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**DEPARTMENT OF THE NAVY**  
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From: Commanding Officer, Navy Environmental Health Center  
To: Commanding Officer, Atlantic Division, Naval Facilities Engineering Command  
(Kirk Stevens), 1510 Gilbert Street, Norfolk, VA 23511-2699

Subj: MEDICAL REVIEW OF THE DRAFT FINAL SUPPLEMENTAL FIELD  
INVESTIGATION PROJECT PLANS SITE 89, OPERABLE UNIT 16, MARINE  
CORPS BASE CAMP LEJEUNE, NC

Ref: (a) LANTNAVFACENGCOM E-mail of 20 Feb 01

Encl: (1) Subject Medical Review  
(2) Medical/Health Comments Survey

1. Per reference (a), we have completed a review of the subject document and forward our comments to you as enclosure (1).
2. Please complete and return enclosure (2) as your comments are needed to continually improve our services to you.
3. We are available to discuss the enclosed information by telephone with you and, if you desire, with you and your contractor. If you require additional assistance, please call Mr. Kenneth Gene Astley at (757) 462-5541 or Mr. David McConaughy at (757) 462-5557. The DSN prefix is 253. The e-mail addresses are: astleyg@nehc.med.navy.mil and mcconaughyd@nehc.med.navy.mil.

  
P. B. GILLOOLY  
By direction 

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**MEDICAL REVIEW OF  
DRAFT FINAL SUPPLEMENTAL FIELD INVESTIGATION  
PROJECT PLANS SITE 89, OPERABLE UNIT 16  
MARINE CORP BASE CAMP LEJEUNE, NORTH CAROLINA**

- Ref: (a) Risk Assessment Guidance for Superfund, Vol. 1, Part A: Human Health Evaluation Manual, Dec 1989 (EPA 540/1-89/002)  
(b) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, October 1988 (EPA/540/G-89/004)

**General Comments:**

1. The document entitled "Draft Final Supplemental Field Investigation Project Plans Site 89, Operable Unit 16 Marine Corp Base Camp Lejeune, North Carolina," was provided to the Navy Environmental Health Center (NAVENVIRHLTHCEN) for review on 20 February 2001. The report was prepared for the Atlantic Division, Naval Facilities Engineering Command by CH2M HILL.
2. We agree that the main study question is "What is the extent of the contaminant source zone below the water table in the southern portion of Site 89?" Our main concern is the current and/or future potential for the continued migration of the chlorinated hydrocarbon groundwater plumes through the semi-confining layer of the upper portion of the Castle Hayne Aquifer (e.g., safety and integrity of the water supply wells). We believe that it may be beneficial to use a groundwater model (that is, developed for Camp Lejeune) in future studies to predict whether Site 89 contaminants will be within the influence of the drinking water supply wells once the additional data are available to completely delineate the Dense Non-Aqueous Phase Liquid (DNAPL) and source area and characterize the aquifer(s). It also would be beneficial to address the precautions taken to prevent the enhancement of groundwater migration within the various source areas during the field investigations.
3. The text does not indicate what sampling cycle will be used. The ideal sampling strategy incorporates a full annual sampling cycle. If this strategy cannot be accommodated in the investigation, at least two sampling events should be considered. These sampling events should take place during opposite seasonal extremes.

**Review Comments and Recommendations:**

1. Pages 2-2 - 2-4, Section 2.2, "Current Site Conceptual Model"

**Comments:**

- a. Page 2-3 of the document defines the acronym/abbreviation for 1,1,2-tetrachloroethane as "112-TCA." This nomenclature should be rechecked and corrected. The acronym/abbreviation for the compound 1,2-dichloroethene is 1,2-DCE.

b. "PCA" is neither defined in the text on page 2-3 nor is it listed in the "Acronym and Abbreviations Section."

**Recommendations:**

- a. Recheck the nomenclature and correct as necessary.
  - b. Provide the nomenclature for "PCA."
  - c. Include CAS Numbers, and chemical formulas for each compound, as feasible.
2. Pages 2-2 - 2-4, Section 2.2, "Current Site Conceptual Model"

**Comment:** The report does not contain a schematic of a site conceptual model (SCM) to include both current and future potential exposure pathways applicable for this site. This would help to identify the potential residual risks remaining from migration of site-related chemicals to various media to include nearby surface waters, etc.

**Recommendation:** Include a schematic of a SCM that depicts both the current and the future potentially completed exposure pathways.

3. Pages 3-1 - 3-3, Section 3.3, "Field Investigation"

**Comment:** As stated above under "General Comments," the potential for continued migration of the chlorinated hydrocarbon groundwater plumes, through the semi-confining layer of the upper portion of the Castle Hayne Aquifer (e.g., safety and integrity of the water supply wells), is not addressed.

**Recommendation:** Address the distance to the nearest supply well used for drinking water purposes and provide a site map that depicts their locations in relation to Site 89, as applicable. Consider using a groundwater model developed for Camp Lejeune to predict whether Site 89 contaminants will be within the influence of the drinking water supply wells.

4. Page 3-7, "Soil Investigation"

**Comments:**

a. The text states on Page 3-7 that "Selected samples will be analyzed for total organic carbon (TOC), grain size, synthetic precipitation leaching procedure (SPLP), and laboratory permeability."

b. Reference (a) Section 4.6.2 states that “Although areas of concern are established purposively (e. g., with the intention of identifying contamination), the sampling locations within the areas of concern generally should not be sampled purposively if the data is to be used to provide defensible information for a risk assessment.” Risk estimates calculated from sampling data collected from locations expected to have the highest concentrations almost always overestimate the risk. The text should clearly state how analytical data from “purposively selected sample locations” would or will not be used in a human health risk assessment.

**Recommendation:** The text should clearly state if analytical data from “purposively selected sample locations will be used in a human health risk assessment to estimate human health exposure.

5. Table 7-1, “Summary of Sampling and Analytical Objectives”

**Comment:** Table 7 does not include metals analysis for Site 89 soils and groundwater, except for investigative-derived waste (IDW) testing purposes. Waste petroleum products, such as, waste oils, frequently contain metals in addition to chlorinated hydrocarbons. Because of this, it may be appropriate to also sample for metals in subsurface soils and groundwater.

**Recommendation:** Consider sampling for metals for Site 89 subsurface soils and groundwater.

6. Pages 6-2 - 6-3, Section 6.1.2, “Soil Sample Laboratory Submission Procedures” Appendix A, “Soil Sample Acquisition”

**Comments:**

a. Page 6-2 briefly discusses the procedure for using the Encore Sampler for collecting volatile organic compound analysis (VOA) samples for laboratory analysis after split-spoon soil sample collection. The reader is referred to Appendix A for more information. It is unclear whether discrete and/or composite samples are to be analyzed for volatile analysis for samples taken from the grid area. We are concerned with taking composite samples in place of individual discrete samples from the desired soil intervals when obtaining data for use in human health risk assessments (HHRAs).

b. In general, we believe that the laboratory data obtained from analyzing composite samples may not be representative of completed exposure pathways. For example, when addressing a residential exposure to surface soil we assume contact is with the upper six inches depending upon the chemical of concern. Soil concentrations are often the highest in the upper six inches. Therefore composting, or mixing the soil from the upper 12 inches would not be representative of the soil a resident would normally be exposed to. Because of the difficulty with obtaining uniform mixing and the potential for “diluting” the highest concentrations, we prefer taking discrete soil samples instead of composites.

c. "Appendix A" does not include the actual United States Environmental Protection Agency (U.S. EPA)-approved "Encore Sampler" method.

**Recommendations:**

a. Clarify whether discrete soil samples instead of composite soil samples are to be taken when obtaining data for use in HHRAs.

b. Include in Appendix A the U.S. EPA-approved "Encore Sampler" method in its entirety. Ensure that the soil sampling procedures provided in Appendix A agree with the information provided in the text concerning taking soil samples for environmental analysis.