaluation problematic. While the data may be limited, there is no indication that any available data has been identified or used in this evaluation.

   Response: **A number of comments relate to the methodology used to evaluate potential impacts to reptilian receptors. The approach used (i.e., an examination of exposures and risks to ecological receptors occupying similar trophic levels) is consistent with the default approach presented on the USEPA Mid-Atlantic Risk Assessment web page (USEPA, 2004), which states "As a general rule in Region 3, impacts to reptiles do not have to be considered as an assessment endpoint in the screening level ERA. However, the screening ERA would need to state that impacts to reptiles are being assessed qualitatively through the use of surrogate receptors." Furthermore, the guidance presented in BTAG's Frequently Asked Questions states, "The methodologies or approaches described should be viewed as default approaches to be implemented in EPA Region III." Given that the approach used in the ecological assessment is consistent with BTAG's default approach, the Navy does not believe that identification and use of available data to evaluate reptilian receptors is warranted. However, the text in Section 3.1.1.2 (Page 3-3) addressing reptiles will be revised to include language that references BTAG policy regarding the evaluation of reptiles.**

   USEPA. 2004. Ecological Risk Assessment Frequently Asked Questions: Ecological Receptors. http://www.epa.gov/reg3hwmd/riskdraft/eco/faqs/ecorecept.htm.

3. On page 3-3, Section 3.1.1.2 states, "...it can be qualitatively stated that reptiles are not at risk if no risks are identified to other upper trophic level receptors...." It is uncertain how true this statement is for reptiles. Additional information will need to be added to this section to support this statement.

Response: **The Navy disagrees with the comment. As discussed in the response to Comment No. 2 above, BTAG's default approach to evaluate reptiles is through the use of surrogate receptors. Given that the BTAG default approach was followed, the Navy does not believe that additional information supporting this statement is warranted.**

4. On page 3-3, Section 3.1.1.2 states, "...it is assumed that reptiles are not likely to be more sensitive to chemical exposures than the other receptors groups...." It is not clear that this assumption is correct nor is this statement supported in the text.

Response: **When a surrogate receptor is used to qualitatively evaluate potential risks to a target receptor, it is necessary to assume that their sensitivity to chemicals is similar. Without this assumption, the premise behind BTAG's default approach regarding reptiles would be invalid. Again, because the BTAG default approach was followed, the Navy does not believe that additional information supporting this assumption is necessary.**

5. On page 3-6, Section 3.1.2.1, Selection of Ecological Receptors, states, "Exposure pathways to terrestrial and aquatic reptiles are likely to be complete at the SSAs; however, a specific reptilian species was not selected as a receptor species in this ecological assessment since the life history and toxicological data base concerning effects of chemicals on reptiles is severely limited." This degree of uncertainty needs to be verified and any recommendations for these sites will need to be qualified according to this uncertainty.

Response: **The Navy recognizes that there is uncertainty associated with the surrogate approach. The uncertainty associated with the use of surrogate receptors is discussed within the uncertainty section (i.e., Section 3.4.2).**

6. On page 3-7, Section 3.2.1, Media-Specific Screening Values, indicates that the values specified in Table 3-2 contain alternative values than those from BTAG (1995). It is not clear why these alternative values have been provided when the BTAG position is that these 1995 BTAG values will be used both during the SERA and Step 3A.

Response: **Conditions for use of alternative screening values and reasons for their use are identified below:**

- **BTAG surface water screening values based on National Ambient Water Quality Criteria (NAWQC) were updated using values contained in the USEPA document entitled National Recommended Water Quality Criteria: 2002 (USEPA 2002). Updated NAWQC reflect current literature information and USEPA policy.**

- **BTAG surface water screening values based on acute endpoints were replaced by chronic toxicological thresholds and benchmarks if available from the literature. Chronic-based thresholds are more appropriate than acute benchmarks when assessing assessment endpoints based on growth and reproduction.**

- **BTAG screening values based on upper trophic level food web exposures were replaced by toxicological thresholds and benchmarks for plants or invertebrates if available from the literature. These are reasonable changes since upper trophic**

level food web exposures are evaluated separately from the media-specific screening evaluations.

- **The BTAG freshwater sediment screening value for chromium is based on soil toxicity studies with tobacco. This value was replaced by a marine and estuarine toxicological benchmark (i.e., ER-L) reported by Long et al (1995) as a screening value for a terrestrial plant is not relevant to sediment.**

- **BTAG values based on background concentrations were replaced by chronic, effect-based values and benchmarks if available from the literature.**

- **BTAG screening values with no known basis and/or reference literature source were replaced by toxicological thresholds or benchmarks reported in the literature. BTAG values will always be given priority if a basis or reference source is provided.**

Based on input from Mr. Bruce Pluta (USEPA Region III BTAG coordinator) during the Navy and EPA Eco Risk Summit held in Philadelphia, Pennsylvania January 21 and 22, 2004, BTAG and alternative screening values for aluminum, antimony, barium, beryllium, cadmium, cobalt, and iron will be replaced by USEPA (2004) ecological soil screening levels. The use of alternative screening values is further discussed in the response to Comment Nos. 7, 8, and 9.

USEPA. 2002. National Recommended Water Quality Criteria: 2002. Office of Water, Washington, D.C. EPA 822-R-02-047

USEPA. 2004. Ecological Soil Screening Levels. http://www.epa.gov/ecotox/ecossl/.

7. A review of Table 3-2 has indicated a number of concerns. First, any reference to MHSPE 1994 should be changed to MHSPE 2000. Further, any reference to MHSPE needs to include appropriate justification for using. Second, the basis for the BTAG number is not sufficient for use of an alternative value, unless it is less than the BTAG value. Third, alternative numbers are based on a number of sources including AET, ERL, LEL, LOEL, TEL, etc. It is not clear from the text how these different sources relate to each other and if more than one source is available for a chemical, which is chosen.

Response. **Any reference to MHSPE 1994 will be changed to MHSPE 2000. Note that MHSPE values were used for two chemicals (1,2-dichloroethane and 2-chloronaphthalene). A MHSPE value was used for 2-chlronaphthalene since a BTAG value has not been established and a toxicological threshold was not available from the literature. A MHSPE value was used for 1,2-dichloroethane since (1) the BTAG value is based on food web exposures, and (2) a toxicological threshold or benchmark was not available from the literature.**

Consideration will be given to BTAG values with no basis if the values can be validated by an appropriate literature source. Without a literature source, the appropriateness of these values cannot be determined. Peer reviewed literature sources will be given priority based on the additional level of confidence in the values they provide.

It is noted that many of the ER-L and AET-based sediment screening values reported in Table 3-2 are BTAG sediment screening values. In no case was a BATG sediment screening value reported as either an ER-L or AET replaced by an alternative screening value. For chemicals lacking BTAG sediment screening values, values were identified from the literature. Because the surface water bodies associated with the SSAs are fresh water, preference was given to freshwater TELs (Buchman 1999) and LELs (Persaud et al. 1993). For a given chemical, when a TEL and LEL value was available from the literature, the minimum value was selected for use as the sediment screening value. In the absence of a freshwater sediment screening value, marine and estuarine toxicological benchmarks were identified from the literature (i.e., ER-L, and AET values). For a given chemical, when an ER-L and AET value was available from the literature, the minimum value was selected for use as the sediment screening value. The process used to identify sediment screening values for chemicals lacking a BTAG value will be added to the text in Section 3.2.1.

Buchman, M.F. 1999. NOAA Screening Quick Reference Tables. NOAA HAZMAT Report 99-1. National Oceanic and Atmospheric Administration, Seattle, WA. 12 pp.

Persaud, D.R., R. Jaagumagi, and A. Hayton. 1993. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of the Environment (OMOE).

8. On page 3-7, Section 3.2.1.1, Screening Values for Soil, indicates that screening values based on risks to amoeba, fungi, or soil bacteria were replaced with values based on toxicity to plants or invertebrates. The reason for this replacement concept is not clear, particularly if the resulting value is greater than that for the amoeba, fungi or soil bacteria.

Response: **Alternative screening values were used in place of four BTAG screening values based on studies with amoeba, fungi, or soil bacteria (antimony, chromium, total cyanide, and nickel). The final document will be revised to reflect the use of BTAG surface soil screening values for chromium, total cyanide, and nickel in risk calculations. However, as discussed in the response to Comment No. 6, the USEPA (2004) ecological soil screening level for antimony will be used in place of the BTAG value.**

USEPA. 2004. Ecological Soil Screening Levels. http://www.epa.gov/ecotox/ecossl/.

9. On page 3-7, Section 3.2.1.2, Screening Values for Surface Water, indicates that a safety factor of 100 was applied to BTAG values that were based on lethal effects (e.g. LC50s) and a safety factor of 10 was applied to BTAG values that were based on acute endpoints. From these definitions, it is not clear that the differences between lethal effects and acute endpoints that would support a safety factor change from 100 to 10. Additional explanation needs to be provided to support this.

Response: **The Navy agrees with the comment and the following corrections will be implemented: A safety factor of 100 will be used to estimate chronic screening values for all chemicals with BTAG values based on median lethal (LC_{50}) or median effective (EC_{50}) concentrations. For BTAG screening values based on acute NOAEL and acute LOEL endpoints, a safety factor of 30 and 50, respectively, will be used to estimate chronic screening values. For those BTAG screening values with insufficient documentation that prevents the identification of the acute endpoint, a safety factor of 100 will be used to estimate a chronic screening value. The safety factors used will be consistent with the safety**

factors contained within the tri-services handbook (Wentsel et. al., 1996). Screening values for other media will be reviewed to ensure proper safety factors have been used to estimate chronic values. Based on these changes, the list of potential chemicals of concern (COPCs) identified at each SSA will be updated, as necessary, to reflect these changes.

Wentsel, R.S., T.W. La Point, M. Simini, R.T. Checkai, D.T. Ludwig, and L.W. Brewer. 1996. *Tri-Service Procedural Guidelines for Ecological Risk Assessments*. U.S. Army Edgewood Research, Development and Engineering Center, Aberdeen Proving Ground, MD.

10. On page 3-9, Section 3.3.1, Selection Criteria for Analytical Data, brings up the concern about the need to address undetected chemicals with reporting limits in excess of screening values.

Response: **The fifth bullet item within Section 3.3 (Page 3-9) states the following: "Maximum reporting limits were conservatively used to estimate exposures for non-detected chemicals". The second bullet item in Section 3.4.1 (Page 3-15) also states the following: "For chemicals not detected in any samples of a particular medium, the maximum reporting limit was used to calculate HQs. For a given medium, non-detected chemicals with HQs greater than or equal to 1.0 based on maximum reporting limits were identified as COPCs for that medium." Therefore, BTAG's concern regarding the need to address undetected chemicals with reporting limits in excess of screening values was adequately addressed.**

11. On page 3-10, Section 3.3.1 indicates subsurface soils were not evaluated because this zone does not represent a significant exposure pathway. Since subsurface soils have been defined as being between 6 inches and 2 feet below ground surface in this section, it is not clear why, or how, this zone does not represent a significant exposure pathway. This zone does include a viable habitat, with both soil invertebrates and mammal, where it is necessary to describe chemical exposure pathways to ecological receptors.

Response: **As a point of clarification relative to this comment, the text does not state or indicate that subsurface soil collected from the 6 to 24-inch depth interval does not represent a significant exposure pathway. Subsurface soil collected from the 2 to 36-foot depth interval pathway was identified as the zone that does not represent a significant exposure pathway that would result in unacceptable risks to receptor populations and/or endangered species.**

12. On page 3-10, Section 3.3.1 states, "Groundwater data were not evaluated at sites where sufficient surface water and sediment data were available." This quote does not address the concern that groundwater needs to be evaluated as a potential source of contamination to both surface water and sediment.

Response: **Groundwater was evaluated at SSA 3 (please see the discussion in Sections 4.4.1.1 and 4.6.1). Groundwater was not evaluated at SSA 21 since this SSA is a pond (Roosevelt Pond), with no CERCLA source areas directly associated with it. SSA 21 does receive surface runoff from SSA 4 and 5. Groundwater was not evaluated at SSAs 4 and 5 for the following reason: Based on water levels recorded in 1997, the depth to groundwater at SSA 4 is approximately 40 feet bgs, while the depth to groundwater at SSA 5 is approximately 30 feet bgs. Based on the nature of disposal activities (surface disposal) and the topography (ravines) at each SSA, vertical migration with infiltrating precipitation and**

transport with groundwater to surface water and sediment is not expected to represent a significant transport pathway.

Although the groundwater transport pathway is likely to be insignificant, Sections 5.0 and 6.0 will be revised to include a qualitative evaluation of the groundwater data. This qualitative evaluation will include a review of groundwater data to determine if chemicals detected and identified as ecological COPCs in downgradient surface water and sediment were also detected in upgradient groundwater at ecologically significant concentrations.

13. On page 3-12 and 3-13, Section 3.3.2.2.1, Exposure Point Concentrations, states, "...a diet to whole-body BAF value of one will likely result in a realistic estimate of tissue concentrations based on reported literature values." There are only 3 examples given; a BAF of 1.0, a BAF below 1.0, and a BAF above 1.0. These examples do not support the statement that a BAF of 1.0 will likely result in a realistic estimate of tissue concentration.

Response: **The Navy disagrees with this comment. Section 3.3.2.2.1 (Pages 3-12 and 3-13) states that "The use of a diet to whole-body BAF of one is likely to result in a conservative estimate of chemical concentrations for chemicals that are not known to biomagnify in terrestrial food chains (e.g., aluminum). For chemicals that are known to biomagnify (e.g., PCBs), a diet to whole-body BAF value of one will likely result in a realistic estimate of tissue concentrations based on reported literature values." Note that four examples are given, not three: a value of 1.0 for PCBs and white-footed mice, a value of 0.3 for DDT and voles, a value of 0.2 for DDT and short-tailed shrews, and a value of 1.4 for dioxin and deer mice. The values reported for DDT are slightly below a value of 1.0, the value for dioxin and deer mice are slightly above a value of 1.0, while the value for PCBs and deer mice is equal to 1.0. Given that each example is based on a chemical known to biomagnify through terrestrial food chains and the magnitude of the values above or below 1.0 are low, the referenced statement is reasonable and no further clarification is warranted.**

14. On page 3-13, Section 3.3.2.2.1, under Aquatic Plants suggests that the tissue concentration in the above ground portion of the plant was estimated. It is not clear that this is true for either aquatic or terrestrial plants. Further, whether or not exposure to roots or tubers (etc) is possible or probable needs to be adequately discussed.

Response: **As stated in Section 3.3.2.2.1, tissue concentrations in prey items (including the vegetative portion of terrestrial and aquatic plants) were estimated by multiplying maximum measured media concentrations for each chemical by chemical-specific bioaccumulation (BAF) or bioconcentration (BCF) values. The BAF/BCF values used in the estimation of tissue concentrations were presented in Tables 3-8 through 3-10.**

The Navy agrees that roots and tubers represent potential food items for terrestrial mammalian herbivores. The following information will be incorporated into the text within Section 3.3.2.2.1: Baes III et al. (1984) reported soil-to-plant bioconcentration factors for radionuclides in vegetative (leaves and stems) and nonvegetative (fruit, nuts, seeds, tubers) portions. For the TCL metals, the highest bioconcentration factors were reported for the aboveground vegetative portions. Baes III et al. (1984) also reported that non-nutritional elemental concentrations in agricultural plants are generally ordered as leaves > stems > tubers $\geq$ fruits $\geq$ seeds. While roots and tubers represent potential food items for terrestrial mammalian herbivores, the available literature indicates that use of bioconcentration

factors based on the vegetative portions of terrestrial plants represents a conservative approach.

Baes III, C.F., R.D. Scharp, A.L. Sjoreen, and R.W. Shor. 1984. A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides Through Agriculture. ORNL 5786. Oak Ridge National Laboratory, Oak Ridge, TN.

15. On page 3-13, Section 3.3.2.2.1 indicates that the tissue concentrations in frogs were estimated by use of chemical specific sediment to fish BAFs. It is not clear that fish BAFs are appropriate for frogs, unless they are the only ones available. In either case the uncertainty of using fish BAFs with frogs needs to be adequately discussed.

Response: **The Navy agrees that clarification is needed relative to this comment. As discussed in Section 3.3.2.2.1, sediment-to-fish BAFs were used to estimate frog tissue concentrations due to the lack of literature-based BAFs designed specifically for the sediment-to-frog pathway. Although the text indicates that use of sediment-to-fish BAFs provides an uncertain estimate of sediment-to-frog bioaccumulation, the language presented below will be added to Section 3.4.2 (Uncertainties Associated With the Conservative Risk Calculation).**

"Sediment-to-fish BAFs were used to estimate frog tissue concentrations due to the lack of literature-based BAFs designed specifically for the sediment-to-frog pathway. Based on differences between fish and frogs (e.g., differences in skin permeability and time spent in direct contact with sediment), the use of sediment-to-fish BAFs may either overstate or understate frog tissue concentrations."

16. On page 3-15, Section 3.4.1, Selection of Ecological Chemicals of Potential Concern, indicates the MATC represents an estimate of the threshold concentration (the concentration above which a toxic effect on the test endpoint is produced). Because the MATC is the geometric mean of the NOAEL and LOAEL, it is not clear that it represents a good estimate of the threshold concentration. In addition, food web exposures need to address the range of risk issue with chemical concentrations and NOAEL/LOAEL values.

Response: **The MATC is an estimate of the toxic threshold dose lying in a range bounded at the lower end by the highest tested dose having no observed effect (NOAEL) and at the higher end by the lowest tested dose having a significant toxic effect (LOAEL). Empirically, the MATC is estimated by calculating the geometric mean of the NOAEL and LOAEL. It is agreed that the MATC may not represent a good estimation of the threshold dose, since the "true" threshold dose will fall somewhere within the range bounded by the NOAEL and LOAEL. However, a standard approach was used to estimate the MATC. Note that while risk estimates were calculated using NOAEL-, LOAEL-, and MATC-based screening values, chemicals of potential concern (COPCs) were identified based solely on the comparison of maximum exposure doses to NOAEL-based screening values. Based on the discussion presented above, the Navy does not believe that changes to the document are necessary.**

17. On page 3-15, Section 3.4.1 indicates cumulative effects are not addressed in this ecological assessment. This uncertainty needs to be adequately addressed.

Response: **This uncertainty is addressed in Section 3.4.2 (Page 3-19). It is noted that cumulative effects include antagonistic, as well as synergistic and additive effects. Furthermore, generalizations regarding cumulative effects cannot be made in a screening-level evaluation. This is shown by a review by Norwood et al. (2003) on the impacts of metal mixtures on aquatic biota. Norwood et al. (2003) found that additive, synergistic, and antagonistic responses were found with equal frequency. Cumulative effects can indirectly be evaluated by site-specific investigations (e.g., toxicity tests); however, such investigations are beyond the scope of this screening-level evaluation.**

Norwood. W.P., U. Borgmann, D.G. Dixon, and A. Wallis. 2003. Effects of Metal Mixtures on Aquatic Biota: A Review of Observations and Methods. Human and Ecological Risk Assessment. 9(4): 795-811.

18. On page 3-16, Section 3.4.2, Uncertainties Associated With the Conservative Risk Calculation, indicates common laboratory contaminants were detected in media at multiple SSAs and identified as COPCs even though their presence is unlikely to be related to the SSA. To be more definitive, the concentrations of these chemicals would need to be compared with background values and/or laboratory controls. It is not clear if this is even possible with these SSAs.

Response: **The Navy agrees with the comment. As part of the data validation process, analytical data for site media were compared to field and laboratory blanks, including field blanks, equipment rinsate blanks, and laboratory control samples. When the maximum detected concentration of a common laboratory contaminant was less than ten times the maximum associated blank concentration, positive detections reported by the laboratory were qualified as non-detected, "B" by the data validator. Several common laboratory contaminants (e.g., acetone and 2-butanone) were either not detected in associated blanks or detected in site media at concentrations greater than ten times the maximum associated blank concentrations. Although these common laboratory contaminants were not qualified as non-detected, "B" due to blank contamination, their presence in site media does not necessarily imply environmental contamination, especially when the history of each site is considered. However, consistent with USEPA guidance (USEPA 1992), it was assumed that they were present in environmental media and evaluated in the conservative and less conservative evaluation.**

The text in Section 3.4.2 (Page 3-16) will be revised to remove the statement that "...their presence is unlikely to be related to the SSA. Furthermore, their identification as common laboratory contaminants as a line of evidence in the less conservative evaluation for each SSA will be removed from the site-specific sections.

USEPA. 1992. Guidance for Data Usability in Risk Assessment (Part A). Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-09A.

19. On page 3-6, Section 3.4.2 states that the use of mean media concentrations to estimate exposure to upper trophic level receptors provides a more accurate picture of potential risks at the site. A similar statement is made in Section 3.5.1 on page 3-20. How representative mean media concentrations are to actual exposure concentrations is a site specific determination and depends on the size of the site relative to the home range, and the number of samples collected within the site being evaluated. Therefore, the use of a mean to estimate exposure to upper trophic level receptors may not be appropriate for all species and at all sites. A site specific determination

should be made for each site to evaluate whether means are appropriate for evaluating risk to all upper trophic level receptors.

Response: **The less conservative evaluation considered mean HQ values as one line of evidence. It is unrealistic to assume that every potentially exposed organism, especially the more transient upper trophic level receptor, remains at the location of maximum detection. It is also unrealistic to conclude that impacts to a small portion of a population translate to unacceptable impacts to the population as a whole. As such, the spatial pattern and magnitude of detections above screening values was also examined to provide information related to the significance of site concentrations. This evaluation of the spatial distribution of the chemical concentrations and the magnitude of detections above screening values was considered to avoid overlooking potential localized areas of contamination.**

While it is true that the home range size of several upper trophic level receptors evaluated in the ERA is less than the size of the individual SSAs, home range sizes apply to individual organisms. Average exposures are still relevant for populations, on which the assessment endpoints are based. Also, the area of suitable habitat present within the area evaluated, not the total size, is the relevant factor. Based on the discussion presented above, the Navy does not believe that changes to the document are necessary.

20. On page 3-16, Section 3.4.2, under Exposure Point Concentrations, states "The use of mean concentrations to estimate exposure in a refinement is more likely to provide a more accurate picture of potential risks at a site." This statement is likely not correct. The correct use of mean concentrations should be to address the range of risk for those chemicals identified during the SERA as COPCs. Using means to develop a range of risk is only appropriate when means represent realistic exposure concentrations for the ecological receptors being evaluated. This change alone will likely mean the list of COPCs and what they mean in this ecological assessment will be different than they currently exist.

Response: **The Navy disagrees with the comment (please see the response to Comment No. 21). It is noted that there was significant bias associated with the sampling design used to chemically characterize the abiotic media at each SSA. Sample locations at a given SSA were selected in a manner designed to chemically characterize abiotic media at locations where maximum concentrations are likely to occur (e.g., adjacent to potential sources and/or within likely migration pathways). As such, mean concentrations become relevant since locations within a site where contamination is not likely are not taken into consideration. Therefore, based on this rationale, as well as the response to Comment No. 19, the Navy does not believe that a further response is warranted.**

21. On page 3-16, Section 3.4.2, under Exposure Point Concentrations notes a difference between total recoverable metal concentrations and dissolved metal concentrations. This paragraph also notes this uncertainty does not apply to filter feeding organisms. It seems that this uncertainty applies to more than just filter feeding organisms and needs to include all organisms that consume substrate as food. It is not clear if this second source of uncertainty needs to be changed more than indicated.

Response: **The Navy disagrees with the comment. This uncertainty specifically applies to exposure point concentrations used in the surface water screening evaluation, not exposure point concentrations used in the sediment screening evaluation. For this reason, the text**

describing the uncertainty of filter feeding organisms will not be changed to include organisms that reside within and consume sediment (i.e., aquatic invertebrates).

22. On page 3-17, Section 3.4.2, under Media-specific Screening Values, indicates that site specific factors (TOC and AVS) can influence bioavailability. It appears that SEP is likely to be more sensitive to reality than AVS, alone, and it is not clear why SEP is not being used.

Response: **The intention of the referenced text was to identify the uncertainty associated with the sediment screening values used in the conservative risk calculation. The referenced text specifically addresses the uncertainty associated with the use of sediment screening values that do not take into consideration site-specific sediment quality characteristics, such as total organic carbon (TOC) and acid volatile sulfide (AVS), that can influence chemical bioavailability. The text was not intended to identify an all inclusive list of sediment characteristics and factors influencing bioavailability, nor was it intended to identify specific laboratory procedures, such as the Sequential Extraction Procedure (SEP), that can be used to evaluate the bioavailability and mobility of metals. Therefore, the text will not be revised to include a discussion of SEP.**

23. On page 3-17, Section 3.4.2, under Media-specific Screening Values, indicates that free cyanide is very rare in soils. It is not clear if this is also true for sediment.

Response: **The referenced discussion was not designed to provide information on free cyanide concentrations in sediment. The literature will be reviewed with regard to cyanide speciation in sediments. If relevant information is found, Section 3.4.2 (Page 3-17) will be revised to include this information. Note that the conceptual site models for each of the SSAs do not suggest that free or un-complexed cyanide would be present. Furthermore, free cyanide is naturally degraded in the environment and is not bioaccumulated.**

24. On page 3-18, Section 3.4.2, under Ingestion-Based Screening Values, indicates a fourth source of uncertainty involving mercury. It is not clear how true this uncertainty is when mercury concentrations less than BTAG screening values in sediment and surface water show tissue concentrations in excess of 3.0 mg/kg in large fish (largemouth bass in excess of 1 pound in Hideaway Pond).

Response: **The Navy disagrees with the comment. The USEPA (2001) reports that less than 20 percent of the total mercury in the water column and 0.5 to 5.3 percent of the total mercury in soil is present as methylmercury. The USEPA (2001) further reports that sediment mercury levels follow the same trends as soil in regard to methylmercury percentages. These data show that there is significant uncertainty associated with the use of an ingestion-based screening value based on methylmercury since its use assumes (1) 100 percent of the detected mercury is present as methylmercury and (2) 100 percent of the exposure is to methylmercury. This information will added to Section 3.4.2 (page 3-18). No further action beyond the addition of this text to the uncertainty section is deemed necessary.**

USEPA. 2001. Water Quality Criteria for the Protection of Human Health: Methylmercury. Office of Science and technology, office of Water, Washington, D.C. EPA-823-R-01-001.

25. On page 3-18, Section 3.4.2, under Ecological Receptors, indicates the effects data on reptiles is severely limited. This section does not indicate if the RATL database/website was used to

generate this statement. This database needs to be used to see if it helpful. In addition, it is not clear that reptiles are "...not more sensitive to chemicals than the other upper trophic level species evaluated in the risk assessment." The reasonableness of this assumption needs to be adequately discussed in this section.

Response: The Navy disagrees with this comment. Based on the responses to Comment Nos. 2, 3, and 4, no further action is deemed necessary.

26. On page 3-19, Section 3.4.2 states that using an area use factor (AUF) of one if the food chain modeling is a conservative assumption since a significant percentage of each receptor species time is spent foraging off-site if areas not contaminated. Using an AUF of one is realistic for those species with home ranges equal to or smaller than the size of the site. This issue should be clarified.

Response: **The Navy has considered the comment and the text in Section 3.4.2 (Page 3-19 [third bullet item under Food Web Exposure Modeling]) will be revised as shown below.**

"A third source of uncertainty related to the food web models is the use of unrealistically conservative exposure parameters. The use of maximum ingestion rates and minimum body weights resulted in a conservative estimate of exposure. In addition, AUFs were assumed to equal one. This is a conservative assumption for species with home ranges larger than the site since a percentage of time could be spent foraging off-site in areas not impacted by site-related chemicals or areas where chemical concentrations are expected to be significantly lower. However, an AUF of one is realistic for those species with home ranges equal to or smaller than the site."

27. On page 3-20, Section 3.5.1, Refined Methodology, states that mean concentrations are appropriate for evaluating potential risks to populations of lower trophic level receptors. This assumption does not consider the size of the site being evaluated (area represented by a single sample), and ecological risk from localized areas of contamination (hot spots). It would be more appropriate to evaluate risk in terms of area of the site where potential risk to lower trophic level receptors would be predicted. Once the area of risk if presented, the significance of this area relative to the population at the site could be discussed. Using only means to eliminate contaminants from further consideration without discussing these issues is unacceptable.

Response: **Based on the responses to Comment Nos. 19 and 20, the Navy does not believe that additional evaluation is necessary. Note that for detected chemicals, mean HQs only represent one line of evidence used in the less conservative risk evaluation. In no case was a mean HQ less than 1.0 used as the sole basis for a recommendation of no further evaluation for a detected chemical.**

28. On page 3-21, Section 3.5.1, Refined Methodology, states that background concentrations in surface soil from both the Weapons Station and Cheatham Annex were used to determine if site concentrations exceeded background concentrations. Justification should be provided stating why it is appropriate to use Cheatham Annex background data to evaluate data from the Weapons Station. For the Cheatham Annex data to be used, statistical analysis should have been performed to show that the data are statistically similar and the data can be combined. Otherwise, only background data from the Weapons Station should be used.

Response: **The Navy disagrees with the comment. From a geological perspective, defining**

the boundaries of Cheatham Annex and WPNSTA is arbitrary. Both the Cheatham Annex and WPNSTA soil background investigations were designed and performed following the same protocols and assumptions and the field investigations for each were developed based on the same geology at each activity (in relation to geological setting, soil association groups, and hydrogeology). In fact, the Cheatham Annex investigation included sample locations from the northern portions of WPNSTA to achieve a balanced and representative sampling effort across soil association groups. In summary, the Navy disagrees with the comment and no further response will be noted in the document.

29. On page 3-21, Section 3.5.1, Refined Methodology, indicates that chemicals that were not detected but were identified as COPCs in the conservative screen due to the lack of screening values were not evaluated in the refinement assessment. It is not clear that this indication is true or that the concentration of these chemicals is near zero. This needs to be more adequately explained.

Response: **The Navy disagrees with this comment. It is not possible to quantitatively address the potential for risk from chemicals which are not detected and which do not have established screening values. Even considerations of the most conservative measurement (the maximum reporting limit) are not informative when no threshold value has been established. As stated in Section 4.6, it is as likely that any non-detected chemicals are present at concentrations near zero as it is likely that they are present in concentrations near the reporting limit when no detectable measurements have been identified. Because of these limitations, the approach taken at SSAs 3, 4, 5, and 21 followed that outlined in the National Oil and Hazardous Substances Pollution Contingency Plan's (NCP) Hazard Ranking System (40 CFR 300 Appendix A), which does not establish a release when the sample measurement is less than the contract required detection limit when using an EPA-certified laboratory. As all samples were analyzed by a certified laboratory, and as laboratory reporting limits were validated and considered satisfactory, the exclusion of non-detected chemicals is considered reasonable and appropriate. It would not be reasonable or appropriate to recommend further investigation for chemicals with analytical data that do not suggest a source is present or a release has occurred. Therefore, no changes to the document are deemed necessary.**

Site Screening Area 3-Fire Training Pits And Vicinity

30. On page 4-1, Section 4.1.1, Site History and Environmental Setting, states that confirmatory subsurface soil sampling conducted following the removal action indicated the presence of total petroleum hydrocarbons along the walls and floor of each of the fire training pits in excess of the action level of 100 parts per million (ppm). The significance of this contamination in terms of concentration and depth is not provided. However, given that contamination was left in place, the document should state whether institutional controls will be used to ensure that this contaminated soil is not disturbed.

Response: **The WPNSTA Tier I Team considered the comment during a March 29, 2004 teleconference. Additional information related to the nature and extent of TPH contamination and the potential for unacceptable impacts was provided to USEPA Region III for review. Based on USEPA concurrence that residual TPH constituents do not present unacceptable risks to current or future receptors, the WPNSTA Tier I team agreed on March 31, 2004 that institutional controls would not be required at SSA 3. It is noted that the 100 ppm concentration is an action level which prompts reporting to the Virginia**

Department of Environmental Quality (VDEQ), and is not indicative of a toxicity threshold for either human or ecological receptors.

31. On page 4-1, Section 4.1.2, Available Analytical Data, states that because areas of burnt surface soils have been removed and because fire training activities in the fire training pits were subsurface in nature, surface soil data were not collected from this site. This statement assumes that site fire training activities did not result in contamination of surface soil through spillage and/overflow. This statement also assumes that removal activities did not contaminate surface soil. If uncertainty is high enough regarding the potential contamination in surface soil, sampling of surface soil may be needed.

Response: **The Navy agrees with the comment. Based on an agreement reached during a meeting on December 3, 2003 between members of the Eco Subgroup, surface soil (0 to 6-inch depth interval) was collected from six locations across the site (outside of the influence of the historic removal action) on December 22, 2003 and analyzed for PAHs and metals. Sample locations were discussed during a site visit conducted by members of the Eco Subgroup on December 4, 2003. The ecological assessment presented in Section 4.0, including the problem formulation, effects evaluation, exposure estimate, and risk calculation, will be revised to include an evaluation of the surface soil exposure pathway.**

32. On page 4-1, Section 4.1.2, Available Analytical Data, indicates that both surface soil and subsurface soil (8 to 34 feet bgs) data were not used in the ecological risk assessment. This appears to be a data gap.

Response: **Clarification is required relative to this comment. Surface soil samples were not collected during previous field investigations. Therefore, a quantitative evaluation of the surface soil exposure pathway was not possible. As discussed in the response to Comment No. 31, surface soil samples were collected on December 22, 2003 to address BTAG concerns regarding the uncertainty associated with the potential contamination of surface soil resulting from spillage/overflow during fire training activities and subsurface soil removal activities. Section 4.0 will be revised to reflect the quantitative evaluation of the surface soil data.**

However, analytical data for subsurface soil (12 to 34 feet bgs) were not used in the evaluation for SSA 3 because subsurface soil from this depth interval does not represent a realistic exposure pathway.

33. On page 4-2, Section 4.1.2 also indicates that no pesticide, PCB, or metals data are available for surface water and no sediment data were collected from this SSA. Again, these appear to be data gaps.

Response: **The Navy recognizes that clarification is required relative to this comment. The Navy agrees with the comment regarding sediment. Based on an agreement reached during a meeting on December 3, 2003 between members of the Tier II Eco Subgroup, surface sediment (0 to 4-inch depth interval) and subsurface sediment (4 to 8-inch depth interval) were collected from three locations within the unnamed tributary to Indian Field Creek on December 22, 2003 and analyzed for PAHs and metals. Sample locations were identified during a site visit conducted by members of the Tier II Eco Subgroup on December 4, 2003. The following changes will be made directly to the document: The ecological assessment presented in Section 4.0, including the problem formulation, effects evaluation, exposure**

estimate, and risk calculation, will be revised to include an evaluation of the sediment exposure pathway.

However, it was also agreed during the December 3, 2003 meeting that the collection and analysis of surface water samples from the unnamed tributary to Indian Field Creek for pesticides, PCBs, and metals was not necessary. This decision is supported by the site history (fire training burn pits [see Section 4.1.1]), the groundwater data presented in Appendix A-1 (pesticides and PCBs were not detected in groundwater), and the groundwater risk evaluation presented in Section 4.6.1 for metals.

34. On page 4-2, Section 4.1.3, Preliminary Conceptual Model, states, "Because surface soils in the area of the trailer and former burn area have been removed and the training activities in the former oil pits were subsurface in nature, surface soil contamination is not a concern at this SSA." It is not clear if these are the only surface soils at risk at this SSP. Are the surface and subsurface soils near the burn pits and in the vicinity of the burn pits presenting risk to ecological receptors? This situation has been shown to exist and has been addressed at other Naval facilities. Regardless, the logic trail needs to be clearly documented.

Response: **The Navy agrees with the comment (see the response to Comment No. 31).**

35. On page 4-2, Section 4.1.3, Preliminary Conceptual Model, states that contaminants in subsurface soils may have leached to groundwater and migrated to the aquatic habitat west of the site. Information should be presented on the depth of groundwater relative to the depth of remaining soil contamination. This information will be useful for determining whether subsurface contamination could be transported to surface water via groundwater. The lack of sediment data creates significant uncertainty as to whether contaminants have historically been transported to the small stream west of the site.

Response: **The Navy recognizes that additional information is needed for clarification relative to this commnet. Please refer to the response to Comment No. 33 regarding sediment. Depth to groundwater at SSA 3 is approximately 30 feet below ground surface (bgs), while the depth of the remaining contamination is 6 to 8 feet below ground surface. Given that groundwater is at least 22 feet below the remaining soil contamination, leaching of chemicals from surface soil and/or subsurface soil by infiltrating precipitation and transport to surface water and sediment with groundwater is not likely to represent a significant transport pathway at SSA 3. The groundwater transport model (see Appendix B of the report) supports this conclusion. Information regarding the depth to groundwater relative to the depth of remaining subsurface soil contamination will be added to Section 4.1.3 (Page 4.2).**

36. On page 4-2, Section 4.1.3 indicates that terrestrial receptors exposed to drinking water is considered negligible and therefore, has not been evaluated. It is not clear that the logic presented to support this position is correct and therefore, it is likely a data gap. This comment also applies to other receptors.

Response: **The Navy agrees with the comment. As discussed in the response to Comment Nos. 31 and 33, Section 4.0 will be revised to include an evaluation of the surface soil and sediment exposure pathways. The terrestrial and aquatic food web models used in this evaluation will include drinking water exposures to chemicals in surface water.**

37. On page 4-3, Section 4.1.3 states, "Though potentially significant and complete, exposures via the sediment pathway were not evaluated given the lack of available sediment data. This represents a data gap and needs to be addressed more quantitatively than this quote indicates.

Response: **The Navy agrees with this comment. Please see the response to Comment No. 33.**

38. On page 4-3, Section 4.1.3 indicates the only exposure route evaluated was for aquatic lower trophic level receptors and direct contact with surface water and groundwater. Based on previous comments, this seems insufficient for the ERA at this SSP.

Response: **The comment is noted and the changes identified below will be made to the document. Note that surface soil and sediment were not collected during previous investigations. As such, exposure routes associated with these media could not be evaluated in the ecological assessment. As discussed in the response to Comment Nos. 31 and 33, surface soil and sediment samples were collected on December 22, 2003. The analytical data for these samples will be used to quantitatively evaluate the following surface soil and sediment exposure routes:**

- **Direct contact with surface soil (terrestrial invertebrates)**
- **Direct contact with sediment (aquatic invertebrates and fish)**
- **Root uptake from surface soil and sediment (terrestrial and aquatic plants, respectively)**
- **Ingestion of surface water (upper trophic level receptors)**
- **Incidental ingestion of surface sediment (upper trophic level aquatic receptors)**
- **Incidental ingestion of surface soil (upper trophic level terrestrial receptors)**
- **Ingestion of plant and/or animal tissue (upper trophic level terrestrial and aquatic receptors)**

As discussed in the response to Comment No. 36, the food web exposure models for upper trophic level aquatic and terrestrial receptors also will include surface water exposures via ingestion. Section 4.0, including Section 4.1.3, will be revised to reflect the quantitative evaluation of the surface soil, sediment, and surface water exposure pathways.

39. On page 4-3, Section 4.2, Effects Evaluation, needs to include the identified data gaps.

Response: **The Navy agrees with the comment. As discussed in the responses to Comment Nos. 31 and 33, Section 4.0, including Section 4.2 (page 4-3) will be revised to include the surface soil and sediment exposure pathways.**

40. On page 4-5, Section 4.4.1.2, Conservative Risk Calculation for Surface Water, indicates pesticide, PCB, and metals data were not available for surface water at SSA 3. This lack of data appears to be a data gap which needs to be filled.

Response: **The Navy disagrees with the comment. It was agreed upon during a December 3, 2003 meeting attended by members of the Eco Subgroup that the collection and analysis of surface water samples for pesticides, PCBs and metals would not be necessary. This decision is supported by the groundwater data presented in Appendix A-1 (pesticides and PCBs were not detected in groundwater) and the groundwater risk evaluation presented in Section 4.6.1 for metals. Based on this discussion, no further action is deemed necessary.**

41. On page 4-5, Section 4.6, Refined Risk Calculation, needs to use the mean chemical concentrations to determine the range of risk for each COPC identified from the SERA. This comment has multiple places for application in this report.

Response: **Based on the response to comment Nos. 19, 20, and 27, the Navy does not believe that further action is warranted. It is noted that mean HQs were used in conjunction with other lines of evidence (e.g., bioavailability, statistical comparisons to background concentrations, and the evaluation of the spatial pattern and magnitude of detections above and below screening value) to determine if ecological COPCs identified in the conservative risk calculation warranted identification as a potential risk driver.**

42. On page 4-5, Section 4.6 states, "...non-detected chemicals identified as COPCs due to a lack of screening values were not considered further for that medium in the refined assessment." There is no justification for this and this appears to be an incorrect conclusion. It is not clear that "...concentrations of these chemicals are near zero and they are not present at ecologically significant concentrations." This needs to be more adequately explained.

Response: **The Navy disagrees with this comment. Please refer to the response to Comment No. 29.**

43. On page 4-6, Section 4.6.1, Refined Risk Calculation for Groundwater, indicates there are a number of chemicals that have a high affinity for sediment, as opposed to dilution in groundwater. As far as the text is concerned, it does not appear that these chemicals were quantitatively evaluated in this report to support this conclusion. Again, this section also indicates that these chemicals would not be able to reach the nearest receptor in less than 115 years. However, there is no indication that the concentrations present at that time would still present ecological risk.

Response: **Section 3.1.3 (Page 3-6) contained a discussion of physical-chemical characteristics that influence the transport and partitioning of chemicals into particular environmental compartments. The specific physical-chemical characteristics discussed included the organic carbon partition coefficient (k_{oc}) and the octanol-water partition coeffcicient (k_{ow}). This section also referenced a table (Table 3-4) listing k_{oc} and k_{ow} values for chemicals evaluated by the food web models. The discussion presented in Section 3.1.3, as well as the kow and koc values listed in Table 3-4 do indicate that the chemicals in question (non-detected SVOCs, pesticides, and PCBs) are not likely to be present within the dissolved fraction of groundwater. A quantitative evaluation of SVOCs, pesticides, and PCBs in downgradient surface water and sediment was not possible due to the lack of sediment and surface water analytical data. As discussed in the response to Comment No. 33, surface and subsurface sediment samples were collected from three locations within the unnamed tributary to Indian Field Creek on December 22, 2003 and analyzed for PAHs and metals. The media sampled and the list of parameters was agreed upon during a Tier 1 meeting on December 3, 2003. The collection of sediment samples will allow for a quantitative evaluation of the sediment exposure pathway. However, based on the parameter list, the evaluation will be limited to PAHs.**

Section 4.1.2 (Page 4-2), as well as Appendix B provided the necessary information regarding chemical concentrations estimated by the groundwater model. As stated in Section 4.1.2, naphthalene, 2-methylnaphthalene, and phenanthrene would not travel more

than 10 feet from their point of release (Fire Training Pit Nos. 2 and 3). Trichloroethene would not travel more than 130 feet from the point of release, while the first generation daughter compound (cis-1,2-trichloroethene) could travel 160 feet and have a concentration of 8 ug/L. Given that the groundwater seep entering the unnamed tributary to Indian Field Creek is approximately 300 feet from the source areas, the groundwater model does not predict naphthalene, 2-methylnaphthalene, phenanthrene, trichloroethene, and cis-1,2-trichloroehtene transport with groundwater to the unnamed tributary in 115 years. This information will be incorporated into Section 4.6.1. No further action beyond inclusion of this information is deemed necessary.

44. On page 4-6, Section 4.6.1 indicates that a statistical comparison of cadmium to background was not appropriate '...given heavy censoring of the dataset." It is not clear what this condition is or why this condition is only applicable to cadmium.

Response: **As a point of clarification relative to this comment, censoring of data occurs when a given data set (site or background) has a large number of non-detected results. Heavily-censored data commonly violate the assumptions underlying standard univariate statistical procedures. For example, in order to perform a t-test or Wilcoxon rank sum test (statistical methods evaluating the mean of the distributions), the detection frequency in each data set must be 85 percent and 60 percent, respectively. Statistical evaluations on the right tail of the distributions (slippage test and quantile test) require at least one detected result in the background data set. As evidenced by Table 4-3, the cadmium data set was comprised of 60% non-detects at SSA 3 and 100% non-detects in background. As such, statistical evaluations on the mean and right tail of the distributions could not be performed. In addition to the distributional statistics, an evaluation using proportional statistics could not be performed since there were no detected site concentrations greater than the largest non-detected value in the background data set.**

45. On page 4-6, Section 4.6.1 does not indicate if aluminum is greater in concentrations other than background, so it is unclear if this is the correct conclusion.

Response: **The Navy does not agree with this comment. The discussion in Section 4-6 presented several lines of evidence that were to evaluate aluminum. The first line of evidence evaluated was the mean HQ value (53.17). The site groundwater data also were statistically compared to base-wide background concentrations. This evaluation, presented in Table 4-3, showed that aluminum concentrations in SSA 3 groundwater were elevated above background concentrations. In addition to a comparison to base-wide groundwater data, the SSA 3 groundwater data also were compared to analytical data for an upgradient well (A3GW01 [see Appendix A-1 for A3GW01 groundwater data]). The maximum aluminum concentration detected in SSA 3 groundwater (12,400 K ug/L) exceeded the aluminum concentration in the upgradient monitoring well (7,740 K ug/L). Note that a statistical evaluation could not be performed since the upgradient background data were limited to a single data point. Based on a mean HQ greater than 1.0 and the comparison to base-wide and upgradient groundwater data, aluminum would appear to be site-related and presenting risks above background levels. Given that activities at SSA 3 were subsurface in nature (i.e., burn pits), site subsurface soil data, collected during monitoring well installation, were statistically compared to base-wide subsurface soil data (see Table 4-4). The statistical comparison demonstrated that subsurface soil aluminum concentrations at SSA 3 are statistically equivalent to background subsurface soil concentrations. Based on**

the subsurface soil statistical evaluation, it was concluded that aluminum concentrations detected in SSA 3 groundwater are not attributable to a release.

Furthermore, as was discussed in the last paragraph on Page 4-6, the groundwater samples collected at SSA 3 had elevated turbidity levels (greater than 200 NTUs). Therefore, it is likely that the potential risk calculated from the analytical data for total metals is overstated since a significant portion of the total concentration is likely attributable to metals adhered to suspended sediments. As evidenced by Appendix A.2, aluminum was not detected within the dissolved fraction of each groundwater sample. Given that the dissolved metal represent the fraction that will migrate with groundwater, the lack of aluminum detections within the dissolved fraction indicates that aluminum is not migrating with groundwater to downgradient surface water and sediment at ecologically significant concentrations. Based on the discussion and rational presented above, the conclusion presented in the text is deemed appropriate and the Navy does not believe that further action is necessary.

46. On page 4-7, Section 4.6.1 summarizes that no chemicals are identified as ecological COCs for SSA 3 groundwater. Based on the previous comments, it is not clear that this summary is correct.

Response: **The Navy disagrees with this comment. Please see the responses to Comment Nos. 42, 43, 44, and 45 (comments specific to groundwater).**

47. On page 4-7, Section 4.6.2, Refined Risk Calculation for Surface Water, states, "No pesticides, PCBs, or metals data were available for surface water samples." This appears to be a data gap, which needs to be filled.

Response: **The Navy disagrees with this comment. Please see the response to Comment No. 33.**

48. On page 4-9, Section 4.8, Conclusions and Recommendation, states, "...no chemicals are identified as ecological COCs for SSA 3." Based on the previous comments, it is not clear that this conclusion is correct.

Response: **As discussed in the responses to Comment Nos. 31 and 33, surface soil and sediment samples were collected on December 22, 2003. Analytical data for these samples will be used to quantitatively evaluate the surface soil and sediment exposure pathways. If chemicals are identified as potential risk drivers in this evaluation, Section 4.8 will be revised accordingly. However, based on the evaluation presented in Section 4.0 and the responses to comments specific to surface water and groundwater, the Navy does not believe that changes to the conclusions and recommendations regarding surface water and groundwater are deemed necessary.**

49. On Table 3-1, Preliminary Assessment Endpoints, Risk Hypotheses, And Measurement Endpoints, SSA 3 should be listed for terrestrial soil invertebrates and soil plant communities. Also, terrestrial amphibians needs to be added to the terrestrial habitats and amphibians need to be added in the wetland and aquatic habitats. Finally, the note on this table indicates exposure pathways are potentially complete at SSA 3; however, there is insufficient data with which to evaluate this pathway. This represents a data gap and this document either needs to adequately explain why it is alright for these data to be missing or else these data need to be collected.

Response: **Based on a December 3, 2004 WPNSTA Ecological Subgroup meeting, additional soil data was collected from SSA 3 to address terrestrial data gaps. Please see the responses to Comment Nos. 31 and 33.**

Site Screening Area 4 - Weapons Casing/Drum Disposal Area

50. On page 5-1, Section 5.1.2, Available Analytical Data, there is no subsurface soil data for this SSA. This is a data gap, which needs to be filled.

Response: **As discussed on Page 5-1, Section 5.1.1 (Site History and Environmental Setting), SSA 4 consists of a wooded ravine within which debris was deposited. Because the material at SSA 4 was deposited onto the surface and not the subsurface, any potential source release would be to surface soil Furthermore the topography of the SSA (a ravine) indicates that rain water would not primarily percolate through the soil, but would flow in a downgradient direction to the unnamed tributary of Roosevelt Pond, thus minimizing vertical transport of contaminants with infiltrating precipitation. As such, it is reasonable to assume that the concentration of contaminants would be greatest in surface soil where ecological receptors would be expected to receive the greatest exposure. Therefore, the lack of subsurface soil data from the 6 to 24-inch depth interval for this SSA does not represent a data gap that would warrant the collection of subsurface soil samples. Therefore, no further clarification will be added to the document.**

51. On page 5-1, Section 5.1.2 lists nitramine compounds twice in the same sentence (last sentence on this page). It is not clear if the second nitramine compounds needs to be deleted or traded with another chemical group.

Response: **The Navy agrees with this comment. The second "nitrosamine compound" listing will be deleted from the text (does not require substitution with another chemical group).**

52. On page 5-2, Section 5.1.2 indicates some parameters "...were collected from select sediment stations." Since there were only 4 sediment stations, it is not clear if these parameter data are sufficient.

Response: **The Navy disagrees with this comment and offers the following points of clarification. The engineering parameters listed on Page 5-1, Section 5.1.2 are pH, total organic carbon (TOC), cation exchange capacity, grain size, and percent moisture. TOC, percent moisture, and grain size were measured in each surface and subsurface sediment sample, while bulk density, pH, and cation exchange capacity were measured in one surface sediment sample (A4SD01-01) and one subsurface sediment sample (A4SD01-02). These data were not used in the conservative and refined risk calculation. As such, the number of samples measured for these parameters is not relevant. Therefore, changes to the document are not deemed necessary.**

53. On page 5-2, Section 5.1.3, Preliminary Conceptual Model, does not appear to address amphibians or subsurface soil data.

Response: **The Navy agrees that parts of this comment are relevant. Section 5.1.3 (Page 5-2) will be revised to include terrestrial amphibians. However, the Navy disagrees with the remaining portion of this comment. As discussed in Section 5.1.2, two subsurface soil**

samples were collected at SSA 5. One sample was collected form the 18 to 20-foot depth interval, while the second sample was collected from the 34 to 36-foot depth interval. Based on their depth, these subsurface soils do not represent a realistic exposure pathway bgs. Subsurface soil data were not available from the 6-24-inch depth interval. However, as discussed in the response to Comment No. 50, the Navy does not believe that the absence of data from this depth interval warrants the collection of subsurface soil data.

54. On page 5-7, Section 5.6.1, Refined Risk Calculation for Surface Soil, needs to estimate, quantitatively or qualitatively, the actual risk from cyanide.

Response: **As evidenced by Table 5-1, total cyanide was not detected in any of the surface soil samples collected at SSA 4. Cyanide was identified as an ecological COPC in the conservative risk calculation because the maximum reporting limit exceeded the surface soil screening value (see page 5-4, Section 5.4.1.1). The mean concentration of this non-detected inorganic also exceeded the surface soil screening value. The screening value used in the conservative and less conservative risk calculations is based on free cyanide. The text on Page 5-7, Section 5.6.1 references a discussion presented in Section 3.4 that was used as the primary basis for the elimination of total cyanide from further evaluation. In lieu of repeating this discussion in Section 5.6.1, the discussion was instead referenced. Note that a quantitative or qualitative discussion of cyanide that estimates the actual risk from cyanide can not be performed since free cyanide data are not available. Therefore, no changes to the document are deemed necessary.**

55. On page 5-8, Section 5.6.1 indicates that detected concentrations of acetone were compared to other VOC screening values. It is not clear why this comparison to other VOC screening values was done, or how helpful it is to addressing ecological risk from acetone. This type of comment also applies to other chemicals.

Response: **The document will be revised to include the following information in order to clarify the issue. There are several examples from the literature that support the use of surrogate values based on chemical class. The National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (Buchman 1999) references screening values developed for either a chemical class in general or from the most conservative value available in a chemical class when a chemical-specific screening value is not available. This approach is employed for aromatic and halogenated volatiles, SVOCs, PAHs, nitroaromatics, and pesticides. The USEPA (1999 and 1995) also reports surrogate values for individual chemicals when a chemical-specific values is not available. The evaluation presented in Section 5.6.1 (Page 5.8) can be focused by limiting the comparison to available screening values for other ketones that included on the TCL list. As evidenced by Table 3-2, the only ketone included on the TCL organics list with an available screening value is 4-methyl-2-pentanone. The maximum detected acetone concentration in SSA 4 surface soil (35 ug/kg) is two orders of magnitude below the 4-methyl-2-pentanone surface soil screening value (10,000 mg/kg). A comparison to screening values for all VOCs was done as a measure of conservatism. The uncertainty section (Section 3.4.2) will be revised to include a discussion of the uncertainties related to the use of surrogate chemicals in the screening-level risk calculation.**

Buchman, M.F. 1999. NOAA Screening Quick Reference Tables. NOAA HAZMAT Report 99-1. National Oceanic and Atmospheric Administration, Seattle, WA. 12 pp.

USEPA. 1995c. Region III - Biological Technical Assistance Group Screening Levels (Revised). Region III, Philadelphia, Pennsylvania. August 1995.

USEPA. 1999a. Screening-Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA/530/D-99/001A.

56. On page 5-8, Section 5.6.1 states, "Due to their limited frequency of detection and low detected concentrations, it is unlikely that these chemicals are posing unacceptable risks to population of terrestrial invertebrates and plants at this site." It is not clear that frequency of detection is appropriate at this site. Also, it is not clear that low concentrations equate with acceptable risk.

Response: **The Navy agrees with the comment. The referenced text refers to a discussion regarding carbazole and dibenzofuran. Carbazole and dibenzofuran were each detected in one of seven surface soil samples (A04SS04) at 230 J ug/kg and 100 J ug/kg, respectively. These two SVOCs lack a surface soil screening value. As such, it is agreed that low concentrations do not equate with acceptable risk. Given that seven surface soil samples were collected at SSA 5, it is also agreed that frequency of detection is not an appropriate line of evidence at this site. The text in Section 5.6.1 (Page 5-8) will be revised to include terrestrial plant, invertebrate, and microbial toxicity test data reported by Sverdrup et al. (2001, 2002a, 2002b, 2003) to further support the recommendation of no further evaluation.**

Sverdrup, S.E., A.E. Kelley, P.H. Krogh, T. Nielson, and J. Jensen. 2001. Effects of Eight Polycyclic Aromatic Compounds on the Survival and Reproduction of the Springtail *Folsomia fimetaria L.* (Collembola, Isotomidae). Environ. Toxicol. and Chem. 20:1332-1338.

Sverdrup, S.E., J.E. Jensen, A.E. Kelly, P.H. Krogh, and J. Stenersen. 2002a. Effects of Eight Polycyclic Aromatic Compounds on the Survival and Reproduction of *Enchytraeus crypticus* (Oligochaeta, Clitellata). Environ. Toxicol. Chem. 21:109-114.

Sverdrup, L.E., P.H. Krogh, T. Nelson, and J. Stenersen. 2002b. Relative Sensitivity of Three Terrestrial Invertebrate Tests to Polycyclic Aromatic Compounds. Environ. Toxicol. Chem. 21:1927-1933.

Sverdrup, L.E., F. Ekelund, P.H. Krogh, T. Nielson, and K. Hohnsen. 2002c. Soil Microbial Toxicity of Eight Polycyclic Aromatic Compounds: Effects on Nitrification, the Genetic Diversity of Bacteria, and the Total Number of Protozoans. Environ. Toxicol. Chem. 21:1644-1650.

Sverdrup, L.E., P. H. Krogh, T. Nelson, C. Kjaer, and J. Stenersen. 2003. Toxicity of Eight Polycyclic Aromatic Compounds to Red Clover (*Trifolium pratenze*), Ryegrass (*Lolium perenne*), and Mustard (*Sinapsis alba*). Chemosphere. 93-1003

57. On page 5-9, Section 5.6.1, Refined Risk Calculation, states that toxicological data indicates that concentrations of polycyclic aromatic hydrocarbons (PAH) less than 25 ppm would be protective of soil invertebrates. The section further states that PAH concentrations measured at the site were orders of magnitude below these values, with a maximum concentration of 3.1 ppm for fluoranthene. Because the mode of action for many of the PAHs are similar, more support would be given to this argument if PAHs for a given sampling location were summed and compared to the 25 ppm invertebrate value. This comment also applies to SSA 5 in Section 6.6.1 on page 6-8.

Response: The Navy agrees with the comment. Individual PAH concentrations detected at each sampling location will be summed and compared to the 25 mg/kg invertebrate value. The text in Sections 5.6.1 (Page 5-9) and 6.6.1 (Page 6-8) will be revised to include this comparison.

58. On page 5-9, Section 5.6.1 it is not clear that once a site concentration has exceeded the screening value that this can lead to a conclusion that vanadium is not identified as an ecological COC and no further evaluation is recommended.

Response: **The Navy disagrees with the comment and offers the following point of clarification. As discussed in Section 5.6.1 (Page 5-9), the maximum vanadium concentration detected in SSA 4 surface soil (30.6 mg/kg) was less than the maximum vanadium concentration detected in the background surface soil data set (31.3 mg/kg). Given that the maximum concentration occurred in the background data set, no further evaluation was recommended.**

59. On page 5-9, Section 5.6.1 indicates for iron and chromium, the concentrations "...were significantly elevated over their respective screening values by sometimes orders of magnitude, indicating uncertainty in the value's ability to predict site-associated impacts." From the information provided, it is not clear that the appropriate indication has been drawn.

Response: **The Navy agrees with the BTAG comment. The referenced discussion will be removed from the test in Section 5.6.1 (Page 5-9). The text in this section regarding iron will also be revised to incorporate recent information contained within the USEPA document entitled *Ecological Surface Soil Level for Iron* (USEPA 2003).**

USEPA. 2003. Ecological Surface Soil Level for Iron (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-68.

60. On page 5-10, Section 5.6.1 indicates no chemicals are identified as ecological COCs for SSA 4 surface soils and no further evaluation is recommended. Once previous comments have been addressed, it is not clear that this indication would remain unchanged.

Response: **Based on the response to Comment Nos. 50 through 59, the Navy does not believe that the conclusion of no further evaluation will change. However, it is noted that changes to the media-specific screening values (see response to Comment Nos. 6 through 9) may result in the identification of ecological COPCs for surface soil at SSA 5. If COPCs are identified, the text in Section 5.6.1 (page 5-10) will be revised as necessary.**

61. On page 5-12, Section 5.6.3, Refined Risk Calculation for Surface Sediment, indicates that 2 chemicals are common laboratory contaminants and are likely not representative of site influences. This may not be true and this is where a comparison with laboratory controls would assist in supporting or refuting this conclusion.

Response: **The Navy agrees with the comment (see response to Comment No. 18). The text in Section 5.6.3 (Page 5-12) will be revised to include a quantitative evaluation of acetone and 2-butanone. Specifically, the recommendation for no additional evaluation will be supported by a comparison of maximum acetone and 2-butanone concentrations (180 J ug/kg and 51 J ug/kg) to acetone and 2-butanone sediment quality guidelines 2,265 ug/kg and 2,928 ug/kg, respectively) developed by Di Toro and McGrath (2000).**

DiToro, D.M. and J.A. McGrath. 2000. Technical Basis for Narcotic Chemicals and Polycyclic Aromatic Hydrocarbon Criteria. II. Mixtures and Sediments. Environ Toxicol. and Chem. 19:1971-1982.

62. On page 5-18, Section 5.7, Uncertainties, indicates groundwater data, though available, were not evaluated for direct exposures at SSA 4. It is not clear if groundwater was evaluated as a potential source of contamination to surface water and sediment.

Response: **Groundwater will be qualitatively evaluated (please see the response to Comment No. 12).**

Site Screening Area 5 - By-Pass Road Landfill

63. On page 6-1, Section 6.1.2, Available Analytical Data, indicates subsurface soil data were not evaluated in this risk assessment. This appears to be a data gap.

Response: **The Navy disagrees with this comment. As discussed in Section 6.1.1 (Page 6-1), SSA 5 consists of a wooded ravine within which debris was deposited. Because the material at SSA 5 was deposited onto the surface (not a subsurface disposal), any potential source release would be to surface soil, furthermore, the topography of the SSA (a ravine) indicates that rain water would not primarily percolate through the soil, but would flow in a downgradient direction to the unnamed tributary of Roosevelt Pond thus minimizing vertical transport of contaminants with infiltrating precipitation. As such, it is reasonable to assume that the concentration of contaminants would be greatest in surface soil where ecological receptors would be expected to receive the greatest exposure. Therefore, the lack of subsurface soil data from the 6 to 24-inch depth interval for this SSA does not represent a data gap that would warrant their collection. Therefore, the Navy believes that changes to the document are not warranted.**

64. On page 6-2, Section 6.1.3, Preliminary Conceptual Model, indicates that due to their depth, subsurface soils do not represent an exposure route to terrestrial receptors. Subsurface soil are traditionally defined as being between 6 and 24 inches below ground surface. Because data from this zone was not taken, this needs to be better explained.

Response: **A clarification is required relative to this comment. As discussed in Section 6.1.2 (Page 6-1), a total of six subsurface soil samples were collected at SSA 5 from depths greater than twelve feet bgs. Given that subsurface soil samples collected from depths greater than twelve feet bgs do not represent a reasonable exposure point for ecological receptors, they were not evaluated by the ecological evaluations. Furthermore, based on the response to Comment No. 63, the Navy does not believe that collection of subsurface soil from the 6 to 24-inch depth interval is warranted.**

65. On page 6-7, Section 6.6.1, Refined Risk Calculation for Surface Soil, indicates the screening value for nitrobenzene (2260 ug/kg) was used to assess effects from tetryl (200 to 550 ug/kg with reporting limits of 480 to 620 ug/kg). This use of this non-tetryl screening value does not appear appropriate for evaluating the ecological effects of tetryl.

Response: **The Navy disagrees with this comment (please see the response to Comment No. 55). However, the text will be revised to include a comparison of tetryl concentrations to screening values for other nitroaromatic compounds.**

Site Screening Area 21 - Roosevelt Pond

66. On page 7-1, Section 7.1.2, Available Analytical Data, states that sampling activities at this site were conducted as part of three separate investigations including sampling of fish tissue. However, the section further states that because of differences in sampling protocol, lack of validation, and the age of the data set, data collected during these efforts were not included in the exposure estimate for receptors in Roosevelt Pond. Fish tissue data could still provide valuable information on whether contaminants are accumulating in biota in the pond, particularly since no tissue data is available in the current data set to evaluate bioaccumulation. The data could also be used qualitatively to determine the potential for exposure to upper trophic level receptors. Therefore, all available biological data should be used to evaluate bioaccumulation in biota and potential risk for receptors living in Roosevelt Pond.

Response: **The Navy disagrees with the comment. While tissue data can provide quantitative information on the bioaccumulation of contaminants in fish, the available fish tissue data for Roosevelt Pond were not used in the ecological evaluation, nor should they be used for the following reasons:**

- **The quality of the fish tissue analytical data is questionable due to the unknown level of laboratory data quality objectives and the apparent lack of independent, third party data validation. Therefore, these data were deemed unacceptable for use in the ecological evaluation. It is noted that lack of independent, third party validation was the primary reason for excluding these data from the ecological evaluation at SSA 21.**

- **Based on the statistical evaluations presented in Section 7.6.5 (Page 7-16) and Tables 7-10 and 7-11) for aquatic food web exposures, the concentration distributions of detected chemicals identified as ecological COPCs in the conservative evaluation for surface sediment (cadmium, chromium, copper, selenium, and zinc) and subsurface sediment (arsenic, cadmium, chromium, copper, lead, mercury, and zinc) were found to be statistically equivalent to background concentrations. The single exception was cadmium. Statistical evaluations of the cadmium data sets could not be performed due to the lack of detections in background surface and subsurface sediment). However, as discussed in Section 7.6.5, no single detected concentration of this metal would result in a mean exposure dose greater than the NOAEL-based screening value.**

67. On page 7-1, Section 7.1.2, Available Analytical Data, indicates a number of historical surface water and sediment samples, reported back in at least 1993, are not included in this ecological risk assessment. These media data would help by supporting or refuting the data that is used in the ERA and the conclusions drawn.

Response: **Identical to the fish tissue data discussed in the response to Comment No. 66, the quality of the referenced surface water and sediment data is questionable due to the unknown level of laboratory data quality objectives and the apparent lack of third party**

validation. Therefore, these data were deemed unacceptable for use in the ecological evaluation. As such, it is not necessary to change the document.

68. On page 7-1, Section 7.1.2 indicates that 3 surface and subsurface soil borings were included in this ERA. It is not clear if these 3 soil boring data points are sufficient for this SSA.

Response: **Roosevelt Pond receives drainage from SSA 4 and 5, as well as storm water runoff from the Former Mine Assembly Plant No. 1. The soil borings were collected along drainage pathways leading from the Mine Assembly Plant No. 1 to determine if soils associated with the plant represent potential source areas for chemical migration to Roosevelt Pond. They were also collected so any contamination in Roosevelt Pond could be linked to a potential source area (SSA 4, SSA 5, or mine assembly plant).**

The concentration distributions for detected chemicals identified as ecological COPCs for mine assembly plant surface soil in the conservative evaluation were found to be statistically equivalent to background concentrations (see Section 7.6.2). Furthermore, chemicals were not identified in the conservative evaluation for Roosevelt Pond surface water and sediment that require additional evaluation (see Sections 7.6.2 and 7.6.3). Therefore, it can be concluded that historical activities at the mine assembly plant have not impacted Roosevelt Pond. The same can be concluded for current conditions. As such, the collection of additional samples is not warranted. It is important to note that the mine assembly plant is not an IR site or SSA, and pursuant to Navy Policy, use of funds must be linked to an IR site.

69. On page 7-1, Section 7.1.2 first indicates there were 15 surface water samples during the SSP and then indicates 18 surface water samples were evaluated. In addition, Figure 7-1 shows 16 surface water sample locations. These 3 surface water sample number appear confusing.

Response: **The Navy agrees that a correction is required in the text. The correct number of surface water samples evaluated is sixteen (as depicted on Figure 7-1). The text in Section 7.1.2 (Page 7-1) will be revised to reflect the correct number of samples.**

70. On page 7-2, Section 7.1.3, Preliminary Conceptual Model, does not list terrestrial amphibians as a potential ecological receptor. It is not clear why this receptor was left out.

Response: **The Navy agrees with this comment. Section 7.1.3 (Page 7-2) will be revised to include terrestrial amphibians.**

71. On page 7-2, Section 7.1.3, Preliminary Conceptual Model, states that the source of contamination at the site is storm water and surface runoff from the upgradient industrial area and sites surrounding the pond. Other than SSAs 4 and 5, no information is provided on the nature of the activities or discharges that could have released into Roosevelt Pond from these industrial areas. A more detailed description of these industrial activities should be provided.

Response: **The Navy agrees that additional information is needed in the text for clarification. The industrial area referred to is the former Mine Assembly Plant No. 1 (Building Nos. 79, 80, 87, 88, 428, and 440). Section 7.1.3 (Page 7-2) will be revised to include a description of activities conducted there.**

72. On page 7-12, Section 7.6.3, Refined Risk Calculation for Surface Sediment, indicates that ERM values were used for comparison of site data. It is not clear that ERM values are appropriate for comparison because they are defined as levels of the chemical that cause risk to 50 percent of the dataset. In effect, this would appear to be too high to represent chronic effects.

Response: **The Navy agrees that ER-M values are not appropriate. The comparison of maximum detected 4,4'-DDT and 4,4'DDE sediment concentrations to ER-M values will be removed from Section 7.6.3 (Page 7-12).**

73. On page 7-13, Section 7.6.4, Refined Risk Calculation for Subsurface Sediment, indicates that mean chemical concentrations producing mean HQs less than 1.0 means these chemicals are not risk-driving chemicals and are not recommended for further evaluation. Mean chemical concentrations need to be used to define a range of risk associated with a particular chemical. Therefore, using mean chemical concentrations this way does not support automatically the conclusion of not being a risk driver nor the recommendation of no further evaluation.

Response: **The Navy disagrees with the comment and offers the following points for clarification. The referenced text specifically applies to five non-detected VOCs, five non-detected SVOCs, three non-detected pesticides, and one non-detected metal with mean HQs less than 1.0. Note that one or more of the lines of evidence used for non-detected chemicals with HQs greater than 1.0 also apply to these non-detected chemicals. Furthermore, it would not be reasonable or appropriate to recommend further investigation for chemicals with analytical data that do not suggest a source is present or a release has occurred (please see the response to Comment No. 29). No further changes in the document are deemed necessary.**

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