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LETTER REGARDING FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION REVIEW OF RESPONSE TO COMMENTS FOR TECHNICAL MEMORANDUM REFINED LIST OF CHEMICAL CONCERNS FOR THE FEASIBILITY STUDY AND DEVELOPMENT OF PRELIMINARY REMEDIATION GOALS FOR SEDIMENT SITE 41 COMBI
07/06/2010
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Florida Department of Environmental Protection

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2600 Blair Stone Road
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Charlie Crist
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July 6, 2010

Ms. Patty Marajh-Whittemore
Naval Facilities Engineering Command Southeast
Post Office Box 30
Building 903
Naval Air Station Jacksonville
Jacksonville, Florida 32212-0030

RE: Response to Comments on the Technical Memorandum - Refined List of Chemicals of Concern for the Feasibility Study and Development of Preliminary Remediation Goals for Sediment, Site 41 - Combined Wetlands, Naval Air Station Pensacola, Pensacola, Florida.

Dear Ms. Marajh-Whittemore:

The Department's risk assessors with the University of Florida's Center for Environmental & Human Toxicology have completed their review of the Response to Comments on the Technical Memorandum - Refined List of Chemicals of Concern for the Feasibility Study and Development of Preliminary Remediation Goals for Sediment, Site 41 - Combined Wetlands, Naval Air Station Pensacola, undated (received by e-mail on May 10, 2010), prepared for the Navy by Tetra Tech NUS, Inc. Their comments are attached.

The chemical analyses done on sediment and surface water at the various wetlands and the toxicity tests conducted for the ecological risk assessment all appear to have been done more than 5 years ago, with much of the work apparently being done more than 10 years ago. While the findings of which contaminants or mixture of contaminants were determined to pose an ecological risk should remain valid, I am of the opinion that the laboratory chemical data is outdated and most likely does not reflect current conditions within the wetlands. While I understand that decisions on remediation with regard to cleanup goals will most likely be made using that old data, I think it wise to err on the conservative side with regard to questions the Department's risk assessors have made in their response to Tetra Tech's response to their original comments. However, with regard to any of their comments that would indicate a need for additional toxicity testing, I would suggest that their comments be put aside for the purpose of what this Technical Memorandum was created for, the refinement of the list of chemicals of concern to be addressed in the Feasibility Study. Depending upon the remedy selected for Site 41, additional toxicity testing may be required. At that time,

their comments on this Technical Memorandum or on other previous reports should be addressed and the specific toxicity tests mentioned incorporated.

If you have any concerns regarding this letter, please contact me at (850) 245-8997.

Sincerely,

David P. Grabka, P.G.
Remedial Project Manager
Federal Programs Section
Bureau of Waste Cleanup

CC: Tim Bahr, FDEP
Greg Fraley, USEPA, Atlanta
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June 7, 2010

Ligia Mora-Applegate
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Tallahassee, FL 32399-2400

Re: Response to Comments on the NAS Pensacola Site 41 Technical Memorandum

Dear Ms. Mora-Applegate:

At your request we have reviewed the *FDEP Ecological Risk Review Comments: Technical Memorandum – Refined List of Chemicals of Concern for the Feasibility Study and Development of Preliminary Remediation Goals for Sediment, Site 41 – Combined Wetlands, Naval Air Station, Pensacola.* The document is undated. This document responds to University of Florida comments on the Technical Memorandum provided in a letter dated March 8, 2010. The original University of Florida Comments and the Navy's response are copied below in italics. Additional comments follow in normal font.

University of Florida Comment #1: *Derivation of the wetland-specific PRGs was based on sediment toxicity testing. Table 2 states that samples 041M5A0501 and 041M640501 are not considered toxic despite significant reductions in growth for C. tentans and N. arenaceodentata, respectively, due to the high benthic diversity at those sample locations. Based on the sediment quality triad, if sediment samples exceed default chemistry criteria and show statistically significant toxicity to benthic organisms, the presence of a diverse benthic community does not preclude impacts to aquatic life. In fact, it suggests that the chemicals are likely stressing the ecosystem (MacDonald and Ingersoll, 2002, Table 23). Therefore, samples 041M5A0501 and 041M640501 should be considered toxic. This changes the no observed effects concentration (NOEC) and lowest observed effects concentration (LOEC) for antimony, cadmium, copper, lead, and zinc in Wetlands 3 and 5A (Table 3) and for all chemicals excluding endosulfan I in Wetland 64 (Table 6).*

Navy response to Comment #1: *The conclusion of Section 11.1.4.4 of the RI report states that "Based on the evaluation of Wetland 5A to date, previous levels of constituents caused statistically significant reduction of growth at one sampling station, 041M5A05. However, the community index indicated that this location indicated the highest levels of diversity in Wetland 5A." The conclusion of Section 11.3.4.3 of the RI report states that "Based on the results of the chemistry and toxicity data, sample locations 041M640401 and 041M640601 exhibited conditions in which toxic chemicals were probably stressing the system." The report did not conclude that 041M640501 was*

a toxic location. Therefore, the Navy does not believe that either location should be considered toxic for purposes of setting PRGs.

Follow-up response to Comment #1: It is understood that samples 041M5A05 and 041M640501 were not considered toxic in the RI report. However, the weight-of-evidence approach suggests that chemicals at these two locations are stressing the ecosystem. Chemical concentrations that adversely affect the ecosystem should be taken into consideration when deriving PRGs even if a particular sample location was not labeled as toxic in the RI report.

University of Florida Comment #2: *Table 2 presents a summary of the sediment toxicity tests. It is unclear from this table how the toxicity tests were performed. Notably, the length of the toxicity test is absent. The FDEP recommended method for determining chronic toxicity to fresh water whole sediment is the 42-day Hyalella azteca survival, growth, and reproduction test and the Chironomus tentens life-cycle test. For salt-water whole sediment, the FDEP recommends the 42-day H. azteca survival, growth and reproduction test and the Leptochirus plumulosus growth and reproduction test. The organisms N. arenicola and N. arenaceodentata utilized for salt-water toxicity testing at NAS Pensacola Site 41 are not included in the organisms recommended for sediment toxicity testing by the FDEP (FDEP, 2004).*

Navy response to Comment #2: *Section 8.7.3 and Table 8-4 of the RI report describes the toxicity testing that was conducted, including the length of the tests. No regulator comments were received on the RI report regarding the length of the test or the test species selected.*

Follow-up response to Comment #2: The 42-day *H. azteca* survival, growth, and reproduction test is recommended by the FDEP for assessment of the chronic toxicity of sediments to benthic invertebrates. Wetlands 64, 16, and 18 utilized a 20-day marine *N. arenacoedentata* chronic toxicity test and Wetlands 5A and 3 utilized a 28-day *C. tentans* toxicity test (Table 8-4 of the RI). Chronic toxicity may occur at lower concentrations when the organisms are exposed for longer periods of time. The 42-day chronic toxicity test recommended by the FDEP may reveal toxicity at lower concentrations than is visualized during a 20- or 28-day toxicity test. Use of these shorter tests increases the uncertainty in the toxicity results and may leave toxic sediments on-site.

University of Florida Comment #3: *The sediment toxicity tests do not appear to have been interpreted correctly. Page 2 defines a NOEC as the greatest concentration that does not cause a toxic response. However, this definition allows the NOEC to be greater than concentrations that displayed sediment toxicity. For example, in Table 3 the greatest concentration of lead that did not cause a toxic response is 75.5 mg/kg in sample 041M5A0601. However, toxicity was seen in sample 041M030701 at a lead concentration of 35.6 mg/kg. Based on the above definition, 75.5 mg/kg is considered a NOEC despite the toxic response at 35.6 mg/kg lead. NOECs should not exceed the lowest toxic concentration in a sediment sample.*

Navy response to Comment #3: *By definition, the NOEC can be greater than concentrations of the same chemical in samples that are considered to be toxic because*

a NOEC is defined as the greatest concentration of a chemical in a non-toxic sample. The LOEC is defined as the lowest concentration in a toxic sample provided that the concentration is greater than the NOEC. Therefore, the NOECs can exceed the lowest toxic concentration in a sediment sample.

Follow-up response to Comment #3: Sediment toxicity tests evaluate the toxicity of the mixture of chemicals present within the sediment. The benefit to these tests is that they account for the possible non-additive toxic effects of mixtures and for changes in site-specific bioavailability. Because many site-specific characteristics are affecting the toxicity of the samples, it is difficult to determine what combination of sediment characteristics is responsible for the toxic effect. Therefore, the LOEC of 35.6 mg/kg lead should have greater weight than the NOEC of 75.5 mg/kg. In addition, the LOEC (Wetland 3) and NOEC (Wetland 5A) concentrations for lead come from two separate wetlands in Wetland Group B. It appears that the grouping of these two wetlands may not be appropriate.

University of Florida Comment #4: *In Table 7, marine water sediment PELs are utilized as freshwater sediment probable effects concentrations (PECs). This is problematic for arsenic and 4,4'-DDE because their marine water PELs are not protective of benthic organisms in freshwater sediment. The marine water sediment PEL value for arsenic of 41.6 mg/kg exceeds the Florida sediment quality assessment guideline (SQAG) freshwater PEC of 33 mg/kg. The 4,4'-DDE marine water PEL of 0.374 mg/kg exceeds the Florida SQAG freshwater PEC of 0.031 mg/kg. PECs are utilized as not-to-exceed values. When the default PEC value is selected as the PRG, chemical concentrations at freshwater wetlands of concern (Wetlands 3, 5A, 18A, and 48) should not exceed the PEC values listed in MacDonald et al. (2003).*

Navy response to Comment #4: *The saltwater refinement values from the RI were used, when available, because they were agreed to by the ecological technical sub-group as documented in the November 16, 2007 responses to EPA comments dated April 5, 2006 "The Tier I Partnering Team agreed to use only the EPA Region 4 Screening values and the FDEP PELs and TELs" in the RI. Also, as documented in the November 16, 2007 responses to FDEP comments dated January 23, 2006 "The Navy's approach for evaluating sediment data were based on the professional judgment of the NAS Pensacola Partnering Team. In addition the Team included ecological experts from the University of Florida, NOAA, and EPA Region 4 Ecological Services Division." However, if refinement values were not available then freshwater refinement values were preferentially used for the freshwater wetlands and saltwater refinement values were preferentially used for the freshwater wetlands, when available.*

Follow-up response to Comment #4: It is unclear why marine water PELs were utilized for freshwater sediment when freshwater PECs are available. As stated above, marine water PELs for arsenic and 4,4'-DDE exceed the freshwater PECs and are not protective of freshwater benthic invertebrates. Use of the marine water PELs for freshwater is likely to result in toxic sediments remaining in freshwater wetlands.

University of Florida Comment #5: *In Table 9, the proposed overall ecological PRG for aldrin (0.08 mg/kg) and manganese (1,100 mg/kg) for Wetlands 3, 5A, and 18A are*

severe effects levels (SELs). SELs should not be utilized as remedial goals since they are not protective of the benthic community. We recommend utilizing the US EPA Region III freshwater sediment screening benchmarks of 0.002 mg/kg for aldrin and 460 mg/kg for manganese. These values are lowest effect levels (LELs) and are likely to provide more adequate protection of the aquatic community.

Navy response to Comment #5: *The Navy does not agree that screening levels should be used as PRGs. The SELs are similar in definition to the PELs that were used to refine the list of COPCs in the RI report, and were also used as one of the criteria for setting PRGs in the Technical Memorandum.*

Follow-up response to Comment #5: SELs are defined as the concentration at which a pronounced disturbance of the sediment-dwelling community can be expected. The SEL represents approximately the 90th percentile of the effects data. The PEL represents the geometric mean of the 50th percentile of the effects data and the 85th percentile of the no effect data. We therefore disagree that SELs are similar to PELs (MacDonald et al, 2003). SELs suggest significant adverse impacts to the benthic community and should not be utilized as PRGs.

University of Florida Comment #6: *In Tables 9-12, the overall wetlands PRGs are a mixture of average (screening level, NOEC, LOEC) and not-to-exceed (PEL and PEC) values. This does not present a problem as long as they are utilized correctly when interpreting site data. It may be more straightforward to separate them into two sets of PRGs: one set for comparison to the average concentration and the other as not-to-exceed values.*

Navy response to Comment #6: *The comment needs clarified. It is not clear why the reviewer believes that screening levels, NOECs, and LOECs are average values while the PEL and PEC are not to exceed values. The Navy believes that all of the PRGs for the chemicals remaining as COCs after the refinement presented in Tables 14 through 20 are not-to-exceed values.*

Follow-up response to Comment #6: The use of all refinement values as not-to-exceed values is acceptable.

University of Florida Comment #7: *The human health PRGs listed in Table 13 for the maintenance worker and recreational fisherman are not apportioned. Per Chapter 62-780, F.A.C., alternative soil clean-up target levels (CTLs) should be apportioned.*

Navy response to Comment #7: *The Navy would like to discuss this comment further with the State. If the PRGs are apportioned according to the number of carcinogenic/noncarcinogenic chemicals at each area, several of the sediment PRGs will result in fish tissue concentrations that are much lower than what is used to set fish advisories in the State of Florida. This is because the State of Florida sets fish advisories using a 10E-4 risk level, whereas apportioning the PRGs results in fish tissue levels based on a less than 10E-7 risk level. The resulting fish tissue concentrations would likely be less than background concentrations. This would also occur if the PRGs were not apportioned, but the impacts would not be as severe. Note that there was an*

error in the fraction of organic carbon values that were used to calculate the PRGs at Wetlands 15 and 64 so those corrections will be made when the PRGs are re-calculated.

Follow-up response to Comment #7: In the State of Florida, human health risk-based CTLs are derived using a target risk level of 10^{-6}. This includes CTLs based on the consumption of fish (Chapter 62-302, F.A.C.), which have a health protection goal very different from a fish advisory level. Additionally, whenever alternative CTLs are utilized, apportionment is required per Chapter 62-780, F.A.C. This ensures the total risk from chemicals present at the site does not exceed the FDEP target risk of 10^{-6}.

University of Florida Comment #8: *Utilizing the equations and values in Attachment B, we calculate a non-apportioned benzene PRG of 453 mg/kg for the maintenance worker. In accordance with the procedure utilized in Chapter 62-777, F.A.C. (Table II), this value should be rounded to 450 mg/kg as opposed to the 500 mg/kg given in the document. We recommend utilizing the value of 450 mg/kg as the non-apportioned PRG because it is the more conservative value and is based on default criteria development for the State of Florida. This value should subsequently be apportioned per Chapter 62-780, F.A.C.*

Navy response to Comment #8: *In accordance with Chapter 62-777 F.A.C. using default dermal absorption (DA) value of 0.01 (Table 3) and a GI absorption of 0.9 (Table 5) for benzene along with the equations and other input assumptions presented in Attachment B the non-apportioned PRG for the maintenance worker would be 448 mg/kg. This value would round to 450 mg/kg. This value will be proportioned per Chapter 62-780, F.A.C. See above table for revised PRG.*

Follow-up response to Comment #8: The response is satisfactory. A table was not included in the response to comments.

University of Florida Comment #9: *In the calculation of PRGs for sediment protective of ingestion of fish, the fraction of intake from the site (FI) is 0.1. This assumes that on the day a child trespasser consumes fish from the site (52 d/y), the fish caught on-site will only account for 10% of the fish ingestion that day. Instead, it appears likely that all fish ingested on that day would originate from the site. Therefore, we recommend utilizing an FI of 1. This would decrease the recreational fisherman PRGs listed in Table 13 by a factor of 10.*

Navy response to Comment #9: *The PRG for the recreational fisherman will be modified as follows. It is assumed the recreational fisherman eats one fish meal a week over a course of the year or 52 meals a year. Not all of the fish that the recreational fisherman eats will come from the wetlands. It is assumed that only 10 percent or 5 meals consists of fish caught at any one wetlands, therefore the exposure frequency would be 5 meals per year. Since the entire meal would come from the site a value of 1 will be used for the fraction ingested.*

Follow-up response to Comment #9: The above response modifies the exposure frequency of the recreational fisherman to 5 d/y. This exposure frequency appears low for a recreational fisherman scenario. We recommend using a value of 52 d/y as proposed in the technical memorandum. This exposure frequency represents a value of approximately once a week and appears more reasonable.

University of Florida Comment #10: *Page 10 states that the exposure frequency for maintenance workers was decreased from 52 d/y in the Remedial Investigation report to 26 d/y. No explanation is given for this change and it is unclear if this assumption remains protective of maintenance workers at the site.*

Navy response to Comment #10: *As presented in a response to an EPA comment on the RI report, "52 days per was assumed to be the total time a maintenance worker would spend performing maintenance in wetlands during a year, whether that is applicable to only one wetland of more than one. If a worker is assumed to spend time in more than one wetland, the exposure frequency should be divided by the number of wetlands to account for their exposure during that year, unless site-specific information is available." Maintenance in any one wetland throughout the year, and subsequent exposure to sediment is expected to be minimal, and much less than 52 times per year in any one wetland. Therefore, even the assumption of 26 times per year (once every two weeks) is conservative, because there is little maintenance that would require a worker to actually enter the wetland. Therefore, the Navy believes that wetting PRGs based on an exposure frequency of 26 times per year for any one wetland is still conservative, and remains protective of maintenance workers at the site.*

Follow-up response to Comment #10: The response is satisfactory.

University of Florida Comment #11: *Table 22 lists the refined COCs for NAS Pensacola Site 41. We have the following comments on the refinement:*

a. *Wetland 3: The refinement is satisfactory.*

Navy response to Comment #11a: *Comment noted.*

Follow-up response to Comment #11a: The response is satisfactory.

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b. *Wetland 5A: The refinement is satisfactory.*

Navy response to Comment #11b: *Comment noted.*

Follow-up response to Comment #11b: The response is satisfactory.

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c. *Wetland 15:*

i. *Lead, 4,4'-DDD, 4,4'-DDT, and total DDT were listed as ecological COCs in the remedial investigation report (RI) Table 16-1 but were omitted as ecological COCs in the technical memorandum. Because these chemicals exceed refinement criteria in the RI, they should remain ecological COCs for Wetland 15.*

ii. *Delta-BHC was listed as an ecological COC in the RI report Table 16-1 (delta-BHC HQ = 5.6). Although it was eliminated in this technical*

memorandum as a COC for human health, it remains an ecological COC for this wetland.

Navy response to Comment #11c: *Lead, 4,4'-DDD, 4,4'-DDT, total DDT, and delta-BHC were not listed as ecological COCs at Wetland 15 in the revised Table 16-1 (see Attachment A of the Technical Memorandum). Therefore, they were not evaluated as ecological COCs in the Technical Memorandum.*

Follow-up response to Comment #11c: Revised Table 16-1 excludes total DDT and total BHC as ecological COCs based on food chain modeling results that conclude the hazard quotient is less than one for concentrations present in Wetland 15. However, it is not clear why lead was excluded as an ecological COC. Revised Table 16-1 lists an HQ of 1.9 for lead in Wetland 15 and it appears to remain of concern.

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d. Wetland 16: The refinement is satisfactory.

Navy response to Comment #11d: *Comment noted.*

Follow-up response to Comment #11d: The response is satisfactory.

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e. Wetland 18A: Table 16-1 of the RI lists beta-BHC, total BHC, 4,4'-DDD, 4,4'-DDT, and total DDT as ecological COCs. They are considered COCs due to exceedance of the refinement COCs and through food chain modeling (DDT HQ=9.7). However, they are absent from Tables 18 and 22 of this report. These chemicals should be retained as ecological COCs based on criteria exceedances. We recommend conducting toxicity bioassays to determine if these ecological COCs are having adverse effects on wildlife in Wetland 18A.

Navy response to Comment #11e: *Beta-BHC, total BHC, 4,4'-DDD, 4,4'-DDT, and total DDT, were not listed as ecological COCs at Wetland 18A in the revised Table 16-1 (see Attachment A of the Technical Memorandum). Therefore, they were not evaluated as ecological COCs in the Technical Memorandum.*

Follow-up response to Comment #11e: The response is satisfactory.

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f. Wetland 18B: Arsenic should be retained as a COC for human health. Arsenic was omitted as a COC based on resampling at one sample site. One sample is not adequate to characterize the wetland. It is premature to eliminate arsenic as a COC for human health based on one sample. We suggest additional sampling to confirm arsenic is not of concern for this wetland.

Navy response to Comment #11f: *The Navy will agrees to retain arsenic as a COC for human health for the FS. However, the only alternative that will be evaluated for this Wetland 18B in the FS will be long-term monitoring to determine whether arsenic is really a concern at the wetland.*

Follow-up response to Comment #11f: The response is satisfactory.

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g. *Wetland 48:* *The refinement is satisfactory.*

Navy response to Comment #11g: *Comment noted.*

Follow-up response to Comment #11g: The response is satisfactory.

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h. *Wetland 64:*

i. *Aroclor 1254 and 1260 were eliminated as human health COCs based on the FI of 0.1. Amending the FI to 1 (which appears reasonable based on the limited exposure frequency) changes the recreational fisherman PRGs to 0.066 mg/kg for both chemicals. The maximum detected concentration of Aroclor 1254 (0.37 mg/kg) and Aroclor 1260 (0.3 mg/kg) exceed this PRG. Additionally, apportionment needs to be considered for these chemicals per Chapter 62-780, F.A.C. Therefore, Aroclor 1254 and 1260 should remain human health COCs for this wetland.*

Navy response to Comment #11h(i): *Please see the Navy's response to Comment 7. Aroclor-1254 will not be added as final COCs for Wetland 64 because it was not detected in any of the Phase III or Phase IV samples.*

Follow-up response to Comment #11h(i): Please see the follow-up response to Comment #7. The omission of Aroclor-1254 as a COC for the protection of human health from Wetland 64 is satisfactory.

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ii. *Copper should be retained as an ecological COC. In Table 6, sample 41M6405 should be considered toxic and 102 mg/kg should be utilized as the LOEC for copper. The maximum Phase II (255 mg/kg), Phase III (146 mg/kg), and Phase IV (200 mg/kg) copper concentrations exceed the LOEC. Therefore, copper should be retained as an ecological COC for this wetland.*

Navy response to Comment #11h(ii): *Please see the Navy's response to Comment 1. The Navy does not agree that the LOEC for copper needs revised.*

Follow-up response to Comment #11h(ii): Please see the follow-up response to Comment #1. Copper should be retained as an ecological COC for Wetland 64.

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iii. *Silver should be retained as an ecological COC. In Table 6, sample 41M6405 should be considered toxic and 1.9 mg/kg should be utilized as the LOEC for silver. The maximum Phase II (5.1 mg/kg), Phase III (3 mg/kg), and Phase IV (4 mg/kg) silver concentrations exceed the LOEC. Therefore, silver should be retained as an ecological COC for this wetland.*

Navy response to Comment #11h(iii): *Please see the Navy's response to Comment 1. The Navy does not agree that the LOEC for silver needs revised.*

Follow-up response to Comment #11h(iii): Please see the follow-up response to Comment #1. Silver should be retained as an ecological COC for Wetland 64.

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iv. *Table 16-1 of the RI states that mercury should be retained as a bioaccumulative COC for this wetland. The refinement PRGs presented in this document did not address bioaccumulation. Therefore, mercury should be retained as an ecological COC for this wetland.*

Navy response to Comment #11h(iv): *Mercury was eliminated from further evaluation for reasons provided on Page 7, 1st paragraph of the Technical Memorandum. This was primarily because risks to the red drum were marginal and most of the mercury concentrations were lower that reference concentrations. The red drum model is discussed in Section 8.7.1.3 of the RI report. Actual tissue concentrations were used, when available. Mercury is a common metal that is in most fish across the State of Florida, much of which is present from atmospheric deposition. In fact, the State of Florida has a fish advisory for the state that prohibits or limits the amount of fish that pregnant or nursing women and women who may become pregnant should consume. Therefore, mercury contamination in fish appears to be a statewide problem.*

Follow-up response to Comment #11h(iv): The response suggests that mercury concentrations in fish tissue at Wetland 64 are representative of background. To our knowledge, a site-specific background mercury concentration in fish tissue was not obtained. Although mercury concentrations in fish tissue may be elevated in some areas of the state, it is not possible to determine if the fish tissue concentrations at Wetland 64 are representative of background without a site-specific background study.

There is a difference in the ecological COCs listed in Table 16-1 of the Final RI dated August 17, 2005 and the revised Table 16-1 listed as Attachment A of the technical memorandum. It is unclear why these tables differ or how the revised Table 16-1 was derived. Information regarding the elimination of COCs from the revised Table 16-1 should be provided.

Please let us know if you have any questions regarding this review.

Sincerely,

Leah D. Stuchal, Ph.D.

Stephen M. Roberts, Ph.D.

Reference:

MacDonald, D.D., Ingersoll, C.G., Smorong, D.E., Lindskoog, R.A., Sloane, G., and Biernacki, T. (2003) *Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters.* Florida Department of Environmental Protection. Tallahassee, Florida.