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CERTIFIED MAIL RETURN RECEIPT REQUESTED

Waste Management Division
United States Environmental Protection Agency,
Region IV
Attn: Ms. Michelle Glenn
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: MCB Camp Lejeune; Response to EPA Comments to the Draft RI/FS/ERA for Operable Unit No. 2, MCB Camp Lejeune, North Carolina

Dear Ms. Glenn:

This letter addresses your comments concerning the above referenced project (facsimile transmission dated 7/20/93). The Navy/Marine Corps responses are attached.

If you have any further questions or comments, please contact Ms. L. G. Berry, at (804) 322-4793.

Sincerely,

L.A. BOUCHER, P.E.
Head
Installation Restoration Section
South
Environmental Quality Division
By direction of the Commander

Encl: Response to EPA Region IV Comments on the Draft RI/FS/ERA for Operable Unit No. 2, Marine Corp Base Camp Lejuene

Copy to:
NC DEHNR (Mr. Peter Burger)
MCB Camp Lejeune (Mr. Neal Paul)

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Response to Comments Submitted by the
U.S. Environmental Protection Agency, Region IV
on the Draft RI/FS for Sites 6, 9 and 82, MCB Camp Lejeune
Comment Letter Dated July 21, 1993

Responses to General Comments

1. The comment identified two major issues: calculation of soil cleanup goals and defining the vertical and horizontal extent of contamination in the groundwater. The later issue (i.e., concerning groundwater) was comprised of several "sub" issues including: inorganic contamination in the shallow aquifer; the vertical extent of contamination in the Castle Hayne aquifer (near the clay layer); the thickness and continuity of the clay confining bed; and miscellaneous comments regarding "missing" data in the report and appendices. These issues are addressed below in order.

Soil Action Levels - The Organic Leachate Model was used to estimate the potential impact to groundwater from chemicals detected in the soil. Groundwater concentrations derived using this model are conservative in that this model does not account for vertical attenuation of a chemical through the vadose zone. In order to estimate soil cleanup goals that are protective of groundwater, the OLM model will be modified to back calculate a soil concentration protective of State and Federal criteria for groundwater. The Summers and Pestan models were considered to estimate soil cleanup goals, but neither model directly calculates a soil concentration protective of groundwater. These models are leachate attenuation models and estimate concentrations in leachate.

Inorganic Contamination in the Shallow Aquifer - The comment suggests that the sampling technique may be responsible for elevated inorganic levels in groundwater. All monitoring wells were purged via pumping at a rate of approximately 2 to 3 gallons per minute prior to sampling. Measurements of pH, conductivity, and temperature were obtained after each well volume, and the sample was collected after the measurements stabilized (see Table 4-8, 4-9, 4-25, and 4-26). The sample was collected from the top of the water column (approximately 2 to 5 feet below the top of water). It is difficult, if not impossible, to conclude that the sampling technique may be responsible for elevated inorganic levels in groundwater. On the same hand, it is difficult to defend (or prove) that the sampling technique did not result in fine suspended solids in the sample. There is always the possibility that suspended solids may be present in the sample even under the most "cautious" sampling procedures.

EPA recommends that those wells exhibiting elevated levels of inorganics above MCLs be resampled. This would take considerable time, may not be necessary, and is expensive. The Navy's contractor (Baker) has reviewed historical data at Site 6 for lead and chromium levels in groundwater. ESE's sampling results of wells 6GW1 through 6GW8 were reviewed and compared to Baker's results (this is somewhat equivalent to resampling monitoring wells). ESE's sampling showed that chromium and lead levels exceeded the MCL in all 8 wells except 6GW4. During the RI (i.e., Baker's results), chromium levels exceeded the MCL in all wells except 6GW4 and 6GW6. Lead levels exceeded the MCL in wells 6GW3 and 6GW5. The comparison of Baker's 1992 results against ESE's 1990 results are similar results. This similarity, as well as the fact that three upgradient wells (wells 6GW2, 6MW9, and 6BP6) all had elevated levels of lead and or chromium, suggest that the sampling technique may not be the result of elevated inorganic levels. Resampling the wells would not yield additional information to conclude whether the elevated inorganic levels are due to suspended solids, poor well construction, or inorganic groundwater contamination. In general, it is believed that elevated inorganic levels are due to fines in the sample even though proper sampling methods were employed. Note that none of the dissolved metal analyses exceeded the MCLs.

Vertical Extent of Groundwater Contamination - The Navy concurs with EPA's comment that the extent of contamination along the clay layer and through the clay layer is unknown. The extent of this contamination will be evaluated during the pre-design study. Four additional deep wells are proposed. The proposed study is outlined in Baker's letter dated July 27, 1993 (EPA and the DEHNR have received copies of this letter). It should be noted that the level of contamination detected in the well 6GWDA (at a depth of 230 feet at the clay layer) was two orders of magnitude lower than the level of contamination detected in the upper zone (i.e., 110 feet). Although contamination may be present near the clay layer (or perhaps through the clay layer), the extraction of groundwater will likely focus on the upper portion of the aquifer. However, the depth of the extraction well will be evaluated in the design phase following the pre-design investigation noted above.

Continuity of the Clay Layer - This will be evaluated as part of the pre-design study. Three of the four proposed wells will be installed either at the clay layer or below the clay layer. The installation of these wells will allow for a better delineation of the clay layer under the site. Offsite continuity of the clay layer will be discussed also; supply well logs will be used to describe the clay layer east and northwest of the site (supply wells 651 and 633, respectively).

Data for Wells 6GW35D and 6GW30D - Appendix L.9 contains the data for well 6GW30D. Appendix L.9 does not include well 6GW35D because Phase II wells were not used in the statistical summary and/or risk assessment. No organic contaminants were detected in well 6GW35D, therefore, this well is not included in the Tables in Section 4 of the report (positive hit tables). The Phase II wells were installed to support the FS. Sufficient information to perform the baseline risk assessment was obtained with the 59 Phase I monitoring wells. The Phase II wells were installed in April. The information from these wells could not be used in the risk assessment due to time constraints (the Draft RI was submitted in June).

Well Construction Data - Well construction data for Site 82 wells (installed by NUS in 1991) will be included in the Final RI report.

Responses to General Comments on the Draft Remedial Investigation Report

1. A deep well will be installed through the clay layer at well cluster 6GW1 to evaluate whether the groundwater beneath the clay layer is contaminated. This will be performed as part of the pre-design study discussed above.

2. Round one sampling of well 6GW26 revealed 0.6 ppb of bromodichloromethane (see table 4-10). Round two sampling of this well revealed 7.7 ppb of chlorobenzene and 3.5 ppb of chloroform (there is no MCL for either contaminant). Placing another well downgradient from 6GW26 is not cost effective or necessary. Another sampling point to better define these low levels will do nothing with respect to the cleanup of groundwater proposed in the FS. Shallow groundwater flow is to the north-northwest and discharges into Wallace Creek.

3. A well west of deep well 6GW37D will be installed under the Pre-design investigation.

4. A sufficient number of samples were collected northwest of soil boring OSA-SB22 (near the ravine and in the wooded area north of Lot 203). Please review Figures 4-17 and 4-18. Also note that confirmatory sampling will be performed as part of the remedial action at this Area of Concern.

5. To state that this section is technically inadequate and unacceptable is not justified by the General and Specific Comments provided by the reviewer. The latest USEPA guidance documents were used in the development of this PHA. The USEPA guidance is designed to provide a framework for developing technically defensible human health risk information. This is demonstrated throughout this document and was concurred upon in a meeting between Baker, the Navy, USEPA Region IV, and the USEPA's independent reviewer. The structure of this section was in accordance with the latest USEPA guidance and was demonstrated in the presentation of the following sections: Identification of Potential Contaminants of Concern, the Exposure Assessment, the Toxicity Assessment, Risk Characterization and Environmental Effects, an Uncertainty Analysis, and Conclusions of Potential Risk. The USEPA guidance cannot address all site-specific circumstances; therefore, users of the manual are advised to exercise professional technical and management judgment. Professional judgment with respect to the latest risk assessment practices was employed when necessary throughout the PHA.

6. The evaluation of analytical data was performed in accordance with USEPA guidelines. However, the vast amount of data generated for this site did not allow for presentation of all of the data in the text of the report; therefore, these data and frequency tables are presented in the Appendix of the report. The Data and Frequency Tables presented in Appendix L of this report summarize the following items each sample matrix (i.e., surface and subsurface soil, groundwater, surface water and sediment) for each area of concern: all validated detected and non-detected analytical results; the last pages of each subsummary presents the minimum non-detected, maximum non-detected, minimum detected, and maximum detected analytical values; the sample location of the maximum detected value; and the frequency of detection. In addition, tables were prepared for Section 6 which present the analytical findings (i.e. concentration ranges and frequency of detection) to criteria established for soil, groundwater, surface water and sediment. When calculating the average concentration that are most representative of the site, the positive detected results should be considered along with the non-detected results. The arithmetic mean is computed by summing all the observations in the sample set and dividing by the number of observations. If nondetects were eliminated from this sample set the average concentration would be biased high and not truly represent a background concentration. The background concentrations presented for the surface and subsurface soil are site-specific, and were generated from soils collected in areas where contamination was not suspected. For some metals analytical values were reported as non-detected, if these values were not used to calculate a background value no value would be established to evaluate the metal.

7. Selection of Contaminants of Potential Concern (COPCs) was completed in accordance with USEPA guidance by considering site history, frequency of detection, a comparison to state or federal criteria and standards and consideration of contaminant concentrations detected in the media. Section 6.2.1 clearly outlines the criteria that was applied to the selection of COPCs. In addition, Section 6.2.2 clearly accounts for the retention or elimination of all COPCs. To state that this section needs to be completely revised is erroneous and demonstrates a lack of understanding of the selection of COPCs. This is demonstrated in the comment which states that because 1,1,1-trichloroethane and tetrachloroethene were detected at a frequency of 14 percent (1 out of 7 samples) that these contaminants should be retained. Chemicals that are infrequently detected may be artifacts in the data due to sampling, analytical or other problems, and therefore may not be related to site operations or disposal practices. A chemical can be eliminated from the quantitative risk assessment if it is detected infrequently in one or perhaps two environmental media, it is not detected in any other sampled media or at high concentrations, and there is no reason to believe that the chemical may be present. In addition, for a statistically accurate]d of frequency, at least 20 samples of a medium is required to determine 5 percent. Furthermore, frequency is only one of several criteria used in the selection of COPCs.

8. Because of the length of this report, chemical-specific toxicity assessment information (i.e., Toxicity Profiles) were not included. If deemed necessary, profiles can be incorporated as an Appendix. This risk assessment was based on the most current and up-to-data toxicity information. This action does not have any direct impact on the approach or outcome of the risk assessment because the most current and up-to-date toxicity information was used in the Risk Assessment.

Responses to General Comments on the Draft Feasibility Study Report

9. It is believed that there is sufficient information regarding the aquifer characteristics at Camp Lejeune to evaluate pumping rates in both the shallow and deep groundwater zone. Tests performed on the shallow aquifer have yielded similar results (i.e., low pumping rates). The shallow aquifer has been shown that it cannot sustain a pumping rate beyond 5 gallons per minute. Additional tests on this aquifer do not appear to be cost effective. Sufficient information has been acquired during the installation and operation of the deep supply wells to ensure that a pumping rate of 150 gallons per minute can be sustained. Therefore, aquifer tests are not necessary. The available information includes the USGS information, the Wellhead Report, and the results from recent pump tests conducted by Baker and Law Engineering (Site 35) at other Camp Lejeune sites.

10. The scope of the remediation activities included under the Time Critical Removal Action at Operable Unit No. 2 will be better defined in the FS (Section 4.0). Confirmation soil sampling will be conducted during the removal action, and therefore will not need to be addressed in the FS. In addition, the removal action excavation activities currently include excavation of an additional 2 foot perimeter around any visually contaminated soils. The only exception to this will be for Soil AOC1. The soils within this AOC will be treated via in situ volatilization, and therefore, confirmation sampling in the removal action excavation areas will not be critical.

11. The potential impacts of the proposed effluent discharge to Wallace Creek with respect to Groundwater RAA Nos. 4, 5, and 6 will be evaluated, and a potential discharge point will be selected. The Navy would appreciate any guidance as to how to conduct such an evaluation on a tidally influenced body of water. What type of data would be required? At this time, Baker is contacting NC DEHNR and U.S. Fish and Wildlife Service personnel to gain any insight into this issue.

It is important to note that the only feasible discharge option for the treated groundwater at this time is Wallace Creek. Reinjection of the treated water into the deeper portion of the aquifer (upgradient of the extraction wells) appears to be a technically feasible option, but it not believed to be allowable by the State of North Carolina. If this can be waived by the State, then reinjection may be the better option for discharging treated water regardless of whether there would be no impact to Wallace Creek. Shallow infiltration galleries do not appear to be feasible based on the high water table at the operable unit and the low permeability of the shallow portion of the aquifer. Discharging the water to the existing Hadnot Point Sewage Treatment Plant does not appear to be viable due to the capacity of the plant (the expected discharge will be over 300 gallons per minute).

12. With respect to Groundwater RAA Nos. 4, 5, and 6, the FS will be revised (Section 4.0) to include plans for the disposal and/or treatment of sludges generated from the pretreatment process and for the disposal of spent activated carbon filters used in vapor recovery, if needed.

13. The FS will be revised, where applicable, to include provisions for monitoring air emissions during groundwater treatment and soil remediation activities.

Response to Specific Comments

Draft Remedial Investigation Report

1. Several aquifer tests have been performed throughout Camp Lejeune on the surficial aquifer (by Baker and other consultants). The test at the HPIA was not flawed. It is a fact that low flow conditions are expected with the shallow aquifer. All aquifer tests conducted at Camp Lejeune have revealed similar results (a pumping rate of only a few gallons per minute). No additional tests to evaluate flow conditions for the shallow aquifer will be performed since it is not cost effective.

2. A limited number of background samples were obtained. Some sample locations revealed levels above background; some locations were below background. In general, there was no one location where inorganic levels were orders of magnitude higher than background levels.

Those locations which indicated elevated levels of TPH did not reveal elevated levels of TCL organics. The risk assessment evaluated the TCL organics and TAL inorganics in soil. The soil at Site 9 does no present a risk to human health or the environment.

With respect to the FS, if the TPH contaminated soil (which was only the surficial soil near the access road) was removed as part of a remedial action, "clean" soils are likely to be contaminated again in the future as long as training activities are conducted. The State standard for TPH (10 to 100 ppm) is applicable to UST and AST situations, not fire training areas.

3. Section 1.3.2.1 is not the appropriate location to present well screen information (the text notes that the wells are shallow wells). Well screen information is presented in Table 3-5. The Final RI will indicate the approximate depth of the four wells (i.e., 25 feet)

4. Section 1.3.2.1 is not the appropriate location to present well screen information (the text notes that the wells are shallow wells). Well screen information is presented in Table 3-5. The Final RI will indicate the approximate depth of the four wells (i.e., 25 feet).

5. Section 1.3.2.2 is not the appropriate location to present well screen information (the text notes that the wells are shallow wells). Well screen information is presented in Table 3-5. The Final RI will indicate the approximate depth of the four wells (i.e., 25 feet).

6. The purpose of Section 2 is to discuss the field activities conducted as part of the RI, not all previous investigations (previous investigations were discussed in Section 1). Previous test boring records can be found in previous reports (see reference section). The EPA should have all of these reports.

7. The drums will be taken to a TSDF for treatment/disposal as part of a Time-Critical Removal Action. If the TSDF warrants additional analyses, they will be obtained. Normally, when disposing of industrial wastes such as fuel oil, lubricants, corrosives, analysis of TCL organics/TAL inorganics is not necessary (you would probably have a difficult time analyzing for these constituents due to the nature of the waste).

8. The Final RI/FS Work Plan describes the criteria. However, this will be included in this section.

9. Justification for deviating from the EPA guideline will be included.

10. The justification for indicating that acetone is present due to laboratory contamination is given in Section 6.

11. The justification for indicating that bis(2ethylhexyl)phthalate is present due to laboratory contamination is given in Section 6.

12. It is not possible to determine whether the high pH is due to grout mixing by reviewing the boring log. The sentence stating that the grout may be responsible has been removed. The well was properly installed.

13. This comment was addressed as part of General Response No. 1.

14. This sentence has been removed. It is not possible to determine that grout was the cause of the high pH.

15. A sample of drilling mud was collected and analyzed. The result is presented in Appendix R (see Sample 6-GW1D-FB-03). The sample was collected from the mud exiting the borehole and not prior to use in the borehole. Low levels of laboratory contaminants (acetone, chloroform) and TCE were detected. The TCE is likely from the water since this well had extremely high levels of TCE. Future investigations will sample the mud prior to use.

16. Justification is given in Section 6.

17. The term "qualitative" will be replaced with "quantitative."

18. In addition to prevalence, mobility, persistence, and toxicity, Arabs were used as a selection criterion for COPCs. If a criterion (i.e., MCLs, AWQCs, ER-M) was established for a chemical the detected chemical concentration was compared to the established criteria. These comparisons to available criteria are presented on Tables 6-9 through 6-15. An exceedance of state or federal criteria alone does not warrant the inclusion of a chemical as a COPC in all cases. If contaminants met the other criterion for inclusion as COPCs they were retained for the quantitative risk assessment.

19. Inorganic contaminants for this Operable Unit were compared to base-specific background concentrations. Base-specific background concentrations were developed from surface and subsurface soil samples collected in areas which were not influenced by site activities. According to the USEPA, since a sufficient number of samples are rarely obtained to perform a statistical analyses, two times the average background concentration should be compared to the site maximum concentration to determine significance. However, the two times rule cannot be used exclusively for the selection of inorganic COPC.

A better more defensible comparison of site inorganic data to background data is obtained by comparing sample analytical results for a given inorganic to the range of background inorganic results. The frequency with which an inorganic constituent exceeds the background range can then be considered in the selection of the inorganics as a COPC. If only a limited number of samples contain inorganics in excess of background, the analytical data can be re-examined to determine if analytical variability is causing the exceedance. If analytical variability is suspected, then one-half of the analytical result can be compared to the highest value in the background range of inorganic concentrations. If one-half of the analytical result exceeds the background range, then the inorganic should be retained and evaluated against the other selection criteria.

20. The 10E-7 to 10E-5 statement is for the establishment of AWQCs not for the EPA-specified range of upper-bound lifetime cancer risk. The EPA provides water concentrations corresponding to incremental cancer risks of 10E-7, 10E-6, and 10E-5. The AWQC concentration given is for potential carcinogens corresponding to a risk of 10E-6, which is the midpoint of 10E-7 to 10E-5 given in the water quality criteria documents. Therefore, the reference to 10E-7 to 10E-5 is correct and will not be modified.

21. Contrary to this comment Appendix L does provide a complete summary of each media within each area of concern (AOC). At the end of each segment (AOC and media) (i.e., Site 6, Lot 201 Surface Soil) a table was prepared summarizing the minimum non-detected, maximum non-detected, minimum detected, and maximum detected concentration. In addition, this table presents the sample location of the maximum detected concentration and the frequency of detected values for each contaminant. Inclusion of this data in the report would be awkward and confusing; therefore, tables were generated for the report to indicate concentration ranges and frequencies of detection. Providing an average concentration is not pertinent to the qualitative or quantitative risk assessment. However, Appendix M does present a statistical summary for each medium within each AOC. As part of this summary an arithmetic mean has been computed to determine the standard deviation and the 95th percent UCL. The arithmetic mean is computed by summing all of the observations in the sample and dividing the sum by the number of observations. If the mean value is not accounted for in the estimation of the mean, this value will be biased high and will not be a statistical estimation of central tendency.

22. A discussion of how concentrations of contaminants detected in the blanks was used to eliminate chemicals as COPC will be incorporated in text. Because of the sampling complexity involved in this investigation, it is difficult to associate each sample with specific blanks (i.e. trip, field, equipment rinsate, or method). Therefore, to prevent the inclusion of non-site-related contaminants in the quantitative risk assessment, blank data was compared to the entire sample data set.

The two times rule is not a test for determining significance. It is a rule of thumb approach based on the general accuracy data for CLP methods. This method cannot be exclusively used in the selection of COPCs.

23. Surface soil samples will be designated as 0-6" and subsurface as 6" and below. This will be corrected on all tables and in text.

24. Additional rationale for the elimination of pesticides as COPC will be provided. Rationale will include a discussion of frequency of detection, and the sample size (7), which does not allow for a strict statistical evaluation of frequency.

25. The rationale for the elimination of acetone and toluene a COPC will be justified with supporting blank data.

26. The rationale for the elimination of bis(2-ethylhexyl) phthalate as a COPC will be presented in the text.

27. Slightly above background will be more clearly defined in the text.

28. The rationale for the elimination of these contaminants as COPC due to blank concentrations will be supported in the text.

29. As stated in the text, one or more PAHs (i.e., benzo(a)anthracene, benzo(k)fluoranthene, benzo(a)pyrene, and phenanthrene) were detected in 1 of 17 surface soil samples, and 1 of 18 subsurface soil samples. These chemicals are ubiquitous in the environment and can occur in environmental media because of natural and anthropogenic sources. The limited occurrence and relatively low concentrations of these contaminants does not warrant their retention as COPC. The occurrence of these contaminants does not warrant their retention as COPC.

The elimination of bis(2-ethyhexyl)phthalate and di-noctylphthalate as COPC due to blank values will be supported in the text.

30. The text will be revised to indicate that the frequency of endosulfan II (1 out of 58), alpha chlordane (3 out of 58), and gamma chlordane (1 out of 58) does not warrant their retention as COPCs.

31. Please refer to Comment Number 25 response.

32. Will clarify statements in text with supporting documentation.

33. This page does not present text regarding organic or inorganic background concentrations. Clarification of this comment is requested.

34. There is no reason to eliminate the word organics from the text. Stating "volatile organic compounds" and "semivolatile organic compounds" is not incorrect. Also, there is no mention of natural background concentrations on this page. Therefore, no action will be taken on this comment.

35. Table 6-13 presents only the contaminants for which Region IV Sediment Quality Criteria (SQC) have been established. Inclusion of nondetect results or contaminants for which SQC has not been established would be cumbersome and unnecessary. The chemicals, toluene, 1,2-DCE, and xylenes are presented on Table 6-16 and were retained as COPCs for the quantitative risk assessment.

36. Figure 6-1 can be found in the Volume 2 of 2 Figures submitted for this report.

37. It has been determined that Wallace Creek and Bear Head Creek are not used for recreational purposes other than fishing, and that the AOCs other than the wooded areas which surround the Operable Unit, are fenced to prevent access.

38. Based on the base master plan, future land use is not likely to be different from current land use. The Operable Unit is currently classified as industrial and future development for residential or recreational purposes is unlikely. In addition, if structures were to be developed on this within this Operable Unit, the type of construction in this region would not involve excavating to the subsurface soil depths.

39. The text will be expanded to explain that the master base plan indicates that future uses of this Operable Unit is for storage and that no permanent structures are planned. In addition, if structures are to erected within this Operable Unit, excavation would not occur to depths greater than 2 feet due to the elevation of the water table. Therefore, the likelihood of exposure to subsurface soil by construction workers will not be evaluated.

40. In the preliminary meeting with USEPA it was decided that quantitative evaluation of potential exposure from this pathway was not necessary because groundwater in this area requires remedial

action based on exceedance of MCLs, and potential carcinogenic risks from ingestion of and dermal contact with groundwater.

41. In the preliminary meeting with USEPA it was decided that there are no current recreational (i.e., swimmers) receptors potentially exposed to surface water and sediment.

42. The word "future" will be removed from the text.

43. The word "not" will be removed from the text.

44. The statement is accurate, and does not need to be revised. The first sentence is an introduction which leads into why the 95th UCL is developed for estimating risk.

45. The statement is accurate, and does not need to be revised. The issue is not whether an individual is potentially exposed at a sampling location, but how to best represent the data generated during the sampling and analytical program with respect to exposure. Obviously, the potential exists for exposure in the area, and no one particular portion of the area is more or less predisposed to an exposure event. Data are compiled specific to an area of concern by media and the best way to represent potential exposure over the area is by averaging the data because an average (or a mean) is an unbiased estimator of what a receptor may encounter. The average, however, must represent the distribution from which the data set is drawn. In this case, (as with most environmental data) the distribution was determined to be lognormal and the geometric mean was derived. In accordance with RAGS supplemental guidance, the 95th percent upper confidence value for the geometric mean was used in the Reasonable Maximum Exposure (RME).

46. This comment is contradictory to current USEPA risk assessment practices. Inputs (i.e., skin surface area, ingestion rates, inhalation rates, and body weight) were obtained from the latest USEPA guidance documents. It would be extremely difficult generate of site-specific inputs for each receptor when defensible statistical are not available for many inputs. Therefore, USEPA promulgated and default exposure factors were used in lieu of site-specific factors unless it was necessary to derive a site-specific input as in the case with sediment ingestion rates, or less than whole body (child) exposure. USEPA promulgated and default exposure factors are clearly referenced throughout the text. Rationale was provided for site-specific input factors.

47. According to USEPAs Dermal Exposure Assessment: Principles and Applications, Interim Report, January 1992, The default for child skin surface area can be derived by multiplying the 50th and 95th percentiles by 0.25 for the ages of interest. Therefore by multiplying 0.918 (the 95th total body surface for male child in square meters at age 5 to 6) by 0.25 a skin surface of 2295 square meters. A value of 1,800 square meters was used in the risk assessment to represent potential exposure to a child 1 to 6 years of age.

48. A heading indicating 6.3.4.3 Inhalation of Fugitive Dust will be added to the text.

49. A site-specific PEF (5.0E+08) was calculated for this Operable Unit. A discussion of the site-specific rationale and inputs will be incorporated in the report and example calculations will be provided in Appendix K.

50. The use of 1.25 m3/hour as in inhalation rate is not low, this value is actually 1.5 times more conservative than the RAGs default value of 20 m3/day and represents the upper bound inhalation rate published in RAGs.

51. Table 6-20 will be corrected to present the site-specific PEF value of 5.0E+08 not 5.0E-08. The default PEF provided in RAGs is not necessary since a site-specific PEF was calculated.

52. The dermal permeability default for water (8.0E-04 cm/hr) although presented in the text was not used for any of the COPC. Contaminant-specific permeability values obtained from Dermal Exposure Assessment: Principles and Applications, Interim Report, January 1992 were used for this scenario. Because the water default value was not used to estimate risk, it will be removed from text. In addition the default water value presented in USEPA, 1992 will be used in future risk estimates if permeability constants have not been developed for a contaminant.

53. It has been determined that the surface water in the area of this Operable Unit is not used for recreational purposes. Therefore, the USEPA default value of 7 days/year for swimming, published in RAGs and the Dermal Exposure Assessment Interim Report was used for the estimation of potential risk. There is no logical rationale or data in RAGs or the USEPA Dermal Exposure Permeability Interim Report that supports an exposure frequency of 45 days/year, especially when swimming is not an issue.

54. The skin surface area was derived from the USEPAs Dermal Exposure Assessment: Principles and Applications, Interim Report, January 1992. This source estimates a total body surface area, for an adult, from about 17,000 cm2 to 23,000 cm2. For default purposes adult surface areas of 20,000 cm2 to 23,000 cm2 are recommended. However, the surface water bodies within this Operable Unit are not used for recreational purposes (i.e., swimming), therefore applying a skin surface area of 17,500 cm2 for an adult and 13,800 cm2 for an adolescent (ages 7-16) would provide a conservative estimate for exposure.

55. The soil ingestion rate is not reasonable default value to use in estimating the potential exposure from ingestion of sediment without consideration of the exposure scenario. If sediment is ingested according to the exposure scenario, it would be ingested along with surface water. Given that the exposure time used for incidental ingestion of surface water was assumed to be 2.6 hr/day and the ingestion rate was assumed to be 50 ml/hr the individual would be ingesting 130 ml of surface water per day. It is unlikely that 100 mg of sediment will be ingested in this amount of water. Therefore, it is more reasonable to use 50 mg/day for this scenario.

56. Please refer to comment 53 response.

57. Because the surface water bodies within the Operable Unit are headwaters, not used for recreational purposes potential exposure is limited. Activities conducted in the head waters (i.e., wading, cooling off, hiking) would entail exposure to the hands, lower legs, and feet. Therefore, from mean values published in the in the USEPAs Dermal Exposure Assessment, Interim Report the surface area would be estimated to be approximately 4,000 cm2.

58. The name "New River" will be removed from text.

59. The fraction ingested (10%) used in the estimation of risk from the ingestion of fish will be increased to (100%). This correction does not create a noncarcinogenic risk. In addition, it should be noted that based on the 10% ingestion from contaminated source there is a potential carcinogenic risk that has already been addressed.

60. The word "not" is not used in this paragraph. This comment must be clarified if action is to be taken.

61. The toxicological information provided in this section is used to define, evaluate, and explain uncertainties in the development of reference doses and carcinogenic slope factors.

If toxicity profiles are deemed necessary for this report, they will be provided as an Appendix.

62. Agreed. Text will be provided defining USEPAs weight-of-evidence.

63. In accordance with the National Functional Guidelines for Organics, the Functional Guidelines for Inorganics, and USEPAs Guidance for Data Usability in Risk Assessment (Part A) (1992) if the blank contains detectable levels of common laboratory contaminants, then the samples results should only be considered as positive only if the sample concentrations exceed ten times (common laboratory blanks) and five times (uncommon laboratory blanks) detected in any blank. If the contaminant is less than 5 or 10 times a laboratory contaminant, then conclude that the contaminant was not detected in the particular sample. If all samples contain levels of common laboratory contaminant that are less than 10 times the level of contaminant noted in the blank, then completely eliminate the contaminant from the sample set. Because it was impossible to associate certain blanks and data, and in order to prevent the inclusion of non-siterelated contaminants blank results were compared with the entire sample set and eliminated or retained as applicable.

64. Figure 6-1 was not omitted from the report. It was provided in Volume 2 of 2 Figures.

65. Please refer to comment 40 response.

66. These values are not available through the USEPA, in the most recent IRIS or HEAST. Using values that are no longer in IRIS or HEAST will lead to an over estimate and introduce significant uncertainty in the quantitative evaluation of potential human health effects. These chemicals will, however, be addressed semi-quantitatively in the uncertainty section.

67. A result is considered non-detected if it has been reported by the laboratory with a "U" qualifier. A "U" qualifier indicates that the sample result is not only less than the CRQL or CRDL but less than the SQL which is the measure of the sensitivity of an instrument at a given period in time.

Surface and subsurface soil depths will be corrected to indicate Surface Soil (0-6 inches), Subsurface Soil (6" and below).

Background sampling and analysis for organic and inorganic constituents is conducted to determine regional or area specific concentrations of these chemicals in environmental media unaffected by site activities. Background sampling and analytical programs are seldom comprehensive enough for rigorous statistical evaluation. Therefore, the use of an average value for site background data is inappropriate. A range of values should be presented to eliminate the potential for overestimating or underestimating the natural or background constituent concentrations. Presenting a range of background concentrations also provides a qualitative insight of the variability of background constituent concentrations.

For the calculation of an average concentration the non-detected results must be used to determine (n) number of samples. If these values are not considered the average concentration will be biased high.

68. A legend will be included to show that the symbol "x" indicates contaminant was retained as a COPC.

69. Recreational sportsmen were not retained as potential receptors because of the restricted access at Lot 203 and Lot 201. In addition, hunting is not allowed in the wooded area (Site 82), and Site 9 is a Fire Training Area which would not be used for recreational purposes. Because of limited access in these areas, recreational receptors were not retained.

70. Agreed. Rationale will be expanded in this section of the report. The acronym "UCL" will be revised to "95% UCL". Because risk values were generated for the more conservative absorption values, and these risk values fall within USEPAs target risk range, absorption values will not be modified to reflect Region IVs interim guidance. Absorption used in the quantitative risk assessment were 10% VOCs, 5% SVOCs and Pest, 3% PCBs and 1% metals instead of 1% for organics and 0.1% for inorganics. No risk was estimated using more conservative absorption factors.

71. Explanation of weight-of-evidence classifications will be presented.

72. RfI will be corrected to RfC on Table 6-28. The toxicity values presented in the comments will be considered for the Final report.

73. Risks from TCE and PCE will be provisionally estimated and presented in the uncertainty section of this report. Toxicity values for these chemicals have not been promulgated by the USEPA and as of yet are not listed on IRIS or in HEAST.

74. This paragraph will be corrected to state that the HI estimated for base personnel did not exceed unity, but the HI estimated for future children and adults residents did.

75. Tables 6-38 and 6-41 will be transposed.

76. Pertains to section 7 of the report.

77. Sampling data sets with fewer than 20 samples may not provide a good estimate of the 95 percent UCL. In general, the UCL approaches the true mean as more samples are included in the calculation. This may account for the discrepancy between the mean and the 95 percent UCL. In order to satisfy this comment an example calculation for the 95 percent UCL will be provided in Appendix K.

In addition, exposure point concentrations will be checked to clarify values used to estimate risk.

78. The soil ingestion exposures for DDT will be estimated using an RfD of 5.0E-4 mg/kg-day.

79. Potential carcinogenic exposures to Total PCBs were not estimated due to the fact that only PCB 1260 was selected as a COPC. The RfD for Aroclor 1016 listed in IRIS (1993) will be used to estimate noncarcinogenic risks for Aroclor 1260.

80. Significant uncertainty is associated with modification of the Oral Reference Dose (RfD) or Carcinogenic Potency Factor (CPF) to determine an absorbed dose. RfDs and CPFs are usually expressed as administered dose. Use of administered dose toxicity values is appropriate when evaluating similar routes of exposure. However, when evaluating dermal exposure to a chemical, an absorbed dose

is derived by the risk assessor. Technically, it is not appropriate to evaluate potential health effects associated with an adsorbed dose using a toxicity value generated from an administered dose. Modifying the RfD and CPF (derived from an administered dose) by some arbitrary oral absorption factor does not produce a better or more accurate toxicity index for evaluating potential dermal exposure.

USEPA promulgated absorption values are not available because of the uncertainty in the available absorption data. For example, an absorption value for a given chemical differs from different animal species and the media by which the chemical is administered (i.e., rat vs guinea pig vs mouse; corn oil vs food). Furthermore, available default absorption values cannot account for the variability of absorption between test animals and humans, nor can they account for absorption differences in individual diets or individuals of different ages, weights, race, or socio-economic status. Until more appropriate dose-response factors are derived or promulgated absorption factors are published by USEPA, absorbed dose RfDs or CPFs cannot be derived and used in place of promulgated USEPA administered dose RfDs and CPFs.

Response to Specific Comments on the FS Report

1. Section 4.0 of the FS will be revised (including Figure 4-2) to clearly indicate which surficial and buried drum/container areas will be remediated under the Critical Time Removal Action and which areas will be remediated under one of the soil remediation alternatives. General locations of all the drum/containers to be removed will be shown on a figure in the FS.

Attachment B
Response to Comments on the Ecological Risk Assessment for Operable Unit No. 2
(Sites 6, 9, and 82)

General Comments:

1. The SOW limited the sampling at the references sites to sampling of fish and benthic macroinvertebrate populations and did not include chemical analyses of sediment, surface water, fish tissue or crab tissue samples. In addition, the SOW limited the sampling at the reference sites to only two stations in the White Oak River Basin.

The reference stations were selected to be as ecologically similar to the sampling stations for Site 6 and 9 and Sites 48 and 69. However, because of the wide range of environmental conditions (i.e., salinity and dissolved oxygen) found at Sites 6, 9, 48, and 69, some of the environmental conditions present at the on-site stations could not be replicated using only the two reference stations. The White Oak River reference station was not included in the OU 2 Draft ERA because salinity ranged from 15 to 26 ppt. This station was selected to be representative of the high salinity New River Stations at Site 48. Because of the limit of one station to represent the low salinity to freshwater areas of Wallace and Bear Head creeks, the Pettiford Creek station was selected to be representative of a creek near the freshwater/saltwater interface. However, their are reported large fluctuations in salinity in the White Oak River watershed with measured salinities varying by 10 to 15 ppt from week to week at a given station. Therefore, the characteristics of the benthic macroinvertebrate and fish populations could reflect the variation between a freshwater and low salinity estuarine habitat. The benthic macroinvertebrate populations were sampled using the same grab sampler. The fish population samples were collected using the electrofishing technique. This technique was selected based on the its use in the headwaters of both Wallace Creek and Bear Head Creek. Apparently heavier than normal rainfall in the area during the spring and summer resulted in lower salinities than normal. This observation was noted in talking to operators of boat docks along the New River and Wallace Creek areas. Reportedly, the barnacle population has been the lowest in many years due to the low salinities.

To address the data gap resulting from the lack of sufficient reference point data, reference areas in White Oak River watershed will be resampled during the conduct of the ecological investigations for Sites 25 and 38.

2. The biological and surface water and sediment sampling locations were presented in the SOW. This scope of work (i.e. RI/FS Work Plan) has been approved by EPA.

Specific Comments:

1. The location of elevated concentrations of contaminants in sediment and surface water will be included relative to source areas in OU 2.

2. The reference to ER-L and ER-M exceedances will be modified to include the NOAA definitions of possible or probable effects, respectively.

3. The contamination upstream of source areas in OU 2 will be documented in the ERA for future consideration during subsequent investigations. Section 3.4 Contaminant Distribution will be modified to include the effects of tidal influence.

4. The Objectives will be amended to include the qualitative evaluation of the potential terrestrial effects.

5. The ERA will be modified to include the presence of fences that separate portions of OU 2 from the rest of the MCB Camp Lejeune. However, the presence of a fence will not limit the accessibility of many of the terrestrial receptors identified in section 2.3.1 Regional Ecology. The ERA will be amended to provide mammalian toxicological effects data for the potential COCs that will be used to estimate risks to terrestrial receptors.

6. Section 3.2 is presented to provide an overview of the type of constituent detected, the range of concentrations detected, and the where the maximum concentration was detected. Tables 3-5 through 3-16 provide the exact station location by depth and cross-stream position for each of the positively detected constituents. Section 3.3 Extent of Contamination discusses the relative contamination upstream and downstream of the site including station locations. Additional information will be provided regarding potential OU 2 source areas.

7. Section 3.3 includes both station locations and relative trends for the detected COCs. The text indicates when trends could not be determined because of limited positive detects or when trends were due to natural conditions (i.e. saltwater intrusion). The SOW did not require chemical sampling of surface water and sediments in the reference creek.

8. The second paragraph in Section 4.3.1.1 Water Criteria will be revised as stated in the comments.

9. The use of Pettiford Creek as a reference creek was based on recommendations by the North Carolina Department of Environment, Health, and Natural Resources. The White Oak River watershed was recommended due to limited development. Therefore, the station should be representative of an aquatic system with relatively few impacts due to point and non-point sources of pollution of an industrial nature similar to Camp Lejeune. As stated in the general comments, only one low-salinity station was to be sampled. Therefore, the creek was sampled at the freshwater/low-salinity interface, based on field salinity measurements, to represent the area of greatest natural stress to the system. The sample results reflected the impact of the freshwater/saltwater interface in the low numbers of benthic macroinvertebrates and fish collected, demonstrating the low diversity and density of this ecotene area.

10. Mercury was inadvertently excluded from Section 5.1.3.3, but was included in the analysis in Section 5.4.3. Mercury will be added to Section 5.1.3.3. The organics were excluded due to infrequent occurrence or blank contamination. The organics listed in Section 2.4.3.4 were not included in Section 5.1.3.4 due to infrequent occurrence or blank contamination.

11. Risks to terrestrial mammals will be evaluated using appropriate toxicity values and hypothesized intake assumptions to determine reference concentrations. The ERA will be amended to evaluate risks to terrestrial receptors for the potential COCs. This assessment will utilize existing toxicological effects data and exposure assumptions from the literature as per EPA guidance and current practice, as available in the literature or from electronic databases and information services.

12. The text indicates where the highest concentration that exceeded relevant surface water and sediment quality benchmarks. In addition, Tables 5-4 through 5-6 and Tables 510 through 5-12 indicate the location of stations that had detected concentrations exceeding relevant surface water and sediment quality benchmarks.

13. Section 7.0 will be divided into two sections - Section 7.1 will include Risk Characterization and Section 7.2 will include Risk Integration. Section 7.2 will provide an analysis of the contamination trends relative to observed ecological data.

14. The surface water sampling program was a "snapshot" in time and can not demonstrate a chronic condition. Variations in regional and local meteorological conditions can result in variations in stream flow and tidal influence as well as groundwater discharge. Therefore, the phrase "provided that the exposure concentration evaluated occurs for sufficient duration to elicit chronic toxicity" refers to this fact and qualified the sampling result so that the reader recognizes that the results of the surface water sampling program represent a data point on a continuum of possible values.

15. Section 7.4.1 will be amended to include additional evaluation of the relative number of tolerant and intolerant species detected and any apparent trends in upstream to downstream stations.

16. Phenol levels in crab tissue will be discussed further. However, it is noted that the blue crab is a highly mobile invertebrate within the estuary and migrate into and out of the estuary in the spring and fall, respectively.

17. The discussion of the silver in the fish and crab will be amended in regards to the presence of silver in the ravine and Wallace Creek surface water samples. Fish tissue sampling for the reference creek was not included in the SOW.

18. the referenced statement may have been misleading in the observation of stressed vegetation at a few of the stations. There only was minor occurrences of vegetation that was stressed, as would be typical of any wetland system that has natural successional processes occurring including dead trees and seasonal die off of mature plant species. the observed stressed/dead vegetation was neither widespread or extensive in areal extent. A further review of field notes and site pictures indicates that the observed stressed/dead vegetation was a natural phenomenon.

The SOW did not include a comparison of wetland function and structure between wetland areas along Wallace Creek and Bear Head Creek. The proposed surface water and sediment sampling program did not include taking additional samples in areas of apparent stressed vegetation.

The ERA will be amended to incorporate additional discussion of the potential effects of contaminants at OU 2 on sensitive environments including wetlands, protected species, and fish nursery areas. However, the SOW did not include collection of field data to specifically address this evaluation but indicated that the evaluation will utilize the published literature and that if the data permits, a comparison will be made between reference areas identified in the literature and study site ares to determine the extent to which habitat function and structure at the site may have been impaired.

19. The statement "Because Wallace Creek is primarily freshwater with a salt wedge, the estuarine theory cannot be relied upon." in Section 8.4.1.1 (and the same statement relative to Bear Head Creek in 8.4.1.2) should not have been applied to the fish population statistics; it was to be applied to the benthic macroinvertebrate statistics. The statement will be deleted. Reference station was collected from a representative low salinity station in Pettiford Creek.

20. Although there was no observed salt wedge or salinity gradient in Bear Head Creek between the biological sampling stations (i.e. above station 6-BH07), Table 3-4 does indicate that a salinity gradient and salt wedge exists at station 6-BH07SW/SD, approximately 2,500 feet below station 6-BH07. Table 3-18 indicates that surface water samples were taken at station 6-BH07-SW/SD on a falling tide

approximately 80 percent to low tide. Finally, there are reported large fluctuations in salinity in the New River watershed with measured salinities varying by 10 to 15 ppt at a given station. Due to the high seasonal rainfall, the salt wedge may be positioned much lower in the downstream reach of Bear Head Creek than would be typical. Therefore, a salinity gradient is the likely influence in the species composition in the lower reach of the creek.