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LETTER REGARDING U S NAVY RESPONSE TO FINAL DRAFT REMEDIAL INVESTIGATION FOR OPERABLE UNIT 3 (OU 3) NTC ORLANDO FL
11/12/1998
HARDING LAWSON ASSOCIATES

03.01.03.0003
ID- 00104

Harding Lawson Associates

November 12, 1998

Commanding Officer
SOUTHNAVFACENGCOM
2155 Eagle Drive
North Charleston, SC 29419-9010

ATTN: Ms. Barbara Nwokike, Code 187300

Subject: **Operable Unit 3**
Final Draft Remedial Investigation Report
Response to Comments
NTC, Orlando
Contract: N62467-89-D-0317

Dear Barbara:

Attached are our responses to the FDEP and EPA comments to the Operable Unit 3 Final Draft Remedial Investigation Report. HLA scientists have coordinated the response effort by directly contacting the appropriate regulatory experts who submitted comments. Thus, we are confident that all concerns have been addressed.

If you have any questions or need additional information, please call me at (904) 269-7012.

Very Truly Yours,

Harding Lawson Associates

Richard P. Allen
Project Technical Lead

Attachments

cc: Wayne Hansel, Southern Division
Nancy Rodriguez, USEPA Region IV
David Grabka, FDEP
Lt. G. Whipple, NTC-Public Works Officer
Bob Cohose, BEI
Steve McCoy, Tetra Tech/NUS
Al Aikens, CH2M Hill
file

PROJECT REVIEW COMMENTS

NTC, Orlando Operable Unit 3
NTC Orlando
Final Draft Remedial Investigation Report

Florida Department of Environmental Protection - David Grabka

1. **For soils, the Department's September 29, 1995 Soil Cleanup Goals (SCGs) for Florida are used as possible screening criteria in the selection of Chemicals of Potential Concern (CPCs). These numbers are obsolete. The Soil Cleanup Target Levels (SCTLs) developed for Chapter 62-785, Florida Administrative Code (F.A.C.), finalized April 30, 1998, should be used instead as these represent the latest calculated risk-based levels. This will have an impact on several areas of the report as well as table and appendices.**

   The report will be revised to use the new SCTLS.

2. **For groundwater, the Department's June 1994 Florida Groundwater Guidance Concentrations (FGGCs) are used as possible screening criteria in the selection of CPCs. These numbers have been updated as Groundwater Cleanup Target Levels (GCTLs) in Chapter 62-785, F.A.C. These GCTLs should be used instead of the FGGCs as they represent the latest calculated risk-based cleanup target levels. This also will have an impact on several area of the report as well as tables and appendices.**

   The report will be revised to use the new GCTLS.

3. **The groundwater screening concentration of 50 ug/L for arsenic is incorrectly stated as a FGGC. The number is actually a primary drinking water standard for arsenic.**

   The footnotes in both groundwater COPC tables indicate that the value shown for arsenic is the primary drinking water standard. The screening concentration, however, will be updated to the new GCTL.

4. **It is stated in the report that MCPP (potassium (2-methyl-4-chlorophenoxy)propionate) does not have a FGGC. However, the GCTL for 2-methyl-(1,4-chlorophenoxy)propionic acid is listed as 7 ug/L. It may be that the two substances are essentially identical and have similar toxicities. This should be investigated to determine if sections and tables in the report should be revised.**

   The appropriateness of using the GCTL for 2-methyl-(1,4-chlorophenoxy) propionic acid as a surrogate for MCPP will be assessed and the report updated correspondingly.

5. **Table 7-19 on page 7-64 states that the FDEP Class III Fresh Water Quality Standard for MCPA is not available. The standard is listed as 72 ug/L in Table 3b in the Technical Report: Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-785, F.A.C. Surface water standards for several of the other semivolatile organic compounds, pesticides and**

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herbicides, stated as not available in Table 7-19, are also listed in Table 3b of the Technical Report.

The Freshwater Surface Water Criteria listed in Table 3b of Chapter 62-785, F.A.C. will be added to Table 7-19.

6. **In the Aquatic Receptors section on page 7-27, reproduction of the water flea (*Ceriodaphniadubia*) in sample 08G01301 is incorrectly compared to sample 08G01601. These samples were not run concurrently. Also, the reproduction numbers are statistically different between the lab control samples that were run concurrently with the two samples.**

The text on page 7-27 of the ERA acknowledges that the reproduction numbers from sample 08G01301 were statistically different from the internal laboratory control. Although the reproduction numbers from sample 08G01301 were not statistically different from the site reference sample, differences in the laboratory control results between the two days indicate that the results of the toxicity test are inconclusive. Further evaluation of the analytical data shows that concentrations of arsenic in sample 08G01301 slightly exceed the Florida Surface Water Quality Standards. The discussion of the groundwater toxicity testing at SA 8 will be modified to discuss the uncertainties associated with the test results as well as arsenic exceedances of the surface water criteria. In addition, the conclusion of no risk to aquatic receptors in Lake Baldwin associated with exposures to groundwater migrating to surface water will also be revised.

University of Florida - N. Christine Halmes and Stephen M. Roberts

Chapter 6: Human Health Risk Assessment

7. **Soil contaminants were screened against Florida Soil Cleanup Goals. These goals were cited from a September 27, 1995 FDEP Technical Guidance document. However, since the distribution of the 1995 tables, recent guidance from the USEPA has resulted in the modification of the equations and formulas used to derive health-based soil cleanup target levels. As a result, the soil cleanup target levels have changed somewhat. The most current soil cleanup target levels as well as equations and default variables can be found in the Technical Report for Chapter 62-785, F.A.C. Despite the use of incorrect Florida screening values, no contaminants were inappropriately screened out of the COPC selection process.**

The report will be revised to use the new SCTLS.

8. **HLA states on page 6-9 that the EPC for groundwater "is the lesser of the maximum detected concentration and the arithmetic mean of all samples calculated using one-half the associated**

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reporting limits." EPCs for groundwater are shown in Table 6-8 for SA 8 and in Table 6-17 for SA 9, and are (with the exception of one COPC for each SA) the arithmetic mean of all samples calculated using one-half the reporting limit for nondetects. This is contrary to Region IV guidance, which allows for the use of the arithmetic mean for groundwater only in the highly concentrated area of the plume. Including marginally contaminated samples (and, in this case, one-half the reporting limit for nondetects) has the potential to inappropriately lower the EPC. If a plume is not well characterized, then the maximum detected concentration should be used as the EPC. Risk calculations for exposure to groundwater at this site may therefore be substantially lower than those calculated according to the preferred methodology.

The EPCs will be recalculated to include only wells in the highly concentrated area of the plume.

9. **The conceptual site models for SA 8 and SA 9 are identical and are presented in Figures 6-1 and 6-8 respectively. Ingestion of groundwater should be considered a complete exposure pathway for future commercial workers, and dermal contact with groundwater should be considered a complete exposure pathway for future residents. If the area is developed for residential or commercial use, groundwater may be used as a potable water source for residences as well as industry. In the residential scenario, if groundwater is used as potable water, then dermal exposure could be a complete pathway.**

HLA evaluated exposure pathways presented in the workplan (residential ingestion and inhalation) that was agreed upon by the Orlando Partnering Team. The residential scenario was evaluated as the most conservative potential exposure pathway and would, therefore, be protective of commercial workers as well.

Additionally, the assessment of risks for dermal exposure to groundwater is not necessary because the groundwater risks at SAs 8 and 9 are above USEPA and FDEP acceptable risks from just the ingestion pathway. Therefore, it is not necessary to look at dermal contact as an exposure pathway for groundwater to make remediation decisions.

10. **Risk calculations and equation variables are described in Appendix E. Tables E-4-1 (page 1) and E-4-7 (page 12) present exposure parameters for the RME and central tendency resident adult and child. Respectively, exposed to surface soil. The equation variables and units for dermal intake should be consistent with guidance in RAGS. However the dermal surface area used by HLA for a child age 1-6 is 766 cm^2-year/kg. The derivation of this value is shown in Table E-7.1 (page E-7.4); one-fourth of the total surface areas for males ages 1-6 are divided by average body weights of males and females of the same age. These values are then summed from age 1-6 to produce an age-weighted surface area. The intake equation already**

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accounts for body weight, and the equation cannot be used with a weight-adjusted surface area; in the completed dermal exposure equation using HLA's inputs, the final units are mg-year/event-kg^2. The units should be mg/kg-day, and these are the units indicated for intake in the risk calculation spreadsheets (Appendix E-6). Therefore, the child surface area should be the average of the surface area available for contact for males and females. The average area available for dermal contact preferred by FDEP is to assume the exposure of the hands, one-half the arms and one-half the legs; it is not unreasonable, based on the Florida climate, that a receptor would wear shorts and a short-sleeve shirt. Using data in the Exposure Factors Handbook (1997) this value for children age 1-6 is derived as 1869 cm^2. Age-weighted surface areas are also used in equations for the adolescent trespasser/recreational user and should be adjusted to reflect the surface area available for contact of the trespasser/recreator in cm^2.

The child surface area will be revised to 1869 cm^2. The age-weighted surface area for adolescent trespasser/recreational user will be recalculated as indicated.

11. **In Table E-4-3 (page 5) equation variables are given for the RME site maintenance worker exposed to surface soil. The exposure frequency is listed as 30 days/year, with the source listed as 'assumption'. Some justification for this, such as a review of records and employee duties, should be given. Table E-4-4 (page 7) presents equation variables for the excavation worker exposed to surface soil. The exposure frequency is 30 days/year and the exposure duration is one year. As we have expressed to FDEP previously, we are concerned that risks for carcinogens, calculated using standard procedures, but based on very short or intermittent exposures, such as the excavation worker presented here, may be invalid. Therefore, risk based on non-cancer health effects should be performed for the excavation worker, and the higher of the two risks should be presented in the risk characterization portion of the RI.**

Because NTC Orlando is closing, the site maintenance worker exposure scenario is a hypothetical scenario; therefore, a record search or review of employee duties is not feasible. HLA feels that these exposure parameters are appropriate and reasonable assumptions given the imminent base closure, the proposed land reuse of this area as a recreational buffer zone, and the lack of any significant infrastructure that, even in a demolition scenario, would require prolonged exposure.

In response to the latter portion of FDEP's comment, cancer and non cancer risks for both the site maintenance worker and excavation worker risks are presented in the risk characterization section. The site maintenance worker has the higher of the two risks.

12. **Appendix E-8 presents the toxicity factors for COPCs. Dermal slope factors were derived by dividing oral slope factors by the oral absorption efficiency. This is the correct methodology,**

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but there appears to be no hierarchy for oral absorption sources. The ATSDR Toxicant Profiles are a good source for these values, and should be the primary source followed by the Hazardous Substance Database, then by Region IV default values. For example, HLA lists the oral absorption for DDD, DDE, and DDT as 20% and reference Siebert, 1976. The ATSDR Toxicant Profile for DDD, DDE, and DDT lists an oral absorption of 80%. Thus, HLA derives a dermal slope factor for DDT of 1.7E+00, when FDEP uses a value of 4.3E-01. Additionally, it is unclear why no dermal slope factors were derived for DDE and DDD, and no risk is calculated from dermal exposure to these contaminants.

Following EPA Region IV guidance, HLA uses IRIS as the primary source of dose response values, followed by HEAST as stated in the report Section 6.1.4.3. The dermal slope factor for DDT will be revised to 4.3E-01, and dermal slope factors will be derived for DDD and DDE using an oral absorption of 80% as indicated.

13. **Inhalation slope factors and reference doses were generally taken from HEAST. If no inhalation slope factor (or unit risk) or reference dose (or RfC) was available, one was not extrapolated and apparently no inhalation risk or hazard was calculated for those chemicals. For systemic toxicants, HLA should extrapolate inhalation toxicity values as follows: Inhalation reference dose (in the absence of a Rfc) = oral reference dose x GI absorption: inhalation slope factor (in the absence of a unit risk) = oral slope factor/GI absorption.**

HLA understands the current controversy associated with extrapolating oral toxicity values to inhalation values and, alternatively, the limitations of a risk assessment that effectively assigns a risk of zero to analytes with no inhalation toxicity values for the inhalation pathway. Therefore, after discussions with both USEPA Region 4 and FDEP risk assessors, HLA will include a discussion of risks from inhalation using extrapolated toxicity information in the uncertainty section of the risk assessment.

14. **Minor Technical Issue: On page 6-5, Table 6-1 (Essential Nutrient Screening Concentrations for Surface Soil and Groundwater) includes iron as an essential nutrient. While this may be technically correct, it is not one of the essential nutrients that may be 'screened out' of the COPC list according to Region IV guidance. The groundwater screening concentration developed for iron in groundwater is listed as 13,267 ug/L. The Florida secondary standard for iron in groundwater should have been listed. It should be noted that, in the COPC selection process, iron was correctly screened against the secondary standard and was carried through the selection process as a COPC for both SAs.**

Minor Technical Issue: Also in Table 6-1, the groundwater screening concentration developed for sodium is listed as 396,022 ug/L. The Florida primary standard for sodium in

Florida Department of Environmental Protection (Continued)

groundwater (160,000 ug/L) should be listed instead; this standard was correctly used in the COPC screening process (Table 6-5).

A sentence will be added to the report explaining that the essential nutrient values for iron and sodium were not used for screening but may be considered in the uncertainty analysis of the risk assessment if they are risk drivers.

Chapter 7: Ecological Risk Assessment

15. **The surrogate ecological receptor species for SA 8 and 9 are described in Table 7-5 (page 7-21) and Table 7-17 (page 7-59) respectively. The same ecological receptors were chosen for both sites. The cotton mouse was selected as the surrogate small mammal herbivore. Data from the Wildlife Exposure Factors Handbook for the deer mouse were used as surrogate values for the cotton mouse, however the Handbook states that body weight for the cotton mouse is 28-51 g. The body weight specific for the cotton mouse should be used; a different body weight will also change the food ingestion rate.**

The body weight and food ingestion rate for the cotton mouse will be revised as requested.

16. **The mourning dove was chosen as the surrogate herbivorous bird. It should be noted that the bobwhite quail may have been a more appropriate choice. HLA states on page 7-6 that dermal absorption to ecological receptors is not considered in the ERA. However, the Wildlife Exposure Factors Handbook states that the bobwhite quail frequently 'dust bathe' and "ingestion of materials preened from the feathers and direct dermal uptake can be significant exposure pathways for quail exposed to aerial application of pesticides. Dust bathing might, therefore, provide a significant exposure route for bobwhites using contaminated soils." It is stated on page 7-2 that the bobwhite quail may be an inhabitant of SA 8 and on page 7-44 that the same species are likely to inhabit SA9.**

Although bobwhite quails are likely to inhabit OU 3, no aerial application of pesticides has occurred at the sites. Therefore, it is unlikely that bobwhite quails would be dermally exposed to pesticides via this route of exposure. The soil ingestion pathway should account for any exposures associated with preening activities. In addition, the majority of the SAs 8 and 9 are covered with vegetation (i.e., maintained grass) making "dust bathing" highly unlikely. The mourning dove was chosen as the representative herbivorous avian species because of its propensity to forage via ground-gleaning, where it would be exposed to surface soil contaminants and seeds that may have bioaccumulated contaminants from the soil.

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17. **Table 7-6 (page 7-22) describes the equations used to estimate contaminant exposures to the surrogate receptor species. A reference should be provided for these equations.**

A reference will be provided for the equations listed in Table 7-6.

United States Environmental Protection Agency, Region 4

Human Health Comments

18. **Exclusion of subsurface soil. Because of field conditions at the site, subsurface soil could not be addressed. None of the subsurface soil is in the vadose zone, but is immersed in the water of the shallow aquifer. The aquifer substrate may be the source of the contamination observed in groundwater. Active remediation of groundwater may not succeed because as chemicals are removed from the water, more chemicals may leach from the aquifer substrate.**

For SA 8, limited soil removals have taken place, and there are several "hot spots" remaining that will require remedial actions. Therefore, HLA agrees with the above assessment that additional compounds have the potential to leach from shallow saturated soils to groundwater. However, coupled with source removal, active groundwater remediation should be successful However, coupled with source removal, active groundwater remediation should be successful.

For SA 9, the interim remedial action involved the excavation of surface and subsurface soil to depths of up to 6 feet below land surface. Furthermore, groundwater contamination is generally not as problematic as at SA 8. Therefore, HLA would not expect that leaching of contaminants would have a significant impact on groundwater remediation at the SA. Because groundwater remediation would not likely occur without soil remediation, potential leaching should not be a significant issue.

19. **Inclusion of all carcinogenic PAHs. Despite the text, risk was apparently assessed separately for the carcinogenic polycyclic aromatic hydrocarbons (cPAHs). This procedure is incorrect. Table 6-7 presents separate exposure point concentrations for the carcinogenic PAHs. The EPC should be calculated in terms of benzo(a)pyrene equivalents.**

Relative potency factors for the various cPAHs should be used to determine a cPAH concentration in benzo(a)pyrene equivalents at each sampling location. cPAH concentrations expressed in this way should be treated as a single chemical with an oral carcinogenic slope factor of 7.3 per (mg/kg-day).

Because of this incorrect procedure, the risks presented in the document may be underestimates and risk from cPAHs and total risk should be recalculated.

The EPC used for calculating carcinogenic risks was calculated in terms of benzo(a)pyrene equivalents (see Appendix E-5). The EPC presented in Table 6-7 was used for calculating noncancer risks. The EPC based on benzo(a)pyrene equivalents will be added to Table 6-7.

United States Environmental Protection Agency - Region 4 (Continued)

20. **Inclusion of Iron. Region 4 does not considered iron in the class of essential nutrients. Iron should be included in the risk assessment.**

Iron was not screened against its essential nutrient value in this HHRA. Iron was screened against it's RBC value and was assessed as a potential COPC in the HHRA. A sentence will be added to Section 6.1.2 of the report, stating that the iron essential nutrient value is presented for discussion in the uncertainty analysis in the event that iron is a risk driver. A sentence clarifying this will be added to the discussion of essential nutrient screening values.

21. **Beryllium. USEPA no longer considers beryllium a carcinogen by the oral route. For COPC screening, the RBC should be recalculated based on the noncancer effects in a child residential receptor. This screening level is approximately 150 ppm.**

The new RBC, based on noncancer effects, was used (adjusted for a Hazard Quotient of 0.1). The value in the April 1998 RBC table is 156 ppm (rounded to 160 ppm). This adjusted value is 16 as presented in the HHRA.

22. **COPC Screening. EPA considers screening on organoleptic criteria, or indeed, any non-health based criteria inappropriate for COPC screening. Primary or secondary drinking water standards or other non-health based criteria should not be used for COPC screening.**

The Florida Drinking Water Standards will be excluded from the COPC screening. The new Groundwater Cleanup Target Levels will be used instead per FDEP comments.

23. **Groundwater EPCs. Table 6-8 presents EPCs for groundwater as averages of all wells at SA-8 and SA-9 respectively. The EPC should be the average of the wells in the center of the plume. For SA-8, the arsenic EPC should include wells OLD8-01, OLD8-02, OLD8-03, OLD8-04, OLD8-08, OLD8-09, OLD8-10, OLD8-11, OLD8-13 and OLD8-17. The average arsenic concentration in these wells is approximately 146 ug/L.**

For herbicides represented by MCPP, the wells should include OLD8-08, OLD8-10, OLD8-11, OLD8-14, and OLD8-15. The MCPP concentration on average in these wells is 734 ug/L.

At SA-9, arsenic and herbicides appear to be co-located. The wells used to calculate EPCs should be OLD9-02, OLD9-04, OLD9-05, OLD9-07, OLD9-11, and OLD-12.

The EPCs will be recalculated using the wells indicated.

United States Environmental Protection Agency - Region 4 (Continued)

Other Comments

24. **Table 6-1. It is not clear from whence the screening concentrations in the table came. Please provide details of their derivation.**

    As stated in the text above Table 6-1, the essential nutrient screening concentration derivations are provided in Appendix E-3.

25. **Manganese. The RBC for manganese has been changed due to a change in the reference dose. IRIS should be checked for the reference dose and the document changed as appropriate.**

    The RBC and reference dose will be updated with the April 1998 RBC Table values.

26. **Page 6-48, first full paragraph. The last sentence states:**

    "Therefore, the risks calculated are presumed to be reasonably accurate with respect to the different valence states of arsenic."

    This sentence is unclear and should be removed.

    The sentence will be removed.

27. **The risk summary refers to cancer risk for the@total@ receptor. The correct term is the Alifetime@ receptor. A lifetime residential receptor scenario consists of 6 years as a child and 24 years as an adult for a 30 year exposure duration.**

    The term will be changed to lifetime receptor.

General Comments on Ecological Risk:

28. **The ecological risk assessment for Naval Training Center (NTC) Operable Unit 3 (OU3) was evaluated for congruence with the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997), which is EPA's Office of Solid Waste and Emergency Response's current program guidance for CERCLA. This guidance will be referred to as the *Process Document* in these comments. The Process Document divides the steps in an ecological risk assessment into the Screening-level Ecological Risk Assessment (SERA) and the baseline ecological risk assessment (ERA). This RI appears to be a combination of both a SERA and baseline ERA, because it does not distinguish these steps.**

United States Environmental Protection Agency - Region 4 (Continued)

In an effort to streamline the ERA process for Orlando OU 3, both elements of the screening-level and baseline ecological risk assessment methodologies were incorporated into the ERA. The methodology used to complete the ERA for Orlando OU 3 was clearly stated in the Remedial Investigation and Feasibility Study Workplan (HLA, 1997), which was reviewed and approved by the Orlando Partnering Team. The purpose of combining both elements of the screening-level and baseline ERA methodologies into one evaluation is to expedite the decision-making process and completion of any remedial action, if necessary. The purpose of combining the methodologies will be clarified in the text of the ERA. In addition, a section will be added to address the first step of the screening-level ERA.

29. **Problem Formulation for the baseline ERA begins with refinement of preliminary contaminants of concern, which were identified in the screening-level risk assessment. (See Chapter 3 of the Process Document.) The identification of contaminants of potential concern (COPCs) for NTC is illustrated in Figure 7-2. A quick look at the data suggests that pesticides and herbicides in SA 8 tend to be detected in the vicinity of the former pesticide storage building (Building 2134), as expected. Certain metals detections (Cd, Cu, Pb, Cr, V, Zn) appear to be both isolated in spatial extent and infrequently detected above a screening value. Some elevated concentrations are associated with presence of metal sheds or a "metal storage box" shown on Figure 1-3. The description of nature and extent for SA 9 did point out how elevated concentrations of pesticides were detected in the north east drainage ditch and discharge points inside the wetland area. A discussion of the frequency, magnitude, and pattern of exceedances of ecotoxicity screening values should be added to SA 8 and SA 9, especially for the metals. Information on the contaminants present and their distribution in the environment is necessary, supporting information for selection of assessment endpoints in Problem Formulation.**

The COPC summary tables originally included in Sections 7.1.3 (for SA 8) and 7.2.3 (for SA 9) will be moved forward into a screening-level ERA and problem formulation section, which preceeds the baseline ERA-type Problem Formulation. Based on the information provided in the screening-level step, the Problem Formulation will refine the preliminary conatminants of ecological concern; characterize the ecological effects of these contaminants; review and refine information on contaminant fate and transport, complete exposure pathways, and ecosystems potentially at risk; select assessment endpoints; and develop a conceptual model for the site.

30. **The next step in Problem Formulation is to discuss the ecotoxicity of the COPCs. The RI report includes the following statement:**

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"The primary ecological effects associated with pesticides include bioaccumulation in the food chain and sublethal reproductive effects in avian species..."

While this may be a summary of the ecotoxicity of COPCs detected in OU3, the text has not revealed the identities of the COPCs from the SERA. The text should summarize chemicals of concern in each medium with a brief discussion of the ecotoxicity of those contaminants. Refer reader to Appendix G for details.

See the response to General Comment 2. A brief discussion of the ecotoxicity of COPCs will also be added to the Problem Formulation, and the reader will be referred to Appendix G for details.

31. **There is a large summary table in Appendix G of toxicity values (NOAELs, LOAELs) for various species. Values used as toxicity reference values (TRVs) in the ERA are boxed on the table. It would be helpful to include an expanded summary in the text of ecotoxicity of the specific set of COPCs to explain the reasons why the particular TRV was selected.**

Section 7.1.5.1 provides an explanation of the data hierarchy that was used to derive the RTVs for COPCs. Table G-2 of Appendix G highlights the values that were selected as RTVs based on the methodology discussed in Section 7.1.5.1. In addition, any deviations in the RTV selection methodology are footnoted in Table G-2 of Appendix G. In response to this comment, a discussion of the most significant ecological effects associated with the compound classes present in OU 3 media will be provided as part of the Problem Formulation.

32. **Appendix D on the fate and transport properties of the various COPCs should be expanded to include information on bioaccumulation, i.e., whether COPCs can accumulate in vegetation, invertebrates, or small mammals. This information is important for choosing assessment endpoints and is needed in the Problem Formulation.**

The bioaccumulation factors for each of the COPCs are summarized in Table G-1 of Appendix G. The Problem Formulation will be expanded to include a discussion of ecotoxicity and bioaccumulation of contaminants identified as COPCs.

33. **The section on Page 7-4 on identification of receptors is not intended to be merely a repeat of the text in Section 3.8 on ecological setting. Rather, it is intended to highlight specific biological groupings that may be particularly sensitive to the contaminants at hand, based on the review of ecotoxicology, e.g., the sensitivity of carnivorous birds to DDT. It should focus on ecological resources that should be evaluated more thoroughly and thus provide a justification for selection of the assessment endpoints.**

United States Environmental Protection Agency - Region 4 (Continued)

The section on identification of receptors will be expanded to discuss specific biological groupings that may be particularly sensitive to contaminants at OU 3. In particular, the sensitivity of carnivorous birds to pesticides will be discussed.

34. **As the intention of the Problem Formulation is to arrive at a set of specific risk questions to guide exposure assessment and risk characterization stages, the section on complete exposure pathways should include language specific to the groups of organisms that are indicated to be sensitive to contaminants identified as COPCs.**

The section on complete exposure pathways will be expanded to include language specific to sensitive groups of organisms, particularly carnivorous birds.

35. **Ground-water migration to surface water should be mentioned as a potential secondary source of site-related contamination. Ground water from the wells closest to Lake Baldwin is assumed to represent an exposure medium for aquatic organisms. The fact that surface water data for Lake Baldwin is evaluated as part of SA 6 is insufficient reasoning to exclude it as part of wildlife exposure through drinking water at OU3. Lake Baldwin may not be a potential concern for its own merits (i.e., due to current contamination levels), however, the RI should investigate the contamination at OU3 for its potential to impact Lake Baldwin and surrounding wetlands. The RI report indicates that ground water in SA 8 is within 1 foot of the surface in the wetlands adjacent to Lake Baldwin. The RI should address whether remediation of ground water may be necessary to prevent a potential (i.e., future or intermittent) risk to organisms exposed to ground water seeping to the surface in the wetland. If this migration pathway is truly of concern for this site, exposure to ground water as drinking water should be considered in the dietary intake models.**

Potential risks to aquatic receptors in Lake Baldwin associated with exposure to groundwater migration were evaluated based on the results of site-specific toxicity of the groundwater adjacent to Lake Baldwin. Exposure concentrations for aquatic receptors were conservatively assumed to be equal to the concentrations of constituents detected from monitoring wells directly adjacent to Lake Baldwin. Based on the results of the toxicity test and a screen of maximum detected concentrations against surface water toxicity benchmark values, detected concentrations of arsenic in groundwater may pose a risk to aquatic receptors. Wildlife exposures associated with drinking groundwater that has migrated to surface water were not evaluated in the ERA because this route of exposure is considered insignificant as compared to ingestion of constituents in soil and food items. As discussed in the ERA, Lake Baldwin was evaluated as a separate study area (SA 6), and exposure to surface water or sediments in the lake were were found to present insignificant risks to ecological receptors. The basis of this conclusion will be included in the RI for OU

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3. In addition, the RI will discuss that remediation of groundwater may be necessary to prevent a future risk to organisms exposed to groundwater migrating to Lake Baldwin and seeping to the surface of the wetland.

36. **The report states that "One of the assessment endpoints selected for the SA 8 ERA is the survival and maintenance of receptor populations and communities..." This assessment endpoint, and others such as "survival and maintenance of fish, macro-invertebrates, amphibian, and aquatic plant populations," are too broad to be useful in the ERA. The Problem Formulation step is the risk assessor's chance to convince the risk managers and trustees that appropriate risk questions are addressed in the ERA. The preferred assessment endpoint is often a combination of type of animal (bird, amphibian, reptile, mammal, etc.) and diet (carnivorous, herbivorous, insectivorous, omnivorous, etc.), e.g., insectivorous bird. Please refine assessment endpoints accordingly.**

The assessment endpoints will be revised so that they are more specific to the contaminants and potential sensitive receptors at OU 3. For example, reproductive effects (i.e., egg shell thinning) in carnivorous birds exposed to pesticides will be considered as an assessment endpoint.

37. **The ERA includes toxicity testing on ground water for SA 8 but not on soil for either SA or ground water for SA 9. The reasoning behind selection of the particular assessment endpoints is not made clear in the ERA. The connection between the contaminants detected at levels of concern, their sources and migration pathways in the environment, and potential for ecotoxicological effects on plants and wildlife needs to be developed further. This information is typically presented as the conceptual site model (CSM). A CSM is required by EPA's Process Document, however, none was included in the RI for OU3. A description of the CSM should be included in the text. There need not be computer graphic illustrations of wildlife, but a flow chart showing the food web would improve the presentation. Figure 7-1 will not substitute for a CSM because it addresses only exposures.**

Groundwater toxicity testing was conducted only at SA 8 because detected concentrations of arsenic in groundwater at SA 8 exceeded MCL values. None of the constituents detected in groundwater at SA 9 exceeded the MCL values. Further discussion of the reasoning behind selection of the assessment endpoints will be included as part of the Problem Formulation. In addition, a conceptual site model (CSM) will be added.

38. **The risk hypotheses presented on Pages 7-8 and 7-46 for OU3 and endpoints in Table 7-1 are very general. Their utility is limited to the screening level. They can potentially serve in the SERA stage of the RI, especially if some COPCs can be eliminated; but the vagueness of the assessment endpoints and associated risk questions leave risk managers without a path**

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forward to FS/RD if potential ecological risk is indicated by the ERA. Without a clear Problem Formulation it is impossible to develop appropriate remedial goal options.

The risk hypotheses will be refined in the Problem Formulation section.

39. **The cotton mouse and mourning dove both have a diet composed mainly of vegetation. Pesticides, however, typically do not accumulate to a large extent in vegetation. Arsenic has a moderate ability to accumulate in vegetation. Pesticides are more likely to accumulate in invertebrates. Carnivorous birds, such as the robin on a diet of earthworms, should be considered as an assessment endpoint for OU3. The great horned owl, while a carnivorous bird, is not expected to be as sensitive of a receptor, because its food source is not as directly associated with the soil. A smaller bird than the great horned owl should be chosen to better represent the variety of birds at SA 9.**

One insectivorous bird, the American robin, will be added as a representative wildlife species. In addition, the Loggerhead shrike will replace the great horned owl as the representative carnivorous avian species.

40. **The bioaccumulation factor (BAF) from soil to small mammal for DDT, DDD, and DDE used here is 1.2. (See Appendix G, Table G-1.) The value was obtained from a paper by Forsyth & Peterle (1984) for shrews and voles based on whole body and stomach contents. This value may be over- or under-estimated depending on site-specific conditions. The uncertainties associated with the use of the BAF model should be discussed. EPA thinks that the uncertainties inherent in the BAF assumptions will limit the ability of this approach to obtain a remedial goal option for DDT contaminated soils in SA 9. EPA prefers the use of site-specific bioaccumulation measurements.**

The use of literature-derived bioaccumulation factors to obtain contaminant levels from soil to plants, invertebrates, and mammals was approved by the OPT as part of the workplan for OU 3. The uncertainties associated with the use of the BAF model are listed in Table 7-13 and are also discussed in Sections 7.1.7 for SA 8 and 7.2.7 for SA 9. A discussion of the specific uncertainties associated with the use of literature-reported BAFs for the pesticides DDT, DDD, and DDE will be added to the Uncertainty Analyses. However, the use of site-specific bioaccumulation measurements for mammals (i.e., mammal trapping) is currently beyond the scope of this project.

41. **The American kestrel would be a more sensitive surrogate receptor species than the great horned owl due to difference in body mass. The kestrel would also better reflect values to be protected at OU3 (threatened/endangered species). The hazard quotients predicted for the owl were in the 10^{-3} range, which is unexpectedly low for DDT exposures to a carnivorous**

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bird. This is probably due to the assumptions for exposure factors and the area use factor. For screening EPA recommends using an area use factor of 1.

See the response to General Comment 12. Use of a threatened/endangered species, such as the American kestrel, as a representative wildlife species is likely to result in an overestimation of risk because the conservatively-based risk assumptions used in the food web model are not appropriate for more abundant avian species found at the site. The American kestrel is not expected to forage or breed in the vicinity of OU 3 because its residence status in the vicinity of Orlando OU 3 is listed as unlikely by the U.S. Fish and Wildlife Service (USFWS) and the Florida Natural Areas Inventory (FNAI). The Loggerhead shrike will be used as an ecological surrogate to the kestrel to evaluate population-level effects to carnivorous birds. Because both screening-level and baseline ERA methodologies were used to complete the ERA for OU 3, an area use factor of 1 as well as less conservative (i.e., lower value), if necessary, will be used to calculate hazard quotients in the food web model.

42. **One of the assessment endpoints is the reduction in biomass of terrestrial plants. The measurement endpoint is comparison of detected concentrations in soil with published values for RTVs. Based on the introductory description of the SA 8 site, vegetation is indicated to be stressed or absent due potentially to the elevated levels of site-related chemicals in soil (See Page 1-5). Elevated levels of arsenic in soil can reduce plant colonization and growth (Brady, 1974). The observation of stressed vegetation can be a measurement endpoint for this assessment endpoint. The absence of vegetation should be examined with respect to soil concentrations as an additional line of evidence. The statement, made several times throughout the report, that "no observations of stressed vegetation were evident during October 1997 site visit" contradicts the observation of lack of vegetation on portions of the site on Page 1-5. This discrepancy should be resolved.**

The introductory description of the SA 8 site indicates that grass is maintained within the fenced area and that the remainder of the site is "sparsely vegetated." The vegetative habitat of SA 8 was characterized during the October 1997 ecological survey. The results of the survey (shown in Figure 3-10) indicate that only one area of disturbed upland habitat was observed directly west of the fenced area; however, it appears that the lack of vegetation in this area is due to physical disturbance from heavy machinery required to install the microwells in the wooded area as well as application of Roundup for fire control purposes in a narrow strip directly adjacent to the fence. Therefore, it is unlikely that the lack of vegetation in the disturbed upland habitat is due to site-related contaminants. The discrepancy between the description of vegetative cover in the introductory text and the ecological risk assessment will be resolved. In addition, observations of stressed

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vegetation will be added as a measurement endpoint to evaluate the assessment endpoint of reduction of terrestrial plant biomass.

43. **The statement on Page 7-33 that some of these inorganic constituents may not be related to the site is unsubstantiated in the text. All of these metals underwent a background screen. There is reason to believe that the plant community at SA 8 could be impacted by elevated levels of arsenic, chromium, silver, vanadium, and zinc in soil due to exceedances of screening values and historical observations of stressed or absent vegetation. Text on potential reasons why inorganic contaminants detected in soils or ground water might not be associated with OU3 should be expanded.**

The text on Page 7-33 also states that "...terrestrial plants could potentially experience adverse growth and reproductive effects from exposure to detected concentrations of aluminum, arsenic, chromium, silver, vanadium, and zinc in the surface soil at SA 8. Text on potential reasons why certain inorganic contaminants detected in soils or groundwater might not be associated with OU 3 will be expanded.

44. **Table 7-13. One of the uncertainties listed in the table is that the occurrence of the food chains assumed in the models is unknown. This is a major source of uncertainty in the ERA. It is uncertain at SA 8 what ecological components are important to protect, assessment endpoints are broad protection of birds and wildlife. The Problem Formulation is too broad and general to make useful predictions of the potential for risk at OU3. The list of chemicals detected above screening ecotoxicity values has not been refined based on frequency, distribution, and pattern of occurrence. The specific manner in which ecological components may be exposed to site-related contaminants has not been defined. All of these points should be clarified in the CSM.**

See the responses to General Comments 2, 6, 7, 9, and 10.

45. **The particular assessment and measurement endpoints chosen for this study appear to be based on the availability of empirical BAFs. For example, herbivorous bird and herbivorous mammal assessment endpoints capitalize on a paper by Travis and Arms (1988) that provides empirical equations for BAFs in crops and beef, which can be adapted to the particular plants and herbivores at the site. Carnivorous and/or insectivorous birds and mammals should be considered as assessment endpoints for SA 8 in addition to herbivorous animals. This recommendation is due to the anticipated significance of the food chain pathway coupled with the sensitivity of birds to pesticides (reproduction). The American kestrel is indicated to be an endangered species at this site. Reproductive effects, including egg-shell thinning by exposure to DDT, based on food chain modeled intakes compared to literature-derived TRVs,**

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should be included as a measurement endpoint. Egg-shell thinning should be specifically addressed.

See the response to General Comment 12.

46. **The uncertainties table (Table 7-13) should also discuss how ground water concentrations in wells closest to Lake Baldwin were assumed to represent surface water concentrations.**

The assumption that groundwater concentrations in wells adjacent to Lake Baldwin are representative of surface water concentrations will be added to the Uncertainty Analyses in Sections 7.1.7 and 7.2.7 for SAs 8 and 9, respectively.

47. **An uncertainty is listed on Pages 7-41 (OU8) and 7-69 (OU9) that BAFs for plant material were based on an assumed moisture content of plants of 80 percent. The text points out that the diet of the cotton mouse and mourning dove is predominantly seeds, which have a moisture content of only 10 percent. It is recommended that a more realistic value for moisture content of dietary vegetation be assumed to reduce the magnitude and direction of the uncertainty from less than conservative to conservative.**

The BAFs for the cotton mouse and the mourning dove will be revised to account for the moisture content of dietary vegetation.

48. **Elevated concentrations of MCPA and MCPP have not been addressed in the ERA due to lack of toxicity information. A literature search should be performed to obtain this information. A paper by Fargasova is listed in the reference section of these comments.**

MCPA and MCPP toxicity values for mammals, terrestrial plants, and aquatic receptors were identified and quantitatively evaluated in the ERA. A literature search for avian and invertebrate toxicity values for the herbicides, MCPA and MCPP will be completed.

49. **While the text suggests that the ERA is conservative for SA 8, the logic behind the selection of assessment endpoints for this site is poorly developed, leaving open the possibility that the ERA focused on the wrong questions. Discussions with U.S. Fish and Wildlife should be initiated to clarify what ecological components at OU3 are important to protect, such as the gopher tortoise and American kestrel. Pesticides detected in SA 8 are a more important issue than arsenic with respect to avian and mammalian receptors. Pesticides do not tend to bioaccummulate in plant tissues, therefore, exposures to ecological components were underestimated by the choice of assessment endpoints made. Insectivorous and/or carnivorous birds and mammals should be evaluated in the risk assessment. The earthworm bioassay would be an excellent means to address both the bioaccumulation and the toxicity of**

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site-related constituents to terrestrial invertebrates. Potential exposures of carnivorous birds and mammals to pesticides and herbicides detected in soils has not been satisfactorily addressed in the ERA, especially in the case of SA 8.

The assessment endpoints and selection of representative wildlife species will be revised as discussed in the responses to General Comments 9 and 12.

50. **Toxicity of MCPA/MCPP should be quantitatively addressed.**

See the response to General Comment 21.

Specific Comments on Ecological Risk:

51. **Discuss frequency, magnitude and pattern of exceedances of TRVs for COPCs to focus selection of assessment endpoints for food chain modeling.**

See the responses to General Comments 1 and 9.

52. **Ecotoxicity of specific COPCs at SA 8 and SA 9 should be included in the text before the selection of assessment endpoints for food chain models. Ability to bioaccummulate in plants and animals should be part of this discussion. Groups of species particularly sensitive to the specific COPCs for SA 8 and SA 9 should be identified.**

See the responses to General Comments 3, 5, and 7.

53. **The possibility of future impact to Lake Baldwin through ground-water migration should be addressed as potential ecological risk.**

See the response to General Comment 8.

54. **A CSM should be included in the ERA, showing the food chains modeled, as outlined in EPA's Process Document and previous comments.**

See the response to General Comment 10.

55. **Specific assessment endpoints should be developed for the Problem Formulation, that identify diet and category of ecological receptor. Thorough justification should be provided for their selection. The selection of assessment endpoints should depend on the ecotoxicity and fate and transport properties of the COPCs. In addition, values to be protected at OU3, such as**

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threatened and endangered species and their sensitivity to the contaminants, should receive elevated attention.

See the response to General Comment 9.

56. **The literature search should be expanded to incorporate toxicity reference values for MCPA to allow quantitative assessment of risk. Try the Materials Safety Data Sheets.**

See the response to General Comment 21.

57. **The RI indicates that Lake Baldwin was assessed as a separate OU (OU 6) and was found to present insignificant risk to ecological receptors (Page 7-6). The basis of this conclusion should be included in the RI for OU3.**

See the response to General Comment 8.

58. **The discrepancy regarding stressed vegetation should be resolved. If the stressed vegetation is real, then it should be addressed.**

See the response to General Comment 15.

59. **By defining assessment endpoints in terms of diet, more attention should be paid to carnivorous and/or insectivorous birds and mammals at OU3, in addition to herbivores. This is especially important for pesticide exposures.**

See the response to General Comment 12.

60. **All assumptions in BAF model and limitations to values used for BAFs should be addressed in uncertainties section.**

All assumptions in the BAF model and limitations to values used as BAFs will be discussed in the Uncertainty Sections (7.1.7 and 7.2.7 for SAs 8 and 9, respectively.

61. **The area use factor of 1 should be used for the carnivorous bird. A smaller bird than the great horned owl such as the American kestrel, robin, or Florida scrub jay. If the hazard quotient exceeds 1, then action should be taken to reduce the uncertainty with site-specific, field-collected biological data.**

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See the response to General Comment 14. If the hazard quotient exceeds one, the decision to collect additional site-specific biological data, if necessary, will need to be approved by the OPT.

62. **Vegetation should be protected in its own right not just as a source of food and cover for small mammals and birds.**

HLA believes that the assessment endpoint for terrestrial plants based on their use as a potential source of food and cover for small mammals and birds is an ecologically significant assessment endpoint. In addition to providing foraging opportunities for wildlife, other ecologically important vegetative attributes that will be qualitatively evaluated include providing habitat for species of special concern, structural (habitat) diversity, and mitigating pollutant discharge.

REFERENCES

HLA, 1997. *Remedial Investigation and Feasibility Study Workplan, Operable Unit 3, Study Areas 8 and 9, Naval Training Center, Orlando, Florida.* Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina (August).

USEPA, 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final Draft.* Environmental Response Team. Edison, New Jersey.