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RESPONSE TO REGULATORY AND CONTRACTOR COMMENTS ON FINAL DRAFT REMEDIAL INVESTIGATION FEASIBILITY STUDY FOR OPERABLE UNIT 3 (OU 3) NAS JACKSONVILLE FL

2/14/2000

NAVFAC SOUTHERN

RESPONSE TO COMMENTS
Final Draft Remedial Investigation and Feasibility Study Report
Operable Unit 3
Naval Air Station Jacksonville
Jacksonville, Florida

Naval Air Station Jacksonville, Facilities and Environmental Department

Diane Lancaster/Tim Curtin

Remedial Investigation Comments

1. **Page iv, 3rd paragraph: Define "unacceptable."**

   Response: Since the term "unacceptable" is subjective, the sentence has been modified to read: "However, concentrations greater than 1,000 ug/l of chlorinated solvents are limited to nine relatively small, discrete plumes (Areas A, B, C, D, E, F, G, Building 106, and Building 780)."

2. **Page iv, 4th paragraph: sp. "northern"**

   Response: Spelling error corrected per reviewer's comment.

3. **Page xxiv, cured-in-place pipe**

   Response: Spelling error corrected per reviewer's comment.

4. **Page 2-5, Chapter 2.1.6, 2nd paragraph: confusing first sentence**

   Response: The first sentence of this paragraph has been rewritten as follows:

   "During the repair and replacement of the storm sewer under Enterprise, Wasp, and Wright Streets, Robert Bates and Associates identified several cross-connections with industrial and sanitary sewers."

5. **Page 2-10, Chapter 2.2.2, Some radioactive material remains under the concrete pads on the north side of PSC 15.**

   Response: The following sentence has been added before the last sentence of the second paragraph of Section 2.2.2: "Due to stability concerns, soil around the pipes and underneath the concrete pad was not excavated even though the gamma measurements were above 12,000 cpm."

6. **Page 2-11, Chapter 2.2.5: clarify the permit application paragraph. The tanks were removed, and the building demolished, as a RCRA unit. The soil excavation under the concrete was removed as a CERCLA removal action. This is a very important legal and regulatory distinction.**

   Response: The following sentences have been added at the end of the first paragraph of Section 2.2.5: "The tanks were removed, and the building demolished, as a RCRA unit. The soil excavation under the concrete was removed as a CERCLA removal action."

7. **Page 2-12, Chapter 2.2.6, 2nd paragraph: sp. "mobile"**

Response: Text corrected per reviewer's comment.

8. **Page 2-12, Chapter 2.2.7, 4th paragraph: first sentence needs clarification.**

Response: The grammatically incorrect word "investigation" in the first sentence has been replaced by "investigated."

9. **Page 2-13, Chapter 2.2.7, last paragraph: change "waste oil" to "used oil" in first sentence.**

Response: Text corrected per reviewer's comment.

10. **Page 2-14, Chapter 2.3.1.1, last sentence: "in Chapter 2.0"**

Response: Text corrected per reviewer's comment.

11. **Page 2-21, Chapter 2.3.2, 4th paragraph: this is confusing since the first concentration is smaller than the second concentration. Suggest revising first two sentences.**

Response: The first two sentences have been rewritten as follows: "In 1986, the total VOC concentration at NARF-B1 (Area G) was 13.3 mg/l (Geraghty & Miller, 1986). Ten years later, in September 1996, the total VOC concentration detected at NARF-B1 was 4.96 mg/l (ABB-ES, 1998a).

12. **Page 2-21, Chapter 2.3.2, 5th paragraph: sp. "the sewer."**

Response: Text corrected per reviewer's comment.

13. **Page 2-24, Chapter 2.3.2, last sentence: what about the eighth site?**

Response: The following clarification has been added to the last sentence: "A time factor was not calculated for Area H because it no longer had elevated concentrations of contamination."

14. **Page 3-12, Chapter 3.8.2, 3rd paragraph: sp. "0.6 feet"**

Response: Text corrected per reviewer's comment.

15. **Page 4-1 through 4-54, Chapter 4: include figure showing previous sampling points from OU 3 Work Plan**

Response: Sampling points from the OU 3 Work Plan are presented in Chapter 2 (Figures 2-3 and 2-4).

16. **Page 5-3, Chapter 5.1.1, 1st paragraph: Figure 4-7 is Area A, not Area G**

Response: Text corrected to refer to Figure 4-13, which is Area G.

17. **Page 9-8, Chapter 9.1.3: RCRA post-closure permit is in place for the Plating Shop, Building 101, and is an ARAR.**

Response: RCRA post-closure permit number HF16-288092 has been addressed in Section 9.1.3, and added to the REFERENCES section.

RESPONSE TO COMMENTS
Final Draft Remedial Investigation and Feasibility Study Report
Operable Unit 3
Naval Air Station Jacksonville
Jacksonville, Florida

Florida Department of Environmental Protection

Jorge Caspary

1. **General: In accordance with applicable Florida statutes, the report must be signed and sealed by a registered engineer or geologist with primary responsibility for geological interpretations and engineering calculations.**

   Response: The Final report has been properly signed and sealed.

2. **Page 4-4, Chapter 4.1.4: please indicate if post excavation soil samples were taken. Also, indicate the quantity of soil removed and whether leachability samples were obtained. Also, show in a figure the approximate extent of excavation. If this information is unavailable, refer to a report documenting the referenced IRA.**

   Response: The military constructor, Harry Pepper and Associates, Inc. (Contact: Willie Dobbs, 904-721-3300) was contacted concerning this issue. According to Mr. Dobbs, no formal report was written for the construction project. The building was redesigned by raising its foundation in order to avoid any contact with the water table and only "enough" soil was removed to lay the foundation. The undetermined amount of contaminated soil was manifested and disposed. Based on this information, the last two sentences of the second paragraph of Section 4.1.4 have been rewritten as follows:

   "A small, undetermined amount of contaminated soil was removed in order to lay down the foundation during building construction in 1992 by Harry Pepper and Associates, Inc. Contaminated groundwater was not addressed during this work as all construction activities were done above the water table (Dobbs, 1999)."

   The cited reference (Dobbs, 1999) has been added to the reference list.

3. **Page 4-19, Chapter 4.3.1.5: the text indicates that soil samples at Areas A, D, PSC 12 and 14 do not indicate soil contamination. Please indicate what criteria, i.e., background, FDEP soil criteria, etc., is being utilized as comparison to assert the lack of soil contamination at these areas.**

   Response: The following phrase has been inserted in the last sentence of 4.3.1.5: "(i.e., generally within background levels and no exceedances of Florida SCGs)."

4. **Page 4-19, Chapter 4.3.2.2: the text describes *background* and *reference* samples. Is the text describing the same samples?**

   Response: The text has been corrected to substitute the term "reference" in lieu of the term "background" when referring to surface water and sediment samples. The text throughout Section

4.2 has been checked and modified for consistent use of these terms. In addition, the following sentence has been inserted into the first paragraph of Section 4.2 to clarify the use of "reference" instead of "background" for these media:

"The term "reference" is used to distinguish the set of surface water and sediment samples taken from the St. Johns River from the set of stationwide "background" surface water and sediment samples collected from creeks and tributaries during the OU 1 RI/FS."

5. **Page 4-35, Figure 4-7 and others throughout the text: dashed lines should be used where a groundwater plume is inferred.**

Response: Dashed lines have been added to Figures 4-7, 4-8, 4-9 and 4-10.

6. **Page 4-35, Figure 4-7 and others throughout the text: please submit a separate table showing screen intervals for the piezometers, etc., used to estimate plume thickness. Also, the minimum value used to define the horizontal extent of the plume is 100 µg/l. it would help the reviewer to show that for instance, PZ028 had no chlorinated solvent detected (ND) above the guidance concentrations.**

Response: Figures 4-7 to 4-13 have been modified to include total chlorinated solvent concentrations at sampling points outside the 100 µg/l contour. Estimates of plume thickness have been inferred primarily from lithology information as most of the data available are from CPT locations where samples were taken at discrete depths. CPT sampling locations, sampling depths, and geologic cross sections at each of the elevated areas of contamination, previously presented in the 1998 OU 3 EE report, have been included in Appendix B-2 of this report. Additional information on depth intervals for samples taken during the period 1996 to 1999 can be found in the sample tracking summary (Appendix C-1, Table C-1.2).

7. **Page 4-36, Table 4-9: Total plume areas and volumes where a plume extent, particularly horizontal, is inferred (see comment 5 above) should, at a minimum, be qualified as "estimated."**

Response: Table 4-9 has been revised. The word "estimated" has been inserted in the total area, total volume and total contaminant mass columns. As noted in this table, all assumptions and calculations to arrive at these estimates are documented in Appendix C-8.

8. **Page 5-13, Chapter 5.3.3: The text indicates that "no ongoing sources of contamination above the water table have been identified at OU 3." Please indicate whether this sentence is based on a review of current waste management practices at NADEP, whether they don't use chlorinated solvent anymore, or other factual basis to assert this statement.**

Response: The text has been revised to indicate that current waste management practices at NADEP do not allow any such discharges, and that during the environmental investigations at NADEP no ongoing sources of contamination have been found that have not been dealt with.

Naval Facilities Engineering Command - Southern Division

Paul Campbell

Human Health Risk Assessment Comments

General:

1. **It is clear that the potential for volatilization into utility corridors and buildings has not been addressed – put simply, it should be. Recommend contractor address this issue early in the documentation, along with the other potential pathways. While there is some allusion to this issue, it is not clearly, distinctly addressed.**

   Response: The following sentences have been inserted at the end of the second paragraph on Page 6-33 (part of section 6.3.2).

   "The potential for exposure from volatile organic compounds in groundwater via volatilization into buildings and basements was given much consideration in the preparation of the human health risk assessment. This topic was discussed in depth on several occasions at the NAS Jacksonville partnering team meetings. This pathway was not assessed for reasons such as the lack of VOC detection in current ambient air monitoring in the buildings; the NAS Jacksonville partnering team's desire to see a worst case groundwater ingestion pathway assessed; and FDEP's position that OSHA requirements are sufficient for the protection of indoor workers."

2. **Page 6-33, Chapter 6.3.2: the report has gone to some length to explain the environmental-geologic factors (also addressed in Chapters 3 and 5) contributing to ruling out drinking water ingestion as a viable exposure pathway, yet follows by including drinking water exposure to future site workers as a conservative measure (and ruling out volatilization by comparison). Note that the conclusions for Chapter 6 indicate that this exposure pathway is "extremely improbable and/or infeasible." Therefore, there is no logical reason to address this pathway in a quantitative manner; it should be ruled out qualitatively under initial evaluation of exposure pathways, and then briefly addressed under the uncertainty analysis.**

   Response: See above response to comment #1. The risk assessor agrees with the point made; however, under the direction and agreement of the NAS Jacksonville partnering team, this extremely unlikely/infeasible pathway was included as a characterization of a worst case exposure to groundwater.

3. **Page 6-33, Chapter 6.3.2: Following on to 2) above - additionally, note that the following paragraph then goes on to indicate that the workers on OU 3 receive 40-Hour OSHA training and practice good hygiene/work practices. The reasoning for including this "conservative" pathway is not clear, if the workers are OSHA trained, and based on likelihood (virtually**

non-existent) of establishing a groundwater well for potable water purposes, this is simply an unsubstantiated pathway.

Response: See above response to comment #1. The risk assessor agrees with the point made; however, under the direction and agreement of the NAS Jacksonville partnering team, this extremely conservative groundwater pathway was included as a characterization of a worst case exposure of workers to groundwater.

4. **Page 6-33, Chapter 6.3.2, 3rd paragraph: The exposure scenario for subsurface soils (which needs to be clearly defined in terms of depth), is also a credible/plausible exposure pathway for groundwater, and as such should be considered (for groundwater). Additionally, ruling out volatilization by assuming groundwater ingestion "covers it," or using groundwater as a surrogate, is inappropriate. This pathway (volatilization to structures, including utility corridors, and hence utility/construction worker exposure) should be evaluated more thoroughly. Figure 6-1 needs to be re-visited in consideration of these comments. Note that Table 6-13 indicates that indoor air quality is currently monitored by NAS Jacksonville – that information would be pertinent to the discussion of exposure pathways and ruling out (or in) volatilization based on historical data collected during sampling/monitoring events. Also within Table 6-13, should consider exposure to utility/construction workers via groundwater exposure (depth to groundwater should be addressed). Also, if volatilization is appropriately considered and addressed under present circumstances, then those results should be included for future volatilization exposure scenario along with the disclaimer given already (i.e., for the future modeling scenario).**

Response: See Response to Comments 1 - 3. A sentence clarifying subsurface depth as below the pavement has been added to Section 6.2.4 "Subsurface soil is defined as soil below the pavement and above 10 feet depth." Additionally, the air monitoring and sampling data collected as part of the OSHA worker ambient air-monitoring program that supports the decision to not model air concentrations of VOCs in basement air is maintained by the NADEP Environmental Department (Contact: Terry Rhodes, 904-542-2200).

5. **General: Based upon the recent release of Florida's 62-777 guidance addressing both soils and groundwater, the contractor should address these issues/target chemical concentrations (specific to new guidance with appropriate citations) early in the document and within Chapter 6 (e.g., section 6.1.2, 6.2, 6.2.2, etc.). Specific example: lead – industrial – 920 mg/kg.**

Response: The decision not to use the new Florida 62-777 guidance numbers was made by the NAS Jacksonville partnering team.

6. **P. 6-49, Chapter 6.5.1: refers to Figure 6-2 – I see no benefit to these particular graphical depictions of risk. In fact, because they are based on a log scale, with no horizontal dimension scale, they would likely be perceived by those unfamiliar with statistics and/or risk assessment, as being much worse than reality. These are essentially point estimates for the**

"reasonable maximum exposure," or "reasonable maximum exposed" individual. These bar charts seem to depict some form of a population or density distribution – I would suggest the information not be depicted using these particular chart formats.

Response: The noncancer hazard and cancer risks are depicted in this way to illustrate that the risks are below the acceptable target levels indicated on the figures. However, in light of the recent prevalence of probabilistic risk assessments which depict population risks; the risk assessor agrees that these figures (as well as all risk values) could be misunderstood by readers not familiar with risk assessment and statistics. Therefore, the bar chart figures 6-2 through 6-9 have been removed.

7. **Page 6-59, Chapter 6.6: should address the number of samples taken (both site and background samples) in terms of their contribution to determining the difference between the background and site data, and adequately characterizing both populations.**

Response: The following text has been added to Section 6.6.1, as the last paragraph of page 6-65 in the section titled "Differences Between Site and Background Concentrations."

"A detailed discussion of background and site data can be found in Chapter 4. The number of OU 3 specific background/reference locations, consisting of three soil, four surface water and four sediment sampling locations is considered adequate to characterize the background data set."

8. **General: While Appendix F (specific subsections) provides carcinogenic weight of evidence designations and toxicological profiles, the discussion of the IELCR and HI values in Chapter 6 fails to address these issues – e.g., break out of HI by target organs and IECLR by carcinogenic weight of evidence. These issues are addressed in broad terms in the uncertainty section (6.6.3), but should be addressed in consideration of site specific contaminants. Note: this assumes that we maintain the current groundwater ingestion pathway (which is inappropriate based on the information already presented in this document).**

Response: The risk assessment has been revised to include the following paragraphs at the end of Section 6.6.3 (Uncertainty Section - Toxicity Assessment). The additional bullets address the HI by target organ and ELCR by carcinogenic weight of evidence for each pathway that exceeds the target level.

"In this risk assessment, the groundwater ingestion pathway of many areas exceeds target cancer and noncancer levels. Therefore, the groundwater areas were reassessed based on USEPA carcinogenicity weight of evidence classification and noncarcinogenic endpoint - only the risk drivers (chemicals that contribute to the exceedance of the target threshold levels) were considered in this assessment.

At each Area the risk drivers each individually exceed the 1×10^{-6} target level or the risk is driven by a single analyte; therefore, the risk indicated in the risk characterization is not likely to over- or under-estimate risk based on the weight of evidence uncertainty factor.

Only Area A, Area E, and Area G had noncancer HIs with more than one primary contributor; therefore, the assessment of noncancer hazard by each target organ/endpoint was restricted to these Areas. At Area A both risk drivers (TCE and 1,1-dichloroethene) are liver toxins and both individually exceed the target hazard index of 1. At Area E, all contributors (PCE, TCE, and 1,1-dichloroethene) are liver toxins, although only PCE and TCE individually exceed the target hazard index. And at Area G, all three primary contributors (TCE, 1,1-dichloroethene, and 1,2-dichloroethene) are liver toxins; only TCE exceeds the target hazard index of 1. Therefore, because the risk drivers for each area have the same target organ, the noncancer hazards indicated for each groundwater area is not likely to be over- or underestimation based on target organ uncertainty."

9. **Page 6-59, Chapter 6.6: "A thorough discussion....is not feasible." The term "thorough" is subjective – but, I would expect the contractor to provide us a "thorough discussion" -- it's a necessary part of the risk assessment. As written, this statement is not only unnecessary, but undermines confidence in the report and is generally poor risk communication. Now, of course, based on the comments presented in this review, the uncertainty analysis is obviously incomplete, and you should expect the contractor to provide a "thorough" uncertainty analysis.**

Response: The sentence in question has been deleted and the Uncertainty Analysis has been revised to include the text provided in Response 8.

10. **Page 6-65, Chapter 6.6.1, 4th paragraph: "Adequate Chara..... the nonrandom sampling may actually result in overestimation of exposures....." First, recommend "likely overestimates" as opposed to "may actually"..... Second, recommend that "exposure" be addressed as "exposure concentration," because that's what we are really talking about. Also, recommend simple address of this "exposure concentration" versus the reality of an "exposure range."**

Response: The paragraph has been revised as suggested.

11. **Page 6-66, Chapter 6.6.2, RME paragraph, last sentence: "To address the most...future resident...." but we don't do that in this risk evaluation, so why include this sentence – recommend it be deleted.**

Response: The paragraph has been revised as suggested.

12. **Page 6-70, Chapter 6.8: the last three bullets state "exposure to groundwater," but don't indicate the mechanism(s) of exposure.**

Response: The last three bullets have been revised to read as follows:

- The ELCR associated with exposure from ingestion of groundwater at Areas C, and H, and outside the designated areas for the future occupational worker are within the USEPA's

acceptable risk range of 1 in 10,000 to 1 in 1,000,000, but above FDEP's level of concern of 1 in 1,000,000. However, for COPCs detected in groundwater outside the designated areas no individual COPC had an ELCR that exceeded 1 in 1,000,000.

- The noncancer risks associated with potential exposure from ingestion of groundwater at Areas A, B, C, D, E, F, and G for the future occupational worker exceed both the USEPA's and FDEP's target HI of 1.

- Noncancer risks associated with exposure from ingestion of groundwater at Area H and outside the designated areas for the future occupational worker are below both the USEPA's and FDEP's target HI of 1.

13. **General: Tables provided in Chapter 6 (i.e., Table 6-29) refer to Florida 1994 guidance and Federal MCLs – need to address the new Florida 62-777 numbers.**

Response: The decision not to use the new Florida 62-777 guidance numbers was made by the NAS Jacksonville partnering team.

14. **Page 6-79, Chapter 6.8: assesses the risks of the future utility worker associated with exposure to storm sewer water, but does not identify specific mechanisms (which should include dermal, incidental ingestion, and inhalation).**

Response: As discussed in the text of the risk assessment, the pathway of incidental ingestion of storm sewer water is not assessed because workers are OSHA 40-hour safety trained and therefore good hygienic work practices are assumed. Inhalation of storm sewer water is not assessed in this risk assessment because future development would significantly alter conditions such that modeling would not accurately predict risks. The bullets have been revised to read as follows:

- The COPCs detected in storm sewer water do not pose unacceptable carcinogenic risks to the future utility worker exposed via dermal contact based on the USEPA's acceptable risk range of 1 in 10,000 to 1 in 1,000,000, and FDEP's level of concern of 1 in 1,000,000.

- Noncancer risks associated with exposure to storm sewer water for the future utility worker exposed via dermal contact are below both the USEPA's and FDEP's target HI of 1.

RESPONSE TO COMMENTS
Final Draft Remedial Investigation and Feasibility Study Report
Operable Unit 3
Naval Air Station Jacksonville
Jacksonville, Florida

Naval Facilities Engineering Command - Southern Division

Dana Gaskins

1. **Cover and Front pages: Change zip code to 29406.**

   Response: Text has been corrected per reviewer's comment.

2. **General: The EE report is referenced as 'ABB-ES, 1998a' several times in the document. This should be 'ABB-ES, 1998' unless there is another reference used for ABB-ES in 1998.**

   Response: Text has been corrected per reviewer's comment.

3. **Page –v-, 8th paragraph: Change 'USEPA, 1988' to 'USEPA, 1988a.'**

   Response: Text has been corrected per reviewer's comment.

4. **Page –v-, 8th paragraph, 8th bullet. Delete '.'**

   Response: Text has been corrected per reviewer's comment.

5. **Page –vi-, 1st paragraph: Delete 'State of Florida' and use 'FDEP' since this has already been defined.**

   Response: Text has been corrected per reviewer's comment.

6. **Page – vi-, 1st paragraph, 4th line: Change '1988' to '1988a.'**

   Response: Text has been corrected per reviewer's comment.

7. **TABLE OF CONTENTS: Add chapter 5.1.1**

   Response: Text has been corrected per reviewer's comment.

8. **TABLE OF CONTENTS: there are two chapters 7.1.7 shown.**

   Response: The second occurrence of 7.1.7 has been changed to the correct designation 7.1.8.

9. **TABLE OF CONTENTS: Add 'and Selected Operable Unit 3 Hydrographs' to the Appendix B title.**

   Response: Text has been corrected per reviewer's comment.

10. **LIST OF FIGURES: Add 'Model' to Figure 5-1 Title.**

Response: The correction has been made.

11. **LIST OF FIGURES: Change Figure 5-5 Title to '...Upper Layer Above the Clay Aquitard, Below River Bed Model...'**

Response: The correction has been made.

12. **LIST OF TABLES: Table 1-1 should be Table 2-1.**

Response: The correction has been made.

13. **LIST OF TABLES: Table 11-4 Title, add 'Areas A, B, C, D, E, F, and G'**

Response: The correction has been made.

14. **LIST OF TABLES: Add 'Treatment via Air Stripping, Area D' to Table 11-14a title.**

Response: The correction has been made.

15. **LIST OF TABLES: Add 'Treatment via UV/OX, Area D' to Table 11-14b title.**

Response: The correction has been made.

16. **GLOSSARY: Add the following acronyms: AVS, CPM, DDD, EE/CA, ER-L, ER-M, ft2, g/cc, GGC, kw, LEL, MILCON P, ml/g, µmho/cm, NACIP, NATTC, NOAA, NPL, OME, ppb, PA, ROI, SI**

Response: Above acronyms added to Glossary per reviewer's comment.

17. **CIPP – 'pip' should be 'pipe'.**

Response: Spelling error has been corrected per reviewer's comment.

18. **FFA – 'Facility' should be 'Facilities.'**

Response: Text has been corrected per reviewer's comment.

19. **Page 1-2, Chapter 1.1, 2nd paragraph, last sentence: Change 'Section 2.2' to 'Section 2.3.'**

Response: Text has been corrected per reviewer's comment.

20. **Page 1-2, Chapter 1.2, 5th and 6th lines: Change 'hydrogeology' and 'hydrogeologic' to 'hydrology' and 'hydrologic.'**

Response: Text has been corrected per reviewer's comment.

21. **Page 1-4, Figure 1-2: Darken the figure or change the line type.**

Response: Figure has been replaced with a better copy.

22. **Page 1-6, Chapter 1.3, 6th line: Change 'is' to 'are.'**

Response: Text has been corrected per reviewer's comment.

23. **Page 2-1, Chapter 2.0: PSC 16 is not contained in OU 3. List it in the other areas.**

Response: PSC 16 has been removed from the list. A sentence has been added at the bottom of this list as follows: "PSC 16, the Black Point Storm Sewer Discharge Area, located south of and adjacent to OU 3 has been added to the list of PSCs investigated."

24. **Page 2-1, Chapter 2.0, 2nd paragraph: There are only six PSCs.**

Response: The phrase at the beginning of the sentence "In addition to the seven PSCs" has been deleted.

25. **Page 2-3, Chapter 2.1.2, 2nd paragraph, last line: Change '1991' to '1991a.'**

Response: Text has been corrected per reviewer's comment.

26. **Page 2-4, Chapter 2.1.4, 2nd paragraph, last line: Add '(HLA, 1998b)' to end.**

Response: Text has been corrected per reviewer's comment.

27. **Page 2-5, Chapter 2.1.6, 9th line: Delete '(PSC 16).'**

Response: Text has been corrected per reviewer's comment.

28. **Page 2-5, Chapter 2.1.6, 10th line: 'NAS Jacksonville, 1982' is not shown in the references.**

Response: The following reference has been added:

"NAS Jacksonville, 1982. Spill Log I, Entries from 1982 to 1983."

29. **Page 2-5, Chapter 2.1.6: Add space between 1st and 2nd paragraphs.**

Response: Text has been corrected per reviewer's comment.

30. **Page 2-5, Chapter 2.1.6, 2nd paragraph, 4th line: Delete '(PSC 16).'**

Response: Text has been corrected per reviewer's comment.

31. **Page 2-5, Chapter 2.1.6, 5th line: Change 'flow' to 'flows.'**

Response: Text has been corrected per reviewer's comment.

32. **Page 2-5, Chapter 2.1.6, 4th paragraph, 3rd line: Is the reference listed here 'USEPA, 1988a' the correct reference for the NDPES permit?**

Response: The correct reference for the NPDES permit is 'USEPA, 1996c' which has been added to the text and REFERENCES section.

33. **Page 2-6, 2nd paragraph, 4th line and REFERENCES: Add Brown and Root to text and references.**

Response: The correct Brown & Root reference has been added to both the text and REFERENCES section.

34. **Page 2-6, 3rd paragraph, 1st line: Add Burns and McDonnell to text and references.**

Response: Text and references corrected per reviewer's comment.

35. **Page 2-10, Chapter 2.2.3, 3rd line: Add 'b' to 'ABB-ES, 1997.'**

Response: Text has been corrected per reviewer's comment.

36. **Page 2-10, Chapter 2.2.3, 8th line: Add 'a' to 'BEI, 1996.'**

Response: Text has been corrected per reviewer's comment.

37. **Page 2-11, Chapter 2.2.4, 6th line: Add 'a' to 'BEI, 1996.'**

Response: Text has been corrected per reviewer's comment.

38. **Page 2-12, Chapter 2.2.6, 6th line: Add 'b' to 'BEI, 1996.'**

Response: Text has been corrected per reviewer's comment.

39. **Page 2-13, 2nd paragraph, 2nd line: Change 'well' to 'wells.'**

Response: Text has been corrected per reviewer's comment.

40. **Page 2-15, Figure 2-3: 'PZ022' is shown at two different locations.**

Response: The figure has been corrected. The piezometer associated with PZ024 has been changed to show its correct designation which is PZ023.

41. **Page 2-18, Chapter 2.3.2: Line 10 should be a continuation of line 9.**

Response: Text has been corrected per reviewer's comment.

42. **Page 2-19, Figure 2-5: Add the page number to this sheet.**

Response: Text has been corrected per reviewer's comment.

43. **Page 2-21, 2nd paragraph, 9th line: CW 31 should be a contamination concentration not a well designation.**

Response: The sentence has been modified to read, "At Area B, this was interpreted to mean that the initial high concentration of approximately 9,900 µg/l at CW31 was a very small and isolated area; ..."

44. **Page 2-21, 4th paragraph, 8th line: 'he' should be 'the.'**

Response: Text has been corrected per reviewer's comment.

45. **Page 2-28, Figure 2-10: Define 'U3SD...'**

Response: Figure corrected per reviewer's comment.

46. **Page 3-2, Chapter 3.3, 5th line: The text states the annual average rainfall is 54 inches, but Table 3-1 shows 51.32. Which is correct?**

Response: The text has been corrected by replacing 54 inches with 51 inches.

47. **Page 3-6, Figure 3-2: PZ022 is shown in two different locations.**

Response: The figure has been corrected. PZ022, near CW48 and CW57, has been changed to reflect its correct designation, PZ023.

48. **Page 3-6 through 3-16, Figures 3-3, 3-4, 3-5, 3-8: Add page numbers to these sheets.**

Response: Figures corrected per reviewer's comment.

49. **Page 3-11, 1st paragraph, 6th line: Which ABB-ES, 1995?**

Response: None. The reference has been revised to (USGS in Appendix O, ABB-ES, 1998).

50. **Page 4-1, Chapter 4.0, 1st paragraph, 4th line: Close parenthesis after 1998.**

Response: Text has been corrected per reviewer's comment.

51. **Page 4-7, Table 4-2,Title: Should be 'Sub-Surface.'**

Response: Text has been corrected per reviewer's comment.

52. **Page 4-7, Table 4-2, Notes: Delete U3BBK203.**

Response: U3BBK203 deleted per reviewer's comment.

53. **Page 4-23, Table 4-7: 2-Methylnaphthalene frequency of detection is shown as 1/3. Should this be 1/13?**

Response: The frequency of 1/3 is correct. As presented in Appendix C-6, Table C-6.3, this PAH compound has not been reported in most samples due to differences in the reporting lists, i.e., PAHs as listed in the Target Compound List versus those listed in Method 8310.

54. **Page 4-28, 1st line: Add 'a' to '1995.'**

Response: Text has been corrected per reviewer's comment.

55. **Page 4-46, Table 4-10: Frequency of detections shows a total number of samples as 19. Appendix C-1.2 has 21 samples. Which of these is correct?**

Response: Both are correct. While Appendix C-1.2 lists 21 samples, two of these samples, U3ZMH202 and U3ZMH302, are resampling of U3ZMH201 and U3ZMH301 respectively. Only the newer data set was used for these two samples with the older data disregarded in the calculations. This information has been added in the notes section of Table 4-10 to help clarify this distinction.

56. **Page 4-46, Table 4-10: 1,2-Dichlorobenzene frequency of detection is shown as 1/13. Is this correct?**

Response: The frequency of detection is correct. There were two sampling events for storm water, January 1998 and June 1998. Samples for the first event were analyzed for the TCL VOCs (list of 33 compounds). However, the second event samples were analyzed using Method 624 (list of 38

compounds). Therefore, not all chemicals (including 1,2-Dichlorobenzene) have the same denominator (total number of samples) in their frequency of detections.

57. **Page 4-46, Table 4-10: Acetone frequency of detection is shown as '2/6.' Is this correct?**

Response: The frequency of detection is correct, as partially explained in the previous two responses shown above. Acetone results were reported in the 8 storm water samples taken in January 1998 but was not reported in the samples taken in June 1998. However, two of the eight January 1998 samples (U3ZMH201 and U3ZMH301) were disregarded because resampling information was available from the June 1998 samples (U3ZMH202 and U3ZMH302). This explains the denominator of 6 instead of 8 for acetone. This information has been added in the notes section of Table 4-10 to help clarify this distinction.

58. **Page 4-48, Figure 4-15B: Delete 'MH" from sample designator 'U3ZMH13902.'**

Response: The correct sample designator "U3Z13902" has been corrected per reviewer's comment.

59. **Page 5-1, 1st paragraph, 3rd line: 'Chapter 3' should be 'Chapter 3.0.'**

Response: Text has been corrected per reviewer's comment.

60. **Page 5-5, 3rd paragraph, 4th line: '1997' should be '1998.'**

Response: Text has been corrected per reviewer's comment.

61. **Page 5-6, 16th line: Insert 'milliliters per gram' before '(ml/g).'**

Response: Text has been corrected per reviewer's comment.

62. **Page 5-8, Figure 5-2, Title: Add 'PEAK CONTAMINATION, AREA D PLUME.'**

Response: Figure corrected per reviewer's comment.

63. **Page 5-10, 2nd paragraph, 3rd line: There is a conflict between the date shown here for Gelhar and the date shown in the references. Please resolve.**

Response: The correct citation is "Gelhar (1993)" not Gelhar et. al. (1992). The reference has been further edited so that "Indiana 390" is deleted and "390 pp." is inserted.

64. **Page 5-10, 6th paragraph, 2nd sentence: This sentence is not clear. Please clarify.**

Response: The text has been changed to read as follows. "These plumes show an attenuation to nondetectable levels before reaching the St. Johns River, assuming a contamination half-life of 13.5

years. The actual measured half-life for Area G ranges from 3.75 to 13.5 years (Section 5.2.1)." The existing 3rd sentence in that paragraph has been deleted.

65. **Page 5-10, 6th paragraph, 8th line: Delete ')' after "standard."**

Response: Text has been corrected per reviewer's comment.

66. **Page 6-2, Chapter 6.1.1, 4th line: Remove parenthesis from 'Contract Laboratory Program' and add '(CLP)' after "Program."**

Response: Text has been corrected per reviewer's comment.

67. **Page 6-3, 5th paragraph, 3rd line: Change 'U3QG0701' TO 'U3GA0701.'**

Response: Text has been corrected per reviewer's comment.

68. **Page 6-4, 3rd paragraph, 1st sentence: This sentence is not clear. Please clarify.**

Response: The word "evaluated" has been deleted from the sentence to clarify the text.

69. **Page 6-4, Area F: Change sample designation 'U3F...' to 'U3GF...'**

Response: Text has been corrected per reviewer's comment.

70. **Page 6-9, Table 6-1: Why is the denominator of the Frequency of Detection not consistent?**

Response: The denominator in the frequencies of detections are inconsistent for some compounds primarily due to the different lists of target compounds analyzed and reported.

71. **Page 6-13, Table 6-2: Title should read the same as that shown on page 6-12, not 'Subsurface soil.'**

Response: The table title has been revised as noted.

72. **Page 6-29, Table 6-12: 1st VOC should be '1,1,1-trichloroethane' not '...ethene.'**

Response: The table has been revised as noted.

73. **Page 6-28, Table 6-11, last page: Change page number to '6-28.'**

Response: The page number has been revised as noted.

74. **Page 6-19, Chapter 6.2.7: The text states there are nineteen storm sewer water samples evaluated. Appendix C indicates there are twenty-one. Which is correct?**

Response: The text reads nineteen samples and two duplicates totaling twenty-one samples. Therefore, both the text and Appendix C are correct.

75. **Page 6-36, 2nd complete paragraph, 1st line: Define 'EPC.' I did not find this defined previously in the text.**

Response: EPC is now defined as 'Exposure Point Concentration.'

76. **Page 6-44, Table 6-25: 1,1,2-Trichloroethane does not agree with Table 4-10 or 6-12.**

Response: The chemical name and frequency of detection have been revised to correctly indicate 1,1,1-trichloroethane and its statistics.

77. **Page 6-44, Table 6-25: Acetone does not agree with Appendix C.**

Response: The frequency of detection is correct. Acetone results were reported in the 8 storm water samples taken in January 1998 but was not reported in the samples taken in June 1998. However, two of the eight January 1998 samples (U3ZMH201 and U3ZMH301) were disregarded because resampling information was available from the June 1998 samples (U3ZMH202 and U3ZMH302). This explains the denominator of 6 instead of 8 for acetone.

78. **Page 6-47, 1st paragraph, 2nd sentence: Please clarify this sentence, as it is unclear.**

Response: The sentence has been revised to read, "Most oral RfDs are based on the dose administered to the animal test subject rather than on the dose absorbed into the animal's system."

79. **Page 6-48, 4th complete paragraph, 2nd sentence: Add 'Pollution' after 'Substances.'**

Response: The text has been modified as suggested.

80. **Page 6-58, 2nd line: Add a hyphen to 'occupation.'**

Response: The text has been modified as suggested.

81. **Chapter 7.0, general: Please check all of the references used in this chapter for applicability. Several seem to be incorrect.**

Response: References have been checked and have been modified as necessary. The following missing references have been added to the reference section:

Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder, 1995. Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environ. Mgmt 19(1): 81-97

Ryan, J.A., R.M. Bell, J.M. Davidson, and G.A. O'Connor, 1988. "Plant Uptake of Non-ionic Organic Chemicals from Soils"; Chemosphere, Vol. 17, No. 12, pp. 2299-2323; 0045-6535/88; Great Britain; 1988.

Suter, Glen W., 1993. "Ecological Risk Assessment"; Lewis Publishers, Chelsea Michigan; 1993.

U.S. Environmental Protection Agency (USEPA), 1986c. "Quality Criteria for Water"; Office of Water Regulations and Standards, Washington, D.C.; Report No. 440/5-86-001, May 1986.

U.S. Environmental Protection Agency (USEPA). 1989d. Risk Assessment Guidance for Superfund – Environmental Evaluation Manual. Interim Final. Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-89/001. March, 1989.

U.S. Environmental Protection Agency (USEPA). 1992e. "ECO Update." Volume 1: Number 3. The Role of Natural Resource Trustees In the Superfund Process. Office of Solid Waste and Emergency Response, Publication 9345.0-05I, March 1992.

U.S. Environmental Protection Agency (USEPA). 1992f. "ECO Update." Volume 1: Number 4. Developing a Work Scope for Ecological Assessments. Office of Solid Waste and Emergency Response, Publication 9345.0-05I, May 1992.

U.S. Environmental Protection Agency (USEPA). 1993b. Technical Basis for Deriving Sediment Quality Criteria for Nonionic Organic Contaminants for the Protection of Benthic Organisms by Using Equilibrium Partitioning. Office of Water, Washington, DC. EPA-822-R-93-011, September, 1993.

U.S. Environmental Protection Agency (USEPA). 1995d. Supplemental Guidance to RAGS: Region 4 Bulletins on Ecological Risk Assessment (November).

In addition, the references for USEPA 1998d and USEPA 1991a has been expanded or revised to read as follows:

U.S. Environmental Protection Agency (USEPA). 1998d. Guidelines for Ecological Risk Assessment. Fed. Reg. 63(93): 26845-26924, Thursday, May 14, 1998/Notices.

U.S. Environmental Protection Agency (USEPA). 1991a. "ECO Update." Volume 1: Number 2, Ecological Assessment of Superfund Sites: An Overview. Office of Solid Waste and Emergency Response, Publication 9345.0-05I, September, 1991.

The Persaud et al. reference has been revised to reflect the most recent version:

Persaud, D., R. Jaagumagi, and A. Hayton. 1996. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario: Ontario Ministry of the Environment, Queen's Printer for Ontario: 24 pp.

82. **Page 7-1, Chapter 7.1, 1st bullet & REFERENCES: '(USEPA, 1989a)' is not this reference.**

Response: Reference has been corrected to read (USEPA, 1989d).

83. **Page 7-1, Chapter 7.1, 5th bullet & REFERENCES: '(USEPA, 1995a)' is not this reference.**

Response: Reference has been corrected to read (USEPA, 1995d).

84. **Page 7-1, Chapter 7.1 and REFERENCES: Add 'USEPA 1991d, 1992f, 1992g', and 'Suter 1993' to REFERENCES.**

Response: The references referred to in the comment have been corrected to read (USEPA, 1991a, 1992e, and 1992f). In addition, those references left out of the Final Draft version have been added.

85. **Page 7-2, Chapter 7.1.1, 4th paragraph: 'City of Jacksonville Planning Department, 1990b' is not shown in the REFERENCES.**

Response: The text on page 7-2, 7-3, and 7-4 have been revised to refer to "Jacksonville Planning Department, 1990" (i.e., "City of" and the "b" following 1990 have been deleted from the text).

86. **Page 7-3, Chapter 7.1.1.2, 16th line: '(ABB-ES, 1992a)' does not appear to be the correct reference for this information. Please check.**

Response: The reference has been corrected to read (ABB-ES, 1992c) and the following was added to the reference list:

ABB-ES, 1992c, Preliminary Ecological Assessment, IRP Sampling Event No. 8, Naval Air Station, Jacksonville, Florida.

87. **Page 7-3, Chapter 7.1.1.3, 1st paragraph, last sentence: See comment for Chapter 7.1.1, 4th paragraph.**

Response: Refer to response to comment #86.

88. **Page 7-4, 2nd paragraph, last line: See comment for Chapter 7.1.1, 4th paragraph.**

Response: Refer to response to comment #86.

89. **Page 7-4, 3rd paragraph, 9th line: Please check to see if 'micromhos' and 'µmho/cm' are correct. Add 'µmho/cm' or correct abbreviation to glossary.**

Response: A mho (or micromho) is the standard unit for electrical conductivity whereas an ohm (or microohm) is the standard unit for electrical resistance. The text and glossary have been revised to read "µmhos/cm."

90. **Page 7-5, Table 7-1: See comment for Page 7-4, 3rd paragraph, 9th line.**

Response: The header and footnote of the table have been revised to read "µmhos/cm."

91. **Page 7-11, 5th complete paragraph, 1st line: Check reference to see if it is correct. The reference states 'human health.'**

Response: The cited reference has been revised as follows:

USEPA. 1995d. Supplemental Guidance to RAGS: Region 4 Bulletins. Ecological Risk Assessment. Bulletin No. 2. Ecological Screening Values. November. 1995.

92. **Page 7-15, 1st paragraph, last line: See comment for Page 7-11, 5th complete paragraph, 1st line.**

Response: Refer to response to Comment #92.

93. **Page 7-15, Chapter 7.1.3.2, 10th line: see comment for Page 7-11, 5th complete paragraph, 1st line.**

Response: Refer to response to Comment #92.

94. **Page 7-28, Chapter 7.1.5.2, 2nd paragraph: USEPA 1986 needs to be identified as to which one it is in the references.**

Response: The text reference has been revised accordingly and the reference added to the reference list. Reference should be:

USEPA, 1986c. Quality Criteria for Water. Office of Water, Regulations and Standards. Washington, D.C., Report No. 440/5-86-001, May 1986.

95. **Page 7-28, Chapter 7.1.5.2, 2nd paragraph: USEPA 1983 is not shown in the references.**

Response: The text reference has been revised to "USEPA, 1985" and the reference added to the reference list. Reference should be:

USEPA, 1985. Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses. Office of Research and Development, Environmental Research Laboratories, Duluth, MI. January 1985. PB85-227049.

96. **Page 7-28, Chapter 7.1.5.2, 4th paragraph, 3rd sentence: 'Threshold Effects Limit' is shown as 'Level' in the GLOSSARY.**

Response: "Level" is correct. The text on this page has been revised to read as follows:

"Sediment. Sediment benchmarks selected for comparison to detected sediment concentrations include the State of Florida Sediment Quality Assessment Guidelines (SQAGs) Threshold Effects Level (TEL) and Probable Effects Level (PEL) values (MacDonald, 1994),..."

97. **Page 7-28, Chapter 7.1.5.2, 4th paragraph, 3rd sentence: 'Probable Effects Limit' is shown as 'Level' in the GLOSSARY.**

Response: See response to comment #97.

98. **Page 7-28, Chapter 7.1.5.2, 4th paragraph, 6th sentence: 'Long et al., 1994' is shown as '1993' in REFERENCES.**

Response: The correct reference is "Long et al., 1993"; this has been corrected in text, tables, and reference section, as appropriate.

99. **Page 7-28, Chapter 7.1.5.2, 4th paragraph, 8th sentence: 'Persuad et al., 1996' is shown as '1992' in REFERENCES.**

Response: Persaud et al., 1996 is correct. Other references to Persaud on page 7-31, 2nd complete paragraph, and in a footnote in Table 7-11 have been revised to reflect this. The reference in the reference section has also been revised.

100. **Page 7-31, 3rd complete paragraph: Add reference for FDEP and Mote Marine Laboratories report.**

Response: The appropriate reference (FDEP, 1994b) has been added to the text.

101. **Page 7-43, 2nd paragraph 13th line: 'Mr. Thomas Seal of Seal' should be '...of FDEP.'**

Response: Text has been revised to read: "Mr. Thomas Seal of FDEP..."

102. **Page 7-46, Table 7-13, acetone analyte: ACQUIRE should be '550,000.'**

Response: The AQUIRE value was revised to "550,000."

103. Page 7-47: There are two Chapters 7.1.7.

Response: The chapter titled "Summary of Screening-Level Ecological Risks" has been renumbered as "7.1.8."

104. Page 7-57, 6th paragraph, 6th line: There is no reference 'USEPA, 1987' listed.

Response: The reference to USEPA, 1987 is incorrect and has been changed to the following:

Janes, N., and R.C. Playle, 1995. Modeling Silver Binding to Gills of Rainbow Trout (*Oncorhynchus mykiss*). Environmental Toxicology and Chemistry 14(11):1847-1858.

The reference has also been added to the reference list.

105. Page 7-60, Table 7-17, Decision Point column, 2nd Decision Point: Identify in the notes what 'r2' is.

Response: The following sentence has been added to the notes of Table 7-17:
"r^2 is the square of the correlation coefficient."

106. Page 7-70, Table 7-21: See comment for Page 7-4, 3rd paragraph, 9th line.

Response: The units for electrical conductivity have been revised to read "µmhos/cm."

107. Page 7-75, 2nd paragraph, 3rd line: Correct units for PAHs.

Response: The correct unit is µg/kg. The "u" preceding it has been removed.

108. Page 7-76, 2nd paragraph, 2nd sentence: This sentence is unclear where discussing lead. Please clarify.

Response: The second paragraph has been revised to read as follows, after the first sentence:

"PAHs and lead appear to be the primary contaminants associated with this toxicity. The source of PAH contamination in the St. Johns River is unclear. The presence of PAHs in sediment adjacent to the outfall may be the result of a one-time historical release from the PSC 16 outfall or a release from an adjacent storm sewer located south of the Kemen Test Cell and directly to the east of the PSC 16 outfall. The presence of "tar balls" observed during the April 1999 depositional characterization also suggests that a previous release of hydrocarbons may have occurred from one of the outfalls that discharge to the St. Johns River south of OU 3.

Based on elevated lead concentrations in sediment samples collected directly from the storm sewer, it appears that the PSC 16 storm water outfall may be the source of lead in the St. Johns River sediments. Lead concentrations in sediment at the outfall were elevated relative to background

concentrations. All sediment within the storm water drainpipe was removed during cleaning prior to installation of CIPP, and therefore this immediate source no longer exists. As discussed above, the presence of "tar balls" suggests that a previous release of hydrocarbons may have occurred, which may also be the source of elevated lead at this PSC."

109. **Appendix A Title: Move ')' to end of Title.**

Response: Text has been corrected per reviewer's comment.

110. **Appendix C, Table C-1.3: Sample ID # U3QF0103 was not used in the human health risk assessment.**

Response: Table has been corrected per reviewer's comment.

111. **Appendix C, Table C-1.3: Sample ID # U3GF0604 was only sampled for inorganics, not VOCs.**

Response: Table has been corrected per reviewer's comment.

112. **Appendix C, Table C-1.3: Sample ID # 'U3ZMW302' should be 'U3MH302.'**

Response: Text has been corrected per reviewer's comment.

113. **Appendix C, Table C-9: The results for Location Ids 139 and MH10 through MH 19 are not shown.**

Response: Table containing this information has been inserted into this Appendix.

114. **Section 8.3, 1st paragraph, 5th line: Please check these references to ensure they are correct.**

Response: The reference to 'ABB-ES, 1995b' has been corrected to say 'ABB-ES, 1995c.'

115. **Section 9.3.3.3, 3rd paragraph, 2nd line: Reference should be '1990c.'**

Response: Actually, the correct reference is 'USEPA, 1990b.' The FATE model (referenced as 'USEPA, 1990') is part of the CERCLA Site Discharges to POTWs Treatability Manual (USEPA, 1990b). The text and REFERENCES have been corrected to reflect this change.

116. **Section 10.1.2.1, pumping test data: Area F has no value for transmissivity.**

Response: The transmissivity value for Area F (127 ft^2/day) has been added to the table on page 10-9.

117. **Table 11-3, Correct difference in font size in 'Remedial.'**

Response: Text has been corrected per reviewer's comment.

118. **Section 11.2.1.1, Groundwater Use Restrictions, 1st line: Delete reference to the property deeds. Land use controls will take care of this without the deeds being annotated.**

Response: Text has been corrected per reviewer's comment.

119. **Section 11.2.4.1, 2nd paragraph: 'USEPA 1990' should be 'USEPA, 1990c.'**

Response: The correct reference is 'USEPA, 1990b' (see comment for Section 9.3.3.3 above).

120. **Section 11.2.6.1: Since the groundwater is removed from the ground, wouldn't this be considered an ex situ treatment system?**

Response: Chemical oxidation is achieved by creating a treatment cell in which groundwater is dosed with a reactive oxidant solution and flushed through the zone of contamination. Because the actual contaminant destruction occurs below ground, chemical oxidation is considered an 'in situ' technology.

121. **Page 12-7, 5th complete paragraph, last sentence: Should be 'conditions.'**

Response: Text has been corrected per reviewer's comment.

122. **REFERENCES: Add the following: ATSDR, 1989; ATSDR, 1991; ATSDR, 1992; HLA, 1999; Sax And Lewis, 1987; Zheng, 1990.**

Response: The REFERENCES have been corrected as follows, per reviewer's comment:

Agency for Toxic Substances and Disease Registry (ATSDR). 1991. Toxicological Profile for Vinyl Chloride, U.S. Department of Health and Human Services, Public Health Service, October, 1991.

ATSDR. 1992. Toxicological Profile for 1-1 Dichloroethylene, U.S. Department of Health and Human Services, Public Health Service, October, 1992.

ATSDR. 1997a. Toxicological Profile for Trichloroethylene, U.S. Department of Health and Human Services, Public Health Service, September, 1997.

ATSDR. 1997b. Toxicological Profile for Tetrachloroethylene, U.S. Department of Health and Human Services, Public Health Service, September, 1997.

HLA. 1999a. Interim Remedial Action Operations Report for Building 106, Naval Air Station Jacksonville, Jacksonville, Florida. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina (June).

HLA. 1999b. Interim Remedial Action Startup Activities Report for Building 780, Naval Air Station Jacksonville, Jacksonville, Florida. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina (June).

Sax N. Irving, and Richard J. Lewis, 1987, Hawley's Condensed Chemical Dictionary, Eleventh Edition, Van Nostrand Reinhold Company Inc.

Zheng, C. 1990. "MT3D, A Modular Three-Dimensional Transport Model for Simulation of Advection, Dispersion and Chemical Reaction of Contaminants in Groundwater Systems" version 1.5. University of Alabama.

123. **Comment: References, USEPA, 1990 – Add 'a' and 'c'.**

Response: The reference to USEPA, 1990 (Fate Model) is actually part of the CERCLA Site Discharges to POTWs Treatability Manual (USEPA, 1990b). Therefore, there are only two references to USEPA, 1990, and they have been designated 'a' and 'b.'

124. **Comment: References, West et al – add date (1997).**

Response: Reference has been corrected per reviewer's comment.

125. **Comment: References: Wolfe, S. – 'Thomas Seal' should be 'Steven Wolfe.'**

Response: Reference has been corrected per reviewer's comment.

Tetra Tech NUS, Inc.

Greg Roof

1. **General: The Executive Summary should provide additional information on the FS. This additional information should include identification of the action levels, a brief description of the remedial alternatives, and a summary of the comparative analysis of these alternatives.**

   Response: HLA has provided what we feel is a sufficient synopsis of the FS in the Executive Summary. With seven hot spot areas at OU 3, and the variety of treatment technologies evaluated for each of those areas, it would be confusing to summarize the FS to a greater extent than what is done in Table E-1.

2. **Page 9-3, Table 9-1: The ARARs in Table 9-1 should be grouped by source (i.e., Federal or State) and type (i.e., chemical-, location-, and action-specific). An additional column should be included to indicate status, i.e., "applicable," or "relevant and appropriate," or "TBC."**

   Response: HLA felt the more significant way to group the ARARs was according to whether an ARAR is regulated or promulgated by a federal or state agency. The requirements within those categories are arranged alphabetically. A similar ARARs table was completed for the feasibility study for OU 1, which was approved by regulatory agencies; therefore, the ARARs table for the OU 3 feasibility study was compiled in the same manner. CERCLA and the NCP require that remedial actions comply with the most stringent requirement, whether it be "applicable," "relevant and appropriate," or "TBC." The column "Consideration in the Remedial Action Process for Operable Unit 3" explains the relevance of the requirement to OU 3.

3. **In the in-text table on Page10-9, the groundwater transmissivity figure is missing for Area F.**

   Response: The transmissivity value for Area F (127 ft^2/day) has been added to the table on page 10-9.

4. **Page 10-12, Chapter 10.1.4: liquid- and vapor-phase granular activated carbon adsorption should have been evaluated as part of the ex-situ groundwater treatment technologies. Some pre-treatment technologies, such as equalization, pH adjustment, filtration, etc. should also have been evaluated.**

   Response: Organic adsorption is discussed in Section 10.1.4.2.

   The pretreatment technologies mentioned would not alone be sufficient to adequately treat the extracted groundwater. Pretreatment processes used in conjunction with the reviewed remedial technologies are not presented in Section 10.1.4, as those are design considerations, and a pilot test would be necessary to determine the need for any pretreatment processes (pilot tests are included in

the cost estimates). As indicated in Section 10.1, the discussion regarding any required supplemental technology is to be deferred to the detailed analysis of alternatives in Chapter 11.0.

5. **Page 10-19, Chapter 10.2: remedial alternatives should have been identified with a letter/number combination (e.g., SSW-1, 2, 3.. for the storm sewer alternatives and GW-1, 2, 3,.. for the groundwater alternatives). This would be very helpful for future reference.**

   Response: HLA considered identifying groundwater alternatives with numbers or letters, but felt it would be confusing with two media of concern, seven groundwater hot spot areas, and several alternatives for each media/hot spot area (and some technologies are retained as alternatives for multiple areas).

6. **Page 11-1 and 11-4, Chapters 11.1.1 and 11.2.1: there seems to be some confusion as to what really constitutes a "No Action" alternative. "No Action" should mean exactly that, meaning absolutely nothing is done (and no costs are incurred). The "No Action" alternative is sometimes also descriptively referred-to as a "walk-away" alternative. The referenced sections describe "No Action" alternatives, which include monitoring, institutional controls, and 5-year site reviews. Such alternatives should have been identified instead as "Limited Action."**

   Response: Because of the nature of the groundwater contamination at OU 3 (exceedances of MCLs), a true "no action" alternative is not practical for any of the hot spot areas. The alternative described as "no action" represents the most conservative option that is practical at OU 3 and acceptable to FDEP and USEPA.

   According to the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004, October 1988), a no action alternative may include environmental monitoring (in which case 5-year reviews should be performed to assess monitoring results).

   A Memorandum of Agreement between the USEPA, FDEP and U.S. Department of the Navy was signed on August 31, 1998, to ensure compliance with LUCs (either already in place, or selected for future remedial action). Under the guidelines of the established MOA, access to environmentally contaminated media at OU 3 will be restricted, and this action is therefore included in each alternative.

7. **General: In the detailed analysis of several remedial alternatives, the evaluation of the "reduction of toxicity, mobility, and volume" criterion (such as that on page 11-17) includes a discussion of remedial duration, which normally should instead be discussed as part of the evaluation of the "short-term effectiveness" criterion. Also, the proper title of the criterion is "reduction of toxicity, mobility, and volume <u>through treatment.</u>"**

   Response: The estimated treatment durations discussed for Areas A, E, F, and G in Section 11.2.2.2 (page 11-17) are presented for the purpose of comparing the estimated treatment duration to the estimated travel time for contaminants to reach a receiving body (e.g., the storm sewers or

St. Johns River). Since the migration of groundwater contaminants is a mobility issue, the evaluation is included under the appropriate criterion.

The title of the evaluation criterion has been changed as noted.

8. **Page 11-29, Chapter 10.2.4, the description of the groundwater extraction, treatment, and discharge alternative does not include, or even mention, off gas treatment for the air stripper. Also, as per Comment 7, pump-and-treat systems such as the one described in this section typically include an equalization tank and, quite often, they include pre-filtration as well.**

Response: Since there is no Section 10.2.4, this comment should have referred to Section 11.2.4 (as confirmed by reviewer).

It is indicated in Table 10-2 (Screening of Ex Situ Treatment Technologies for Groundwater), under "Operation and Maintenance" for the air stripping and aeration technology, that air emissions monitoring and treatment may be necessary. Calculations for VOC mass emissions, (based on the maximum influent concentrations of TCE) for the extraction and treatment alternatives are included on page 6 of 17 in Appendix J-2.4. The calculations indicate that collection and treatment of off-gas should not be necessary. Vendor calculations of the anticipated air discharge emissions (also based on site data) for extraction and treatment via air stripping are included on page 14 of 17 in Appendix J-2.4. Both calculations show that the anticipated emissions are well below 13.7 lbs/day, so off-gas treatment is not expected to be necessary. At each hot spot area for which extraction and treatment is an alternative, treatability studies are included in the cost estimate. The treatability study would include gathering data to confirm whether or not off-gas treatment is necessary.

At the low flow rates anticipated for the extraction and treatment alternative, it is unlikely that an equalization tank would be necessary. Design details such as the need for an equalization tank or pre-filtration of extracted groundwater would be determined during a treatability study (included in the cost estimates for this alternative).

9. **Page 10-10, Chapter 10.1.3: would FDEP approval on re-injecting the groundwater present such a problem to implementibility and cost that the benefits of forcing the groundwater flow through the impacted area, and possibly decreasing the remediation time are outweighed?**

Response: Yes.

10. **Page 10-24, Table 10-4: eliminates enhanced biodegradation at areas where natural attenuation is working. If enhanced biodegradation reduces the cleanup time by a considerable margin, why should we eliminate it as a possibility?**

Response: The hydraulic conductivity in the shallow portion of the surficial aquifer is low (a horizontal hydraulic conductivity of 0.6 feet per day was determined from a multiple-well aquifer test conducted at Area A [ABB-ES, 1998a]). Therefore, the applicability of enhanced biodegradation in the shallow zone of the surficial aquifer (Areas A, E, F, and G) would be limited.

Enhanced biodegradation would either require an unreasonably large number of boreholes for nutrient injection to effectively remediate the aquifer such that cost would become a limiting factor; or, the limited mobility of the injected nutrients with the contaminated groundwater would result in a treatment duration just as long as unassisted natural attenuation.

11. **General: it does not appear that we are considering multiple technologies (e.g., air sparging followed by natural attenuation). Would there be any benefits to combining technologies to reach the RAOs?**

Response: Based on regulatory agency and public comments received on the Proposed Plan, the Navy may consider a combination of remedial alternatives for hot spot areas at OU 3. Combining alternatives described in Chapter 11.0, or portions thereof, to form an optimum site response, should be considered during the design phase of the remediation process.

U.S. Environmental Protection Agency, Region IV

Gannette Flemming, Inc. through Doug McCurry

General Comments:

1. **Appendix F-3 presents the human health risk characterization for the potential receptors at OU 3. There are several rounding errors that are present throughout this appendix when the cancer risks and hazard indices are summed together. For instance, the hazard index that is listed in Table F-3.9 for the future adult worker is 4. However, when all of the specific hazard indices that are presented in the table are added together the total hazard index is 4.81, which should be rounded to a hazard index of 5 and not 4. This could have occurred because the spreadsheet that calculated cumulative risks and HIs was set up to add a different number of significant figures than was presented in the tables in Appendix F. The text should be reviewed to ensure that the correct cumulative HIs and risks have been reported.**

   Response: The spreadsheets are correct and the reviewer's assumption that the discrepancy is due to rounding is correct. The document has been checked to ensure that the correct cumulative HIs and risks were reported.

2. **Appendix H presents the ecological risk food chain modeling calculations. This reviewer found several slight discrepancies in the presented values that are possibly rounding errors. The use of significant figures in the spreadsheet calculations should be quality checked and corrected as needed.**

   Response: The use of significant figures in the Appendix H spreadsheet calculations has been quality checked and corrected as needed.

3. **The RBC values used in this document are from the April 1998 version of the EPA Region III RBC table. This table has been updated since that time. The next version of this document should update the COPC screening to compare values to the most current version of the Region III RBC table, which is April 1999.**

   Response: The most recent version of the RBC table has been used in this version. The only changes to the report are increases in the tapwater RBCs for bromoform (8.5 µg/L) and chloromethane (2.1 µg/L). One or both of these chemicals appear in Groundwater Area B, D, and Outside the Designated Areas. In no case did the change affect the selection of COPCs.

4. **Aquatic organism (e.g., snails) tissue concentrations are calculated in this ecological risk assessment based only on surface water contaminant concentrations. This is likely not an adequate representation of potential tissue concentrations because it does not account for potential uptake of contaminants from sediments. This aquatic organism (e.g., snails) tissue concentration calculation could underestimate the predicted risk for both the gull and the**

manatee with the larger underestimation occurring for the gull. This potential for underestimation should be discussed in the uncertainty section. This added text in the uncertainty section should explain that aquatic invertebrates could be collected for chemical analysis in order to achieve a tissue concentration that is representative of site conditions.

Response: Aquatic invertebrate tissue concentrations (e.g., snails) were calculated in the ecological risk assessment by multiplying the sediment contaminant concentrations by the aquatic invertebrate bioaccumulation factors listed in Table H-8 of Appendix H. As stated in footnote b of Table H-14, the aquatic tissue concentration used to calculate the potential dietary exposure is the greater of the BAF-derived aquatic invertebrate tissue concentration and the BCF-derived aquatic organism tissue concentration. The aquatic organism tissue concentration is derived by multiplying the aquatic organism bioconcentration factor (listed in Table H-8 of Appendix H) by the surface water contaminant concentration. Therefore, potential uptake of contamination from both surface water and sediment was considered in deriving aquatic tissue exposure levels to semiaquatic wildlife including gulls and manatees.

5. **It is premature to dismiss remedial action at the PSC 16 storm water outfall. Another round of toxicity testing should be conducted to validate the conclusion that the severe toxic response observed at station 11 is isolated to a small area.**

Response: Instead of conducting another round of toxicity testing, the NAS Jacksonville Partnering Team decided, with input from Dr. Lynn Wellman, EPA, to include PSC 16 sediment in the Feasibility Study for OU 3.

Specific Comments:

1. **Page 5-4, Chapter 5.2: This section on persistence and fate of OU 3 contaminants includes a sentence that states, " lead in the sediments pose an ecological risk to aquatic and semi-aquatic receptors as shown in Chapter 7.0." This statement is not consistent with the conclusions of Chapter 7.0 since risks to semi-aquatic receptors are not predicted.**

Response: This sentence has been modified by deleting "and semi-aquatic."

2. **Page 6-1, Chapter 6.0, 3rd paragraph, Last Sentence: The text in this section references Appendices F-1 through F-7. It is stated that Appendix F-7 "is a duplication of the tables presented in the text of this section reformatted to comply with the *Risk Assessment Guidance for Superfund, Part D.*" However, Appendix F-7 is not included in this document. Appendix F-7 should be added to the next draft of this document.**

Response: The omission of the RAGS Part D tables from this version of the report was an error. The tables have been included in the final version of the document.

3. **Page 6-5, Chapter 6.2, 1st paragraph, first sentence: "CPCs are defined as chemicals for which data of sufficient quality are available for use in the risk assessment, are potentially site**

related, have maximum detected concentrations above standards or guidelines, have above risk-based screening concentrations, and, for inorganic analytes, have above background screening concentrations." This sentence does not make sense as it is written. The sentence apparently should read: "CPCs are defined as chemicals for which data of sufficient quality are available for use in the risk assessment, are potentially site related, have maximum detected concentrations above standards or guidelines, have maximum detected concentrations above risk-based screening concentrations, and, for inorganic analytes, have maximum detected concentrations above background screening concentrations." To avoid confusion, the text should be changed to incorporate these changes.

Response: The text has been revised as suggested.

4. **Page 6-7, Chapter 6.2.2, last paragraph, last sentence: This section discusses the risk- based screening concentrations and other screening values that will be used in the risk assessment to identify CPCs. The last sentence of this paragraph states that the published Florida SCG for lead is 500 mg/kg (which is the residential FSCG). This is inconsistent with the value for the Florida SCG that is presented in Table 6-1 of 1,000 mg/kg (the industrial FSCG). This inconsistency should be addressed and corrected in the next draft of this document.**

Response: The text has been revised to reflect the industrial screening value, 1,000 mg/kg, for lead instead of the residential value, 500 mg/kg.

5. **Page 6-9, Table 6-1: shows the selection of human health chemicals of potential concern for subsurface soil. Footnotes for this table were cited at the end of the table on page 6-11. However, no footnotes were included in the text of the table. The table should be revised to include these footnotes.**

Response: The table has been revised to include references to the footnotes.

6. **Page 6-12, Table 6-2: reportedly shows the selection of human health chemicals of potential concern for groundwater at Area A. The units that are shown in this table appear to be erroneous. The units that are shown for VOCs are µg/kg, and the units shown for inorganics are mg/kg. The appropriate units for groundwater are typically presented as mg/liter or µg/liter. The information provided should be checked for accuracy and corrected as appropriate.**

Response: The table has been corrected to reflect the appropriate units of µg/L. Also, the values in the table have been checked for accuracy and corrected as appropriate.

7. **Page 6-12 and Appendix F, Table 6-2 and Tables F-1-1 and F-1-5: The RBC value that is given for calcium (1,055,398 mg/kg) is theoretically impossible. This value should read 1,000,000 mg/kg with a footnote indicating that the calculated essential nutrient screening value is above 1,000,000 mg/kg, which indicates that the nutrient would not be present at toxic levels.**

   Response: The tables have been revised to read 1,000,000 mg/kg instead of 1,055,398 mg/kg.

8. **Page 6-13, Table 6-2: subtitle at the top of the page incorrectly states that the table shows the CPC selection for subsurface soil. The subtitle should be changed to read: "Unfiltered Groundwater, Area A."**

   Response: The table has been revised to reflect the appropriate media "Unfiltered Groundwater, Area A."

9. **Page 6-34, Figure 6-1: displays the complete exposure pathways for the human receptors. The figure shows the trespasser as a receptor. However, this contradicts the text in Section 6.3.2 (on Page 6-32, last complete paragraph), which states "access to OU 3 is restricted by fence and security guards and is limited to NADEP personnel and authorized visitors. Therefore, a trespasser scenario will also not be considered in this HHRA." This inconsistency in Figure 6-1 should be corrected.**

   Response: Figure 6-1 has been revised to reflect that a trespasser scenario is not considered.

10. **Page 6-34, Figure 6-1: The utility workers' dermal exposure to storm water runoff is not shown in Figure 6-1. This is in contradiction to the text on page 6-33 (last bulleted item), which clearly shows that "utility workers exposed to storm sewer water via limited dermal contact" are expected to be a completed pathway. Figure 6-1 should be corrected.**

    Response: Figure 6-1 has been revised to reflect that a utility worker dermal exposure scenario is considered.

11. **Page 6-36, Chapter 6.3.3, 1st complete paragraph: Section 6.3.3 introduces the methods used for the quantification of exposure. The text states that the parameters used will reflect the most reasonable maximum exposure, and references Appendix F-4 for specific values. However, the parameters for the exposure equations are included in Appendix F-2 and not Appendix F-4. The text should be changed accordingly.**

    Response: The text has been revised to reference Appendix F-2.

12. **Page 6-36, Chapter 6.3.3, 1st paragraph, last sentence: This section shows the derivation of the exposure point concentration. The text states that "for groundwater outside the designated areas the EPC is the lesser of the maximum and the arithmetic mean of all detected concentrations (nondetects are not considered)." However, a look at Table 6-23 shows that**

nondetects were used in the derivation of the EPC. This inconsistency should be addressed.

Response: The referenced sentence has been deleted from the report.

13. **Page 6-43, Table 6-2: The exposure point concentrations for surface water are presented in this table. The units shown for inorganics in surface water are mg/kg. The units should be changed to µg/liter.**

Response: The table has been corrected to reflect the appropriate units of µg/l.

14. **Page 6-54, Chapter 6.5.3, 1st paragraph, 1st sentence: The risk characterization results for future groundwater land use are discussed in this section. The first sentence of this page references Tables F-5.3 and F-5.11 in Appendix F-5 for the results. However, the correct reference is Tables F-3.3 through F-3.11 in Appendix F-3. The text should be changed accordingly.**

Response: The text has been revised to reference Tables F-3.3 through F-3.11 in Appendix F-3.

15. **Page 6-68, Chapter 6.6.4, 3rd paragraph, last sentence: This paragraph discusses the central tendency exposure estimates. The text references Tables F-5.13 through F-5.21 in Appendix F-5 for the results. However, the text should reference Tables F-3.15 through F-3.23 in Appendix F-3.**

Response: The text has been revised to reference Tables F-3.15 through F-3.23 in Appendix F-3.

16. **Page 6-71, Table 6-29: A summary of the remedial goal options (RGOs) for groundwater at Area A are presented in this table. The range of detected concentrations for 1,1-dichloroethene is shown as being 1.1 to 3.1 µg/L. However, Table 6-2 on page 6-12 shows the range of detected concentrations as being 1.1 to 31 µg/L. This range of values should be corrected.**

Response: The table has been revised to reflect a maximum detected value for 1,1-dichloroethene of 31 µg/L.

17. **Page 6-77, Table 6-35: A summary of remedial goal options for groundwater at Area G is presented in this table. The EPCs that are listed in this table are different than the EPCs that are shown in Table 6-21 on page 6-42. This discrepancy should be corrected.**

Response: Not all chemicals listed in the exposure point concentration table (Table 6-35) were presented in the remedial goal option table (Table 6-21), as Table 6-21 reflects only the chemicals that contribute greater than 0.1 hazard quotient when the HI is greater than 1 or an ELRC of greater than 1×10^{-6}.

18. **Page 7-6, Chapter 7.1.1.4, 1st paragraph, 1st sentence: The sentence that no rare, endangered, or threatened species have been directly observed at OU 3 is misleading since manatee have been observed in the St. Johns River adjacent to OU 3. This discrepancy should be corrected.**

Response: The text has been revised to indicate that manatees have been observed in the St. Johns River adjacent to OU 3.

19. **Page 7-11, Chapter 7.1.3, 3rd paragraph: The text states that in accordance with USEPA Region IV guidance 1991, an inorganic analyte was not selected as an ECPC if the maximum detected concentration was less than two times the average detected inorganic concentration in background samples. Please note that this is not consistent with current USEPA Region IV guidance on ecological risk assessment. Comparison of detected concentrations to background inorganic concentrations should not be done as part of the screening level ecological risk assessment, but can be done as part of the baseline risk assessment problem formulation. A comparison of the maximum detected chemical concentrations per media to EPA Region IV ecological screening values is the only comparison that should be performed in the screening level ecological risk assessment.**

Response: The Navy acknowledges that recent USEPA guidance requires screening maximum detected concentrations against Region IV ecological screening values and not background values in the screening-level ERA. However, the methodology for selection of ECPCs in the screening-level ERA was presented to and approved by the RPMs at the March 25-26, 1998 partnering meeting. It is believed that screening maximum concentrations of detected inorganic analytes against background concentrations provides a more realistic list of potentially site-related chemicals (i.e., ECPCs) that require further evaluation in the ERA. Review of the analytical data for inorganic constituents indicates that only four analytes detected in surface water (aluminum, barium, manganese, and vanadium) and four analytes detected in groundwater (aluminum, barium, cobalt, and zinc) were not selected as ECPCs based on comparison to background screening values. None of the inorganic constituents detected in sediment were excluded as ECPCs based on comparison with background screening concentrations. Of the eight constituents that were excluded as surface water and groundwater ECPCs, four analytes (barium in surface water and groundwater, cobalt, manganese, and vanadium) do not have ecological screening values; therefore, it is believed that screening against site-specific background values is appropriate. Although detected concentrations of aluminum in surface water and groundwater and zinc in groundwater exceed their respective ecological screening values, maximum detected concentrations of these constituents are well below the background screening values, indicating that the chemicals are not site-related.

20. **Page 7-13, Table 7-3: This table presents the comparison of surface water maximum detected concentrations to USEPA Region IV screening values. The table indicates that a freshwater surface water screening value is not available for chloromethane; however, a value of 5,500 µg/L is available. The maximum detected concentration is below the screening value so chloromethane does not need to be retained as a contaminant of potential ecological concern. Please revise Table 7-3.**

Response: Table 7-3 has been revised to include the ecological screening value for chloromethane. This contaminant has been retained as a surface water ECPC for semiaquatic receptors.

21. **Page 7-25, Table 7-8: This table presents the ecological food chain modeling equations. The equation for the "total exposure related to surface water and sediment" does not include ingestion of aquatic vegetation. Please revise the presented equation to be consistent with the modeling calculations presented in Appendix H. The calculation of the sediment ingestion rate should be presented on the table. Also, the notes on the table are not consistent with the equations presented. Please revise to eliminate extraneous information and to provide additional information specific to the presented ecological equations. For example, the predicted dietary exposure (PDE), site foraging frequency (SFF) and the exposure duration (ED) are not defined in the table.**

Response: Table 7-7 has been revised to be consistent with the modeling calculations presented in Appendix H. In addition, all extraneous information has been removed and information specific to the presented ecological equations are now included.

22. **Page 7-24, Table 7-7, footnote h: Table 7-7 presents exposure parameters for the manatee. The table indicates that it is assumed that manatees do not ingest surface water but they "get water from the plants they ingest." No supporting documentation is provided for this assumption. Since the St. John's River in the proximity of OU 3 has a salinity range that is closer to freshwater than brackish water, this assumption seems unfounded.**

Response: Because the salinity range in the St. Johns River adjacent to OU 3 is closer to freshwater than brackish water, a water ingestion rate for the manatee was calculated based on the water ingestion regression equation for mammals (USEPA, 1993). The water ingestion rate for the manatee has been added to Table 7-7 and factored into the food chain model calculations.

23. **Page 7-24, Table 7-7: The exposure duration and site foraging frequency should be provided for both of the exposure models. Only an exposure duration of 1 representing year round use of OU 3 is presented in Table 7-7 even though Table H-17 presents a less conservative exposure duration used in the "more realistic" model. Please present the exposure duration and site foraging frequency for both the 100% exposure model and the "more realistic" model.**

Response: Table 7-7 has been revised to include the exposure duration and site foraging frequency for both the 100% exposure model and the "more realistic" model.

24. **Page 7-24, Table 7-7, footnote b: While the Herring Gull estimated diet information is in the Wildlife Exposure Factors Handbook, information on the West Indian Manatee is not provided. Please clarify footnote b since it specifies the Wildlife Exposure Factors Handbook as the source of the assumed diet percentages for the West Indian Manatee.**

Response: The correct source of the assumed diet percentages for the West Indian Manatee is Burt and Grossenheider (1980). The footnote in Table 7-7 has been revised accordingly.

25. **Page 7-27, Chapter 7.1.5, last paragraph on page 7-27: indicates that a conversation with a pathologist from the FDEP supported the use of data from other mammals to derive RTVs for the manatee; however, the quote presented only supports that bioconcentration or bioaccumulation of contaminants in manatee tissue generally has not been a problem. The quoted statement does not support the validity of the toxicity values used in this ecological risk assessment. The text should be clarified.**

Response: The text has been clarified as follows: "According to a pathologist from FDEP, tissue burdens of environmental contaminants in manatees are generally low and are not believed to be associated with mortality (FDEP, 1997). Therefore, bioconcentration and bioaccumulation of contaminants in manatee tissue generally is not of concern."

26. **Page 7-30, Table 7-9: presents a summary of hazard indices calculated for the manatee and the herring gull. Footnote 2 states, "The HIs are based on conservative exposure parameters for the manatee." The footnote should be revised to better reflect the HI. It should indicate the HI was calculated assuming that the ecological receptor forages 100% of the time at a location with the maximum detected concentrations of each of the contaminants of potential ecological concern. Footnotes 2 and 3 are in column headings that provide both the manatee and the herring gull HIs; therefore, the footnote should address both the manatee and the herring gull.**

Response: Footnote 2 of Table 7-9 has been revised to indicate that the HI was calculated assuming that the ecological receptor forages 100% of the time at a location with the maximum detected concentrations of each of the contaminants of potential ecological concern. Footnotes 2 and 3 of Table 7-9 have also been revised to address both the manatee and the herring gull.

27. **Page 7-77, Chapter 7.2.6: The baseline ecological risk assessment summary states that the source of the lead in the sediments is unknown. Lead was detected at elevated concentrations from residue collected from the storm sewer; therefore, it is plausible that the elevated concentrations of lead in the sediment near the PSC 16 storm sewer outfall is site related. The statement on page 7-77 should be modified accordingly.**

Response: The statement on page 7-77 has been modified to indicate that it is possible that the source of lead in sediments near the PSC 16 storm sewer outfall is site-related.

28. **Appendix B: This appendix presents the sediment toxicity test data, including the sediment toxicity laboratory data sheets. Unfortunately salinity and ammonia concentrations were not measured. It was agreed by the RPMs in the September 9, 1998 partnering meeting that Test Method 100.4, 10-d Survival test for sediments using *Leptocheirus plumulosus* would be the sediment toxicity test. Test Method 100.4 states that salinity, DO and pH of the overlying water should be measured daily in at least one test chamber per treatment, and at a minimum,**

they must be measured in every test chamber at the beginning and the end of a test. Although a column for the salinity data is included on the sediment toxicity laboratory data sheets, the salinity data are not filled in. Test Method 100.4 states that ammonia must be measured in overlying water towards the beginning and towards the end of a test. Although a column for ammonia data is included on the sediment toxicity laboratory data sheets, the ammonia data are not filled in. This omission of ammonia monitoring introduces uncertainty into the conclusion that the zero percent survival at station 11 was solely due to exposure to contaminants within the sediment. Ammonia toxicity can contribute to mortality in sediment toxicity tests; therefore, any future performance of sediment toxicity tests should monitor ammonia.

Response: Ammonia and salinity data were not measured during the sediment toxicity tests as required by Test Method 100.4 due to an oversight by the laboratory, QST Environmental Inc. Dr. Ann Shortelle, of QST Environmental, Inc., was contacted regarding this oversight, and she has agreed to retest the sediment to obtain data on salinity and ammonia toxicity. The results of the salinity and ammonia monitoring have been included as an addendum to their toxicity testing report, which was included as Appendix B.

29. **Appendix F-1,Table F-1.3: The parameters for the essential nutrient screening values are presented in this table. The units for the cancer slope factor are shown as mg/kg-day. The units should be corrected to read $(mg/kg\text{-}day)^{-1}$.**

Response: The units have been corrected to read $(mg/kg\text{-}day)^{-1}$.

30. **Appendix F-3, Table F-3.1: The risk characterization to the adult recreational user is summarized in this table. The units for the thallium surface water concentration of mg/kg are incorrect. The units should be changed to µg/liter.**

Response: The units on Table F-3.3 have been corrected to ug/l.

31. **Appendix F-3, Table F-3.3: This table presents the risk characterization for the future adult worker at ALAAP Area A. However the table is not labeled as Area A. For the sake of clarity, the table should be changed.**

Response: The table has been revised to clarify Area A.

32. **Appendix F-5, Tables F-5.1 to 5-6: The tables in this appendix present the dose-response data for both carcinogenic and non-carcinogenic effects. Throughout all of these tables, pyrene is given a "chemical group" classification of B. However, this chemical group is not explained in the notes of the tables. It is assumed that the "B" refers to the EPA carcinogenic classification. Please clarify.**

Response: The reviewer is correct in the assumption that "B" refers to the EPA carcinogenic classification. This is presented in the carcinogenic tables F-5.1, F-5.3, and F-5.5.

33. **Appendix H, Table H-1: Table H-1 is entitled "species commonly found in habitats observed at NAS Jacksonville." The table includes species for Pine Flatwoods Community, Old Field Community, Perimeter Ditch and Bank Community, and the St Johns River Estuarine Community. There is not a Pine Flatwoods Community within OU 3. Since the table could be misinterpreted, it would be beneficial if the presentation of this community was deleted or a footnote was added to specify that the community is not present within OU 3.**

Response: The Pine Flatwoods Community species list has been removed from Table H-1.

34. **Appendix H-2 References: Page 7-11 of the report cites USEPA 1991b but a reference for this citation is not included in the reference appendix. Please add. Also, please confirm that other USEPA Region IV guidance cited in the risk assessment is included in the references.**

Response: The references cited in Chapter 7 of the report are included in the References section. Only those references cited in the Appendix H tables are included in the Appendix H references.

35. **Appendix H, Table H-8: Table H-8 presents a summary of bioaccumulation (BAF) and bioconcentration (BCF) factors. According to footnote f, the BAFs presented for the PAHs are the average of the earthworm BAFs presented in Beyer 1990. Since Beyer 1990 provide data, from Marquerie et al 1987, to derive PAH specific BAFs, it is unclear why added uncertainty is introduced by averaging the data to derive an average BAF. Since PAHs are a concern at the outfall, it would be best to derive PAH specific BAFs. However, since the magnitude of change in BAFs in unlikely to alter the conclusion of the ecological risk assessment, these values do not need to be recalculated for this report.**

Response: PAH-specific BAF values have been calculated for all future ecological risk assessments.

36. **Appendix H, Table H-14: Either Table H-14 or Table H-15 should present the sediment exposure dose, plant tissue ingestion dose, invertebrate ingestion dose, and aquatic organism ingestion dose. These doses do not appear to be presented in Appendix H. For transparency of the ecological risk assessment, please provide the calculated sediment exposure dose, plant tissue ingestion dose, invertebrate ingestion dose, and aquatic organism ingestion dose.**

Response: The calculated surface water and sediment exposure doses, aquatic plant ingestion dose, and aquatic tissue ingestion dose have been provided in Tables H-15 and H-18. As previously stated in the response to General Comment #4, the greater of the BAF (aquatic invertebrate tissue) and BCF (aquatic organism tissue) derived tissue level was selected as the aquatic tissue ingestion dose for modeling food chain exposures.

37. **Appendix H, Tables H-15 - H-19: To be consistent with Table 7-8 and to use a more accepted term, Table H-15 and the other tables should state potential dietary exposure (PDE) instead of "total body dose"(TBD).**

Response: The term "total body dose" (TBD) has been replaced with the term "potential dietary exposure" (PDE) in Tables H-5 through H-19, as appropriate.

38. **Appendix H, Tables H-18 - H-19: The title of these tables should indicate that they represent food chain modeling using site foraging frequency and migration exposure parameters. Also, the title states that the tables represent exposure via ingestion of food, water and sediment. This is not accurate for the manatee calculations since no water ingestion is included in the model. The title should be revised.**

Response: The titles of Tables H-18 and H-19 have been revised to indicate that they represent food chain modeling using site foraging frequencies and migration exposure pathways.

Because surface water ingestion rates for the manatee have been considered in the model (see response to Specific Comment #22), the table titles stating exposure via ingestion of food, water, and sediment will remain unchanged.

39. **Appendix I-1, Table I-6: The first page of Table I-6 seems to be missing from this draft. This page should be included in the next draft.**

Response: The first page of Table I-6 has been included in the final.

RESPONSE TO COMMENTS
Final Draft Remedial Investigation and Feasibility Study Report
Operable Unit 3
Naval Air Station Jacksonville
Jacksonville, Florida

U.S. Environmental Protection Agency, Region IV

Doug McCurry

1. **Page 2-8, Chapter 2.1.11, last sentence: mentions a Contamination Assessment Report completed in 1993, but does not say what the report concluded. Add a brief statement regarding the results of this report.**

   Response: The following sentence has been added as the last sentence of the paragraph. "This report indicated that both soil and groundwater had been impacted by petroleum product, particularly in the vicinity of the UST."

2. **Page 2-10, second paragraph, first sentence: re. "radiation levels measured" is confusing and needs some further elaboration.**

   Response: The sentence has been rewritten as follows: "Soil excavation continued until radiation levels were below two times the background radiation level (approximately 9,000 cpm) [BEI, 1995]."

3. **Page 2-10, 3rd paragraph: Did EPA concur with the radiation clean-up levels discussed in the last part of this paragraph? (Response needed for EPA, does not need to be added to RI/FS).**

   Response: Martha Berry, USEPA, concurred with RASO's decision on the clean-up levels per letter to Dana Gaskins, SDIV, dated 29 January 1998.

4. **Page 4-40, general: for Areas A, E, F, and G, provide data/discussion re. the depth the plume of contamination.**

   Response: The text has been revised to include the estimated depths (upper and lower boundaries) for all the plumes: In addition, Table 4-9 has been modified to include two columns on the estimated upper and lower boundaries of contamination.

5. **Page 4-37, Figure 4-8: include data on the depth of the contaminant plume. Do this for all Areas A through G.**

   Response: Depth information for the contaminant plumes are not included in the Figures but have been added to the text and Table 4-9.

6. **Page 2-5, Chapter 2.1.6, 2nd paragraph: mentions a study by Robert Bates and Associates-1988 concluded that there were both industrial and sanitary sewer lines that were improperly discharging to the storm sewers. A brief discussion of the work that has been done to "find**

and eliminate" all (industrial and domestic) discharges to the storm sewer system should be included.

Response: Based on information provided by Diane Lancaster, NAS Jacksonville, to Doug McCurry, USEPA, the following sentences have been added to Page 2-5, 2nd paragraph.

"The cross-connections were presumably repaired when Wright Street was re-piped (north of Enterprise Street) around 1993-1994. In 1994, another survey was subsequently conducted and a few additional cross-connections identified and repaired."

7. **Page 9-11 and 9-12, general: the Florida Surface Water Standard for TCE of 80.7 ppb that is referenced may be based on an annual average, which may mean that 12 months of data could be averaged to determine whether or not the Standard was being violated. Therefore, it may be justified to continue sampling the storm sewer water for a period of time before concluding that there was a clear violation of water quality standards and that remedial action was necessary.**

Response: Refer to response to specific comment #3 from Greg Brown and Jorge Caspary, FDEP.

8. **Page 9-26, Chapter 9.3.3.3: the pretreatment levels required for TCE as shown in Table 9-10 seem unusually high if the treated groundwater is the only source of TCE going into the FOTW. The total flow through the FOTW is about 1.0 MGD and the treated groundwater flow would not likely be more that 30,000 to 40,000 gallons/day. Please recheck these calculations.**

Response: The pretreatment calculations were performed using the FATE model, which was used in cooperation with the NAS Jacksonville Public Works Center (PWC). PWC approved use of the FATE model, as they do not have their own model for this purpose. Had the FATE model not been used, PWC would have restricted the concentrations of our influent to their discharge limits (i.e., any water entering the FOTW would have to meet the plant's discharge limits).

The total flow through the FOTW was provided by PWC, and is a factor in the FATE calculations. Based on operations conducted at the station, it is not practical to assume that treated groundwater from OU 3 is the only source of TCE entering the FOTW. Although the assumptions used in developing pretreatment levels are conservative, it is not practical to try to estimate the concentrations of other chemical inputs to the FOTW, or the resulting dilution from mixing influent from OU 3 with other inputs to the plant.

9. **Page 11-17, general: the statement is made that "most of the groundwater plume in Area F migrated East of the storm sewers." This statement does not seem to be supported by Figure 4-12 and Figure 10-1 which seem to show the sewer running right through the middle of the Area F groundwater plume. Please change or correct as appropriate.**

Response: The Area F plume is located approximately 15 to 25 feet below land surface. The statement has been amended to indicate that the contaminated groundwater at Area F is deeper than the elevation of the storm sewers.

10. **Page 10-25, Table 10-4: Development of Remedial Alternatives for Groundwater For Area E, Chemical Oxidation is eliminated from further consideration due to the low permeability in a clay formation. There have been some cases where chemical oxidation has been successful in clay soils. Because of the small size of the Area E plume chemical oxidation could be a very attractive alternative, IF it would work. Please reconsider chemical oxidation or provide further narrative as to why it cannot be considered.**

Response: In the table under the word *Eliminated*, the explanation has been rewritten as follows: "Relative to other technologies, chemical oxidation falls into the same category as extraction and treatment. The oxidant would need to be delivered to the plume via some injection scheme to flush it into and through the plume. Because of the very low hydraulic conductivity, the time required for this flushing would be excessive."

11. **Page 10-27, Section 10.2.2.3 Remedial Alternatives for Area C. Would it be possible to utilize chemical oxidation for Area C in conjunction with a horizontal injection well?**

Response: It would be possible, but relative to the other technologies considered, it is not practical, just as it is not practical for Area D.

12. **Chapter 12.0, general: the normal time frame for comparing remedial alternatives is up to 30 years. However, the alternative analysis shown in Chapter 12 includes time frames of 38, 39, 53 and 55 years for one of the technologies (Monitored Natural Attenuation). While the remediation technologies being considered would only require 10 to 15 years. Consequently, there is a big time differential as to how much longer one remediation technology would have to operate as compared to another to achieve the same results. Because the usual type of cost-benefit analysis done for Superfund projects does not consider an inflation factor for annual O and M costs, those alternative with long operating times may seem favorable in a present worth cost analysis, but might not seem so attractive if some consideration for inflation was factored into the analysis. For this reason it would be appropriate perform a sensitivity analysis which would include some consideration for inflation on those alternatives that have very long operating times (i.e. Areas A, E, F and G).**

Response: There are various guidance documents which provide direction regarding the discount rate to be used for present worth analyses. For example:

- A discount rate of 7%, before taxes and after inflation, should be used according to a USEPA memorandum documenting Revisions to OMB Circular A-94 on Guidelines and Discount Rates for Benefit-Cost Analysis (OSWER Directive 9355.3-20, June 25, 1993). This memorandum replaced previous OMB guidance, which directed federal agencies to use a discount rate of 10% (1972).

- A discount rate of 5%, before taxes and after inflation, is recommended in the USEPA Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (October, 1988).

- The USEPA Fact Sheet: The Role of Cost in the Superfund Remedy Selection Process (September, 1996) defers to the 7% discount rate, before taxes and after inflation, stipulated by the 1993 OSWER Directive.

A discount rate of 6% was used in the present worth calculations for each remedial technology considered in the OU 3 FS. For the purpose of selecting the preferred remedial alternative for each hot spot area, a sensitivity analysis was performed to evaluate the impact of different interest and inflation rates on total cost. Varying the assumed interest and inflation rates produces a range of possible costs, especially for alternatives with long durations, such as natural attenuation. The sensitivity analysis was presented to the NAS Jacksonville Partnering Team on October 5, 1999, and the preferred remedial alternative for each area within OU 3 will be presented in the Proposed Plan. A summary table of present worth costs for remedial alternatives at each hot spot area, based on discount rates ranging from 1% to 7%, is included as an attachment to the Response to Comments.

13. **Page 4-11, Chapter 4.2.2.4: the text states, "Twelve TAL metals were detected in reference surface water samples, including aluminum, barium, calcium, chromium, copper, iron, lead magnesium, manganese, potassium, sodium, and potassium." Potassium is listed twice in the above sentence and it is unclear whether the correct number of metals is 11 or 12. The discrepancy should be corrected.**

Response: The extra potassium entry in the list has been replaced by the 12th detected metal, vanadium.

14. **Pages 4-35 thru 4-43, Figures 4-7 thru 4-13: the figures show the contamination isocontours for various areas at the site. The figures do not include the total concentration of chlorinated solvents listed for each sampling location. The figures should be revised to list the total chlorinated solvent concentrations detected at each location that were used to draw the contours.**

Response: The referred figures have been revised to include concentration information, but only on the wells outside the estimated contamination plume. For wells inside the plume, the contour intervals should provide an estimate of the total chlorinated solvent concentrations around each groundwater sampling location.

15. **Page 10-15, Chapter 10.1.5.1: the text states, "Natural attenuation parameter monitoring was performed at Areas A, C, D, F, and G in July 1997 as part of the Engineering Evaluation of Areas With Elevated Groundwater Contamination (ABB-ES, 1998)." The**

RI/FS should include supporting summary table(s) presenting the analytical results for the natural attenuation parameter monitoring for Areas A, C, D, F, and G.

Response: An effort was made to include as much information as required in the feasibility study to adequately develop remedial alternatives without reproducing the voluminous studies conducted in support of the FS. Because the regulatory agencies have been provided copies of these supporting documents (including the Engineering Evaluation of Areas with Elevated Groundwater Contamination) and the documents are maintained in the NAS Jacksonville Information Repository for the public, it was deemed appropriate to duplicate only the pertinent information and reference its source.

16. **Pages 11-12 through 11-15, Chapter 11.2.2: provides a detailed analysis of a natural attenuation alternative for Areas A, E, F, and G. This section discusses monitored natural attenuation (MNA) as a stand-alone action with no supplemental remedial alternatives. According to the Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water (EPA, 1998), "Monitored natural attenuation is appropriate as a remedial approach only when it can be demonstrated capable of achieving a site's remedial objectives within a time frame that is reasonable compared to that offered by other methods and where it meets the applicable remedy selection program for a particular OSWER program. EPA, therefore, expects that monitored attenuation typically will be used in conjunction with active remediation measures (e.g., source control) or as a follow-up to active remediation measures that have already been implemented." The issue of reasonable time frames for MNA is suggested in the National Contingency Plan (NCP) as a "time frame comparable to that which could be achieved through active restoration." The time frames presented for MNA do not appear to be reasonable when compared to other remedial alternatives such as air sparging (AS). The FS should evaluate combining certain active remedies, such as hot spot removal using AS with MNA, in the detailed analysis section of the FS.**

Response: In general, as indicated by the referenced EPA guidance, the active remediation most commonly expected by EPA to be used in conjunction with MNA is source control. Since there are no remaining sources, it is reasonable to consider MNA alone, as has been done at OU 1 and many other sites where the source has been removed or depleted. Based on our conclusion that MNA is a viable, stand alone technology for the site, it is carried forward to the detailed and comparative analyses, where it is screened against all of the NCP criteria.

Although the time frames for MNA as a stand alone technology are longer than those for some other technologies evaluated, when considered in context of time for contaminants to travel to the St. Johns River or the storm sewers (see table on page 11-17), the durations are not unreasonable. It is estimated that the contaminants in the groundwater at Areas A, E, F, and G would achieve action levels before impacting human health or the environment.

17. **Page 11-18, Chapter 11.2.3.1: the text states, "Results of the engineering performance testing indicated that anaerobic biodegradation could not be promoted by adding electron donors**

within the timeframe of the test (30 days). However, it is presumed that if the test period had been longer, anaerobic biodegradation could have been successfully stimulated." If the performance testing indicated that biodegradation could not be promoted within 30 days, the text should provide discussion and data to support the presumption that if the test had been operated for a longer timeframe, it would have been successful. Otherwise the presumption should not be included in the detailed analysis of remedial alternatives since the performance testing was unsuccessful.

Response: The fact that anaerobic biodegradation could not be stimulated within 30 days of adding the carbon source and nutrients is not surprising. There is typically an acclimation period for anaerobes that can often take several months before the enhanced biodegradation begins. It is certain, however, that if natural biodegradation is occurring, as has been observed, then enhanced biodegradation is definitely possible – it is only a matter of time and finding the optimum amount and type of carbon source.

18. **Page 12-36, 5th paragraph: the text states, "Because the Area G plume is overlain by grass, a vapor extraction component of the AS system was assumed to be unnecessary, keeping capital costs low for this alternative." Additional discussion supporting not implementing soil vapor extraction (SVE) in conjunction with AS should be included in the text.**

Response: Discussions supporting not implementing SVE in conjunction with AS are included in the detailed analysis of the AS alternative (Section 11.2.5.1), and in the calculations in Appendix J-2.5.

As indicated by the calculations for the air sparging alternative at Area G (Appendix J-2.5), the mass removal rate at Area G is expected to be only about 0.13 lbs/day (significantly less than 13.7 lbs/day of VOCs, the Florida air emissions standards).

In addition, in Section 11.2.5.1, the text states "For areas in which injection of air creates the potential for collection and migration of sparged vapors beneath overlying impervious surfaces such as pavement and buildings (Areas A, E, and F), the VOC emissions will be collected by an SVE system." The contaminated groundwater at Area G is not overlain by impervious surfaces which could cause the sparged vapors to become trapped or to migrate to nearby buildings; therefore, it was considered unnecessary to collect the estimated 0.13 lbs/day of sparged vapor.

RESPONSE TO COMMENTS
Final Draft Remedial Investigation and Feasibility Study Report
Operable Unit 3
Naval Air Station Jacksonville
Jacksonville, Florida

U.S. Geological Survey

Hal Davis

General: **Comments are generally minor corrections and included directly on the pages of the draft text (letter from H. Davis to P. Miller dated July 9, 1999). Groundwater flow velocities were changed in several places because of the change in estimated porosity from 25% (1998 report) to a best estimate of 12.5% based on the solute transport model, resulting in a doubling of the estimated groundwater flow velocities. The proposed changes are itemized in the specific comments below.**

Response: The change in estimated porosity from 25% to 12.5% was based on assuming that the source for the Area D plume was the dry cleaning operation at Building 106, and adjusting the porosity in the MT3D model until the time of arrival of the plume at Area D from an assumed source at Building 106 was matched by the time from the initial dry cleaning operations in 1962 until 1993-96. Although this scenario would physically explain the existence of the plume at Area D, there are other data that would suggest that the dry cleaning operation was not the source for the Area D plume. The first is the fact that 12.5% is an unreasonably small value for porosity in the very uniform fine sand deposits in the intermediate zone; evidence from large scale field tests indicate that similar deposits have a surprisingly high effective porosity (e.g., 33% for the fine to medium sand aquifer in Borden, Ontario; and 39% for the sand and gravel outwash on Cape Cod). The second is that the assumed source at the dry cleaners would have been PCE and the Area D plume is almost totally TCE. Even if there were active natural biodegradation occurring, we would expect to see much more of the parent compound than is measured. Furthermore if there were such active biodegradation of PCE to TCE, we would also expect to see much more DCE than is measured. As a final note on biodegradation, the AFCEE scoring method for biodegradation shows the intermediate aquifer to exhibit only "adequate" evidence for biodegradation of chlorinated solvents. Therefore, a strong argument can be made that the dry cleaner location is not the source for the Area D plume. Consequently, we do not feel justified in changing the estimated porosity of 25% to 12.5% throughout the entire document.

Specific Comments:

1. **Page 3-12, 4th paragraph, last sentence. Fee to feet.**

   Response: The suggested correction has been made.

2. **Page 3-17, 2nd paragraph, 4th sentence. Averaging about 2 feet – change to averaging about 4 feet.**

   Response: Based on our response to the General comment above, the original value of 2 feet has been retained.

3. **Page 3-17, 2nd paragraph, 4th sentence: 35 and 12 ft/year – change to 70 and 24 ft/year.**

   Response: See response to item #2 above.

4. **Figure 3-9: Change text in legend to 20 years instead of 40 years.**

   Response: See response to item #2 above.

5. **Figure 3-10. Change text in legend to 10 years instead of 20 years.**

   Response: Since this figure is taken from a published reference and based on the above discussion, the legend text has been retained.

6. **Section 5.1.1. Replace second to last sentence, 1st paragraph that states "There does not appear to be enough leakage into the sewer around Areas F and G to affect the calibration of the groundwater flow pathline model." Sentence to be replaced as follows: "At the time this study was completed it was assumed that the sewers around Areas F and G were not leaking. However, a camera survey later showed that they were leaking in these areas.**

   Response: The text has been changed to read as follows: "During the pathline modeling study, there did not appear to be enough leakage into the sewer around Areas F and G to affect the calibration of the groundwater flow pathline model, and therefore, it was assumed that the sewers around Areas F and G were not leaking. However, as discussed in Chapter 4.0, ..."

   Note: The last line in this paragraph refers to Figure 4-7, that should be Figure 4-13.

7. **Page 5-4, 2nd paragraph: Replace the following sentence "The travel time between dots is 40 years on Figure 3-9 and 20 years on Figure 3-10." to "The travel time between dots is 20 years on Figure 3-9 and 10 years on Figure 3-10."**

   Response: See response to comment #5 above.

8. **Page 5-10, 1st paragraph, 2nd line: Replace the phrase "model layer 3" to "model layers 3&4".**

   Response: The change has been made.

9. **Page 5-10, 2nd paragraph. Replace last word of 2nd paragraph from "ten" to "five".**

   Response: The change has been made.

10. **Page 5-10, 3rd paragraph, last sentence. Replace with "These were chosen to be near the average values shown in Table 5.1."**

    Response: The change has been made.

RESPONSE TO COMMENTS
Final Draft Remedial Investigation and Feasibility Study Report
Operable Unit 3
Naval Air Station Jacksonville
Jacksonville, Florida

Florida Department of Environmental Protection

Greg Brown / Jorge Caspary

General Comment

1. **In general, the FS is a comprehensive report; however, it appears that the authors missed an important fact. The Feasibility Study appears to disregard the fact that a groundwater treatment system *already* operates at OU-3. Both Buildings 106 and 780 plumes have been undergoing treatment since earlier this year and, according to the FS authors, appear to be operating successfully (page 8-4). Disregarding an existing groundwater remedial system and, in the engineering economic analysis, treating those plumes where groundwater extraction is feasible (Areas B, C, and D) with their own separate treatment systems we believe may be in error. The groundwater extraction alternatives for the above areas should, in our opinion, have considered groundwater extraction and *storage* whereby groundwater is extracted, stored, and the existing system at 106 and 780 is modified to accept and treat extracted water from the above referenced plumes. Based upon previous discussions with HLA and the Station's personnel, it appears that groundwater extraction and storage prior to its treatment is already occurring. We recommend that an evaluation of utilizing the existing remedial system at Buildings 106 and 780 as the sole remedial system for Areas B, C, and D be developed and compared against other technologies.**

   Response: HLA did not disregard the existence of a groundwater treatment system already operating at Building 780 (at Building 106 the treatment system consists of air sparging and soil vapor extraction only, and does not have a component for treatment of extracted groundwater). HLA realized that this system is totally different from one that might be developed for Areas B, C and D. At Building 780, the system is operating on a low-discharge, high concentration chlorinated solvent contaminated waste stream; while at Areas B, C and D a groundwater treatment system would be designed for a comparatively high-discharge, low concentration chlorinated solvent contaminated waste stream. Although this might not preclude the use of a similar treatment system for both, this basic difference would make it potentially difficult to adapt the existing system at Building 780, and we felt that the existing system should stand alone for the purposes of the FS. Furthermore, we note the following:

   The system at Building 780 includes both soil vapor extraction and treatment of extracted groundwater. The startup activities for the Building 780 system, conducted between April 29 and May 12, 1998, were documented in the *Interim Remedial Action Startup Activities Report for Building 780* (HLA, 1999). (This report was completed after the Final Draft RI/FS was issued so the reference has been added to the Final RI/FS). The Building 780 system was operated only intermittently between May 13, 1998 and March 1999 due to various equipment and process problems. Although the system operated successfully during startup, there is not consistent data to demonstrate long-term, dependable effectiveness of the system.

The capital costs required to retrofit the system to handle the extra groundwater that would come from other sources would likely exceed the cost of installing new treatment systems at Areas B, C, or D (if the extraction and treatment alternative is selected).

Using the Building 780 treatment system for treatment of groundwater from Areas B, C, or D would require storage and transportation of hazardous waste. The possible extraction of contaminated groundwater from Areas B, C, and D, and the subsequent storage and transportation to Building 780 was presented to the NAS Jacksonville Facilities Department (FED). Ms. Jane Beason, FED, said the station disapproves of the storage and transport of hazardous waste due to the burden of additional compliance and liability issues at NADEP.

The above information has been added to Section 11.2.4 of the text.

Specific Comments

1. **Page 8-4: a table showing the operation of the remedial systems at Buildings 106 and 780 should be provided.**

   Response: A general comparison of the existing system at Building 780 to what would be required for treatment of extracted groundwater from Areas B, C, and D has been added to Section 11.2.4 of the text.

2. **Table 9-3: the Class III freshwater criteria for Trichloroethene (TCE) is based on an average of annual flow conditions at the point of compliance. For further details please see Section 200, Chapter 62-302, F.A.C.**

   Response: Noted. An appropriate note, reflecting this criteria, has been added to Table 9-3.

3. **Page 9-12: while the ultimate RAO for the storm sewer water will likely not change, we recommend adding "Upon sampling results," as an introduction to the RAO statement.**

   Response: Based on discussions during the NAS Jacksonville Partnering Meeting on August 31, 1999, one of the active treatment technologies evaluated for Area F (i.e., air sparging or chemical oxidation) has been identified as the preferred alternative in the Proposed Plan. This action has been pursued in anticipation that actively remediating the groundwater in the vicinity of the elevated TCE in the storm sewers may reduce the TCE to concentrations below the Florida Surface Water Standard. The estimated treatment durations for air sparging and chemical oxidation at Area F are 6 years and 5 years, respectively. Monitoring of the storm sewer water at the southern end of OU 3 has been proposed during implementation of the selected remedy for Area F.

   Because the source of TCE in the storm sewers cannot be determined, the NAS Jacksonville Partnering Team agreed on August 31, 1999 that no action for the storm sewer is unacceptable, and that additional monitoring is necessary to assess whether or not there is an exceedance of the Florida Surface Water Standard over the long term. Therefore, a no action alternative for the

storm sewers will not be considered, but a limited action alternative has been evaluated in its place. According to the USGS the best time for sampling, to meet the intent of the regulations, is during base flow (non-rain) conditions. The limited action alternative will include annual sampling for VOCs (at base flow conditions) from 5 manholes within the tidally influenced portion of the storm sewers, until completion of the active groundwater remediation at Area F. After the active groundwater remediation is completed for Area F, the storm sewer water monitoring data should be evaluated to determine the most appropriate remedial alternative for the storm sewer.

4. **Page 9-17: the text discusses Area H; however, we could not find a figure describing where said area is located.**

   Response: The location of Area H is shown on Figure 2-6. A reference to this figure has been added to Section 9.2.5 on page 9-13.

5. **Page 9-20: based upon comment 3 above, the in-situ requirements for storm sewer water may have to be met if sampling events demonstrate continued exceedances of the surface water standards.**

   Response: Noted. Refer to response to comment #3 above.

6. **Table 9-10: if the TCE surface water criteria is based on an annualized average of flow, then it is conceivable that the amount of FOTW-treated water and subsequent post-treatment amount of effluent may be able to reduce the TCE criteria to below surface water standards.**

   Response: Noted. Refer to response to comment #3 above.

7. **Page 10-23: please include in the sewer alternatives "monitoring" and perform an economic analysis to justify its possible selection. Note, the "cured in place" alternative should be maintained as a separate alternative if the surface water monitoring program reveals violations of applicable standards.**

   Response: Noted. Refer to response to comment #3 above.

8. **Table 10-4, Areas A, E, F, and G: we recommend the Navy consider enhanced biodegradation coupled with monitored natural attenuation. Results indicate that aerobic and anaerobic biodegradation are effective in Area A. Increasing microbial counts at the hottest areas of the plume coupled with monitoring of perimeter wells should have been considered as a potential effective technology.**

   Response: Durations for unassisted natural biodegradation in the shallow zone of the surficial aquifer were calculated based on an assumed contaminant half-life of 5 years (derived from historical sampling results for monitoring well NARF B-1 at Area G). In Section 11.2.2.2, the estimated duration for natural biodegradation to reduce contaminant concentrations to MCLs is compared to the calculated travel time for the contaminants to reach either a leaky storm sewer or

the St. Johns River. For each hot spot area (i.e., A, E, F, and G) the treatment duration for unassisted biodegradation is significantly less than the estimated travel time for contaminants to migrate to a receiving medium. Therefore, while biodegradation could potentially be enhanced in the shallow zone of the surficial aquifer, we feel that the additional expense would be unwarranted.

9. **Table 10-4, area C: chemical oxidation is eliminated because "the large and separate nature of the two interconnected zones of contamination." No other technical reasons are provided. We recommend that chemical oxidation be evaluated for both separate plumes (one centered close to CW16 and the other around MW31). The appropriate calculations and economic analysis should also be submitted. If this is not feasible, then evaluate chemical oxidation for a single plume as shown on Figure 4-9 of the RI.**

Response: The eastern portion of the Area C plume is located on an active aircraft taxiway near helicopter landing locations and the western portion of the plume is located directly off the taxiway, between aircraft maintenance hangars.

Any above-ground equipment associated with chemical oxidation would interfere with aircraft operations – the primary mission of the installation – and is strictly forbidden. Thus, any above-ground equipment would have to be located away from the taxiway, and therefore far from the plume, requiring extensive horizontal drilling beneath the runway to deliver oxidant to the plume. In order to effectively flush oxidant through the entire plume, a series of injection points, extraction points and conveyance piping would have to be installed at both the eastern and western portions. This is impractical on the flight line due to the thick, specialized high-strength concrete on the runway, and the extended interruption of aircraft activities while installing the system. Therefore, HLA believes chemical oxidation at Area C is technically impractical and the extra capital costs that would be required are unreasonable.

Harding Lawson Associates

The following are additional edits to the draft final RI/FS by HLA:

1. Page xvii: List of Figures, Figure 5-1: Title corrected to read "Conceptual Pathways Model."

2. Page xvii: List of Figures, Figure 5-5: Title corrected to read "MT3D Model Results, Future Conditions, TCE Contaminant Plumes in Upper Layer Above the Clay Aquitard, Below River Bed Model Layer 1."

3. Page xix: Table 1-1 changed to Table 2-1.

4. Page xxii: Added "Areas A, B, C,D, E, F and G" to the end of title for Table 11-4.

5. Page xxii: Added "Treatment via Air Stripping, Area D" to the end of title for Table 11-14a.
6. Page xxii: Added "Treatment via UV/OX, Area D" to the end of title for Table 11-14b.

7. Page xxiv: The correct acronym for CLP is "Contract Laboratory Program.

8. Figure 2-3, p. 2-15: The PZ022 designator near Building 780 has been changed to PZ023.

9. Figure 3-2, p. 3-6. The PZ022 designator near Building 780 has been changed to PZ023.