

05.01-01/18/96-01631



**DEPARTMENT OF THE NAVY**

NAVY ENVIRONMENTAL HEALTH CENTER  
2510 WALMER AVENUE  
NORFOLK, VIRGINIA 23513-2617

5090.5

Ser EP/WB:4117/ 03526

18 JAN 1996

From: Commanding Officer, Navy Environmental Health Center  
To: Commanding Officer, Atlantic Division, Naval Facilities  
Engineering Command, ATTN: Lance Laughmiller, 1510 Gilbert  
Street, Norfolk, VA 23511-2699

Subj: MEDICAL REVIEW OF INSTALLATION RESTORATION PROGRAM  
DOCUMENTS FOR MARINE CORPS BASE, CAMP LEJEUNE, NC

Ref: (a) Baker Environmental transmittal ltr of 17 Nov 95

Encl: (1) Medical Review of Draft Remedial Investigation Report  
for Operable Unit No. 9 (Site 65), Marine Corps Base,  
Camp Lejeune, North Carolina  
(2) Medical/Health Comments Survey

1. Per reference (a), we have completed a medical review of the  
"Remedial Investigation Report for Operable Unit No. 9 (Site 65),  
Marine Corps Base, Camp Lejeune, North Carolina." The attached  
comments are included for your information as enclosure (1).

2. Please complete and return enclosure (2). Your comments are  
needed to continually improve our services to you.

3. The points of contact for this review are Ms. Wendy Bridges  
or Mr. David McConaughy, Health Risk Assessment Department. If  
you would like to discuss this medical review or if you desire  
further technical assistance, please call them at (804) 363-5552  
or 363-5557, DSN prefix 864.

*W. E. Luttrell*  
W. E. LUTTRELL  
By direction

**MEDICAL REVIEW OF DRAFT REMEDIAL INVESTIGATION REPORT FOR  
OPERABLE UNIT NO. 9 (SITE 65)  
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA**

- Ref: (a) Risk Assessment Guidance for Superfund, Volume I, Part A: Human Health Evaluation Manual, December 1989 (EPA 540/1-89/002)
- (b) Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program, June 1988 (NEESA 20.2-047B)
- (c) Public Health Assessment Guidance Manual, Agency for Toxic Substances and Disease Registry, 1994
- (d) Environmental Data Needed for Public Health Assessments, A Guidance Manual, Agency for Toxic Substances and Disease Registry [ATSDR], June 1994

**General Comment:** The draft document entitled "Remedial Investigation Report For Operable Unit No. 9 (Site 65), Marine Corps Base, Camp Lejeune, North Carolina," dated 17 November 1995 was provided to the Navy Environmental Health Center (NAVENVIRHLTHCEN) for review on 22 November 1995. The report was prepared for Atlantic Division, Naval Facilities Engineering Command by Baker Environmental, Inc.

**Review Comments and Recommendations:**

1. Page 1-3, Section 1.3, "Site Description and History"  
Page 4-7, Section 4.4.1, "Surface Soil"  
Page 4-15, Section 4.7.1, "Surface Soils"

**Comment:** Using historical information, the text indicates that petroleum, oil, and lubricant products (POL) reportedly were disposed of at Site 65. However, there is no discussion of past site-related disposal activities involving petroleum products or the location of disposal.

**Recommendation:** The text should describe the past site activities related to the reported disposal of petroleum products and provide sufficient explanations to support the site locations potentially impacted, if known.

2. Page 1-3, Section 1.4, "Summary of Previous Investigations"  
Figure 1-7, "Site Investigation Sample Locations (Baker 1994) Site 65 - Engineer Area Dump"

**Comment:** Reference (a) states that detailed sampling maps should be provided, indicating the location, type (e.g., grab, composite, duplicate), and numerical code of each sample. Figure 1-7 includes some, but not all sample locations for Site 65.

Recommendation: Include a detailed sampling map of all sample locations for Site 65 in this report.

3. Page 1-3, Section 1.4, "Summary of Previous Investigation"  
Page 4-7, Section 4.4, "Analytical Results"

Comments:

a. As noted in reference (b), five general levels of analytical options to support data collection are identified by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Three of these analytical levels, (i.e., C, D, and E), are used by the U.S. Navy as Quality Control (QC) requirements, of which Level D (Level IV) QC is used for sites on the National Priorities List (NPL). (Camp Lejeune was placed on the NPL on 4 October 1989). The laboratory that performs Level D QC must use the Contract Laboratory Program (CLP) methods and must be able to generate the CLP data package. The level of QC required at the site is decided by the Navy Engineer in Charge (EIC) or the Remedial Project Manager (RPM).

b. The text indicates that although Level D QC was used to support previous site investigations at Site 65, the recent Remedial Investigation/Feasibility Study (RI/FS) analytical support efforts were conducted using Level C QC. No explanation was provided to justify this change in QC requirements.

Recommendation: Consideration should be given to stipulating Level D QC for all future analytical needs, unless strong argument exists to justify a less stringent level of QC that allows the use of non-CLP methods.

4. Page 2-3, Section 2.1.1, "Surface and Subsurface Soils"  
Page 2-4, Section 2.1.2, "Exploratory Test Pit Investigation"  
Page 3-2, Section 3.3.2, "Site-Specific"

Comments:

a. The text discusses the surface soil sampling conducted at Operable Unit No. 9 (OU #9). The sample depth from which surface soil samples were collected is listed as 0 to 12 inches. USEPA guidance, such as reference (a), defines "surface soil" samples as samples taken from depths of zero to six inches. Reference (c) defines "surface soil" samples as soil samples collected from depths of zero to three inches below ground surface (bgs), and "subsurface soil" samples are defined as samples taken at depths greater than three inches. Future resampling efforts may be reduced with the adoption of zero to three inches as the norm for surface soil sample collection.

b. A single sample from each of the six test pits was pulled from the bottom of the excavation (the exact depth is not given). However, the report indicates that the test pits were commonly excavated to a depth of five to 15 feet bgs. No surface soil samples were collected for

the test pits. Justification for the elimination of the surface soil pathway was not provided. The report does state that "Samples were collected from the bottom of each excavation because no visually contaminated soils and/or positive PID [Photoionization Detector] readings were observed." In addition, we would like to stress that not all site contamination is visually detected. As recommended by reference (a), the surface soil pathway should be evaluated or sufficient evidence should be provided to justify elimination of this pathway.

c. Although drums were discovered in the test pits, no sampling was collected near the drum or at other debris locations. Areas where drums are discarded potentially may present a greater likelihood for contamination.

Recommendation: As per reference (c), adopt zero to three inches as the recommended depth for future surface soil sampling. The adoption of this sampling protocol will not be in controversy with current USEPA guidance, since reference (a) does direct that surface soil samples should be collected at the "shallowest depth practical" to accurately reflect potential surface soil exposure pathways. In addition, either evaluate the surface soil exposure pathway for the test pit locations or provide stronger justification for elimination of this pathway, as recommended by reference (a).

#### 5. Page 2-3, Section 2.1.1, Surface and Subsurface Soils"

Comment: According to the report, soil sampling protocols specified in the field sampling analysis plan (FSAP) were modified in the field to reduce the possibility of collecting an overabundance of unnecessary samples from shallow borings. For example, sampling intervals of ten feet of unsaturated soil conditions were used to locate the third sample from each boring/well cluster rather than at six feet of saturated soil, as stipulated in the FSAP. The report did not indicate who made the decision to modify the FSAP and whether potential hot spots of contamination may have been missed due to the smaller number of samples pulled.

Recommendation: Provide stronger justification to support the decision to modify the FSAP in the field to pull a smaller number of samples.

#### 6. Page 2-4, Section 2.1.3, "Analytical Program for Soils" Appendix D, "Chain of Custody Records"

Comment: According to reference (b), the laboratory personnel authorized to receive samples for analysis should sign and date the chain of custody forms provided. The forms in Appendix D were neither signed nor dated by the laboratory personnel. Although the text indicates that samples were sent via overnight courier, we were unable to verify that the sample holding times were met from the information provided in Appendix D. Internal laboratory sample tracking forms listing the date of sample analysis and the date of sample receipt by the laboratory should also be provided to aide in laboratory data validation efforts.

Recommendation: Ensure that chain of custody forms are signed and dated by the designated laboratory personnel for all future laboratory analysis and that copies are provided in the RI report.

7. Page 2-7, Section 2.3, "Surface Water/Sediment Investigation"

Comments:

a. The text states that "Sample 65SW/SD-07 was not collected because the drainage way was dry in the location that the sample was to be collected at the time of the sampling activities."

b. These surface water/sediment samples were to be collected from the marshy area adjacent to Courthouse Bay Pond and the drainage way leading from Courthouse Bay Pond in the southwestern direction, respectively. Reference (d) defines sediment to be "any solid material, other than waste material or waste sludge, that lies below a water surface; that has been naturally deposited in a waterway, water body, channel, ditch, wetland, or swell; or that lies on a bank, a beach, or floodway land where solids are deposited."

c. Reference (d) further indicates that contaminated sediments are not always found in constantly wet drainage areas. Many drainage ditches associated with releases are dry part of the year. To fully characterize the site, we feel that sediment samples should be collected from areas where there is a potential for human exposure (i.e., either direct or indirect, such as through the food chain route), regardless if the sampling locations are dry.

Recommendation: Reconsider sampling to determine if a release of contaminants has reached the nearby surface water bodies or provide stronger justification to rule out the need for these sampling data.

8. Page 3-7, Section 3.6, "Land Use and Demographics"  
Page 6-12, Section 6.3.2, "Current and Future Scenarios"

Comment: Recreational activities at Site 65 (other than fishing) where personnel could contact potentially contaminated site-related media were not discussed in the human health risk assessment (HHRA).

Recommendation: Recreational activities in and around Site 65, such as hunting, should be discussed in the HHRA, if applicable. This information is needed to develop a health risk assessment that will demonstrate those populations potentially at a higher risk.

9. Page 3-8, Section 3.8., "Water Supply"  
Page 6-12, Section 6.3.2, "Current and Future Scenarios"

Comments:

a. The text states on page 3-8 that "potable water for Marine Corps Base (MCB), Camp Lejeune is supplied entirely by groundwater." On page 3-9, it states that "five active wells are located within a one-mile radius of Site 65."

b. On page 6-12, the text states "presently, the groundwater at the site is not used for potable water." Although an "active well" is not located at Site 65, on page 3-8 it states that "All of the water supply wells utilize the Castle Hayne aquifer. The Castle Hayne aquifer is a highly permeable, semi-confined aquifer that is capable of yielding several hundred to 1,000 gallons per minute (gpm) in municipal and industrial wells in MCB, Camp Lejeune area." This statement makes us believe that possible contamination from Site 65 could impact the Castle Hayne aquifer, which is used for potable water. We realize that the **existing** ground water sampling data did not exceed the Chemical of Concern (COC) screening values for potentially carcinogenic and noncarcinogenic concentrations (RBCs) that are issued by USEPA Region III. Therefore, the contaminants were not retained for risk assessment, for routes of exposure involving future use of ground water. We do not feel enough information has been presented to adequately justify that site 65 will have no future impact on the Castle Hayne aquifer.

Recommendation: Provide justification for no future impact on the Castle Hayne aquifer from Site 65 or discuss the possibility of future impact on the potable water.

10. Page 4-2, Section 4.2.1, "Laboratory Contaminants"

Comment: The last sentence of the first paragraph in the section states that "To remove non-site related contaminants from further consideration, the concentration of the same chemicals detected in environmental samples." This sentence seems to be incomplete.

Recommendation: Complete sentence to clarify meaning.

11. Page 4-4, Section 4.2.2.2, "Groundwater"

Comments:

a. The text states that "groundwater samples were analyzed for total and dissolved metal parameters. The samples analyzed for total metal parameters were used in the risk assessment. One sample (10%) was analyzed for dissolved metals." The first statement says that groundwater samples were analyzed for dissolved metals. The next statement seems to say that only one sample was analyzed for dissolved metals.

b. The text states that “the concentrations for the dissolved metals were generally found to be higher than total metals, particularly for metals such as calcium, magnesium and sodium.” Calcium and iron were the only metals which exhibited lower results in the dissolved metals than the total metal. Theoretically, the inorganic metals should have been detected in the total (unfiltered) groundwater samples at a higher concentration than in the dissolved (filtered) samples. There is no discussion of the reason (i.e., sampling technique, contamination, well construction material) why the higher concentration of metals was found in the filtered samples.

Recommendations:

a. Clarify whether only one or all samples were analyzed for total and dissolved metal parameters. We agree with the use of unfiltered groundwater samples in the risk assessment, however, justification for excluding the dissolved (higher concentration) sample(s) from the risk assessment should be included in the text.

b. Discuss the reason(s) why most metals were at higher concentrations in the filtered rather than unfiltered samples.

12. Page 4-7, Section 4.4.41, “Surface Soil”  
Page 4-9, Section 4.4.3, “Test Pit”

Comment: The text on page 4-7 and page 4-9 discusses volatile organic compounds which were detected in surface and subsurface soil samples. Trichloroethene is one of the surface compounds and carbon disulfide is one of the subsurface compounds which were detected. Further in the text, it states that “these compounds are considered to be sampling or laboratory contaminants, since they are less than 10 times the maximum concentration detected in the QA/QC blanks.” Whereas acetone, 2-butanone (or methyl ethyl ketone), methylene chloride, toluene, and phthalate esters are considered by EPA to be common laboratory contaminants, trichloroethene and carbon disulfide are not frequently included within this group. Reference (b) provides specific guidance for chemicals considered common laboratory contaminants introduced into a sample set either in the field or within a laboratory setting.

Recommendation: Blank data should be compared with results from samples associated with the blank samples. If the blank contains detectable levels of one or more organic or inorganic chemicals that are not considered by EPA to be common laboratory contaminants, the site sample results should be considered as positive only if the concentration of the chemical in the site sample exceeds five times the maximum amount detected in any blank. Samples containing less than five times the amount of the chemical in any blank should be treated as non-detects. Recalculate the sample concentrations of trichloroethene and carbon disulfide compared to five times the blank concentration for an uncommon laboratory contaminant instead of ten times the blank for a common laboratory contaminant to see if trichloroethene and carbon disulfide should be considered chemicals of potential concern (COPCs).

13. Page 4-10, Section 4.4.4, "Groundwater"  
Page 4-13, Section 4.4.7, "Ecological"  
Pages 4-14, 4-15, Section 4.6, "Quality Assurance/Quality Control"

Comments:

a. The text states that "Given the fact that 1,2-dichloroethane was consistently detected at the same concentration [in eight of ten site-related samples and two trip blank samples], it is prudent to assume that the contamination did not originate from the site, but rather from the laboratory."

b. The text indicates that contamination in trip blank samples that are prepared by the laboratory typically indicate that either the source of the water used for the blanks or the analytical equipment used for the analysis is contaminated with volatile organics. A check of both the laboratory and the field QC procedures seems warranted.

c. It is relatively simple to check the laboratory water supply source for preparation of the trip blanks to rule out this type of contamination. Only organic free water is correct to use for blank preparation. Field equipment rinsate procedures should also be reviewed to eliminate sample cross-contamination from contaminated sampling equipment, as stipulated in the FSAP.

d. Because of the numerous references throughout the report to possible laboratory contamination, we feel that a review of the last laboratory QC audit should be initiated and a decision made to address these issues before additional analytical services are provided by this laboratory. If this contamination problem appears to only involve samples from Site 65, then this information may indicate that all site-related contamination issues have not been adequately addressed.

e. The statistical methods chosen to select sampling locations and sample depth issues already commented on the need for review to verify that a sufficient number of samples in the best sampling locations were taken to ensure a thorough investigation of Site 65 potential contamination.

Recommendations:

a. Review both the laboratory and the field QC procedures to detect possible contamination sources and eliminate them for future sampling efforts.

b. Review the methods chosen to determine sampling locations and evaluate whether all potential hot spots have been covered.



14. Page 4-11, Section 4.4.4, "Groundwater"  
Appendix M, "Evaluation of Metals in Groundwater"

Comment: The highest groundwater manganese concentration reported in the text conflicts with the data provided in Table 1 of Appendix M.

Recommendation: Clarify the groundwater metals data presented.

15. Page 4-16, Section 4.7.1, "Surface Soils"

Comment: According to the report, the material comprising the northern debris pile was removed during the field investigation by the field engineers that operate the heavy equipment within the training area. The final disposition of this material is not stated. The present location and status of this potentially contaminated debris pile should be documented in the text.

Recommendation: Provide additional information concerning the present location and status of the relocated debris pile. If the location is known, indicate if additional sampling is being considered.

16. Page 6-12, Section 6.3.2, "Current and Future Scenarios"

Comment: Since the public is allowed limited access to the two small ponds near Site 65 for fishing, there is the possibility children may accompany adults who are fishing. Children visiting the ponds may be exposed to site related chemicals by accidental ingestion of surface soil, surface water, sediment and/or dermal contact with surface soil, surface water, and/or sediment while they play at this site.

Recommendation: Include a recreational pathway for children who may be playing around the fishing ponds in the quantitative risk assessment, or present strong evidence for its exclusion.

17. Page 6-14, Section 6.3.4, "Quantification of Exposure"

Comment: The text states that "For exposure areas with limited amounts of data or extreme variability in measured data, the 95 percent UCL (upper confidence limit) can be greater than the maximum detected concentration. In such cases, the maximum concentration is used." We agree with the calculation of a Reasonable Maximum Exposure (RME) to estimate risk. However, we also feel the arithmetic average is the most representative of the concentration that would be contacted at a site over time and should also be calculated. An USEPA Deputy Administrator memorandum dated 26 February 1992 ("Guidance on Risk Characterization for Risk Managers and Risk Assessors") and an USEPA publication dated May 1992 ("Supplemental Guidance to RAGS: Calculating the Concentration Term") indicate that a single number used to represent the health risk to an individual or population may hamper the risk manager's ability to make an informed risk decision. Although the guidance discusses the concept at length, the

bottom line is that risk estimates for both the **upper bound (RME)** and **average case** should be presented. We fully endorse the USEPA's guidance for calculating quantitative risk estimates for the average case as well as the maximum value.

Recommendation: Future remedial investigations should provide quantitative risk estimates for the average as well as the RME value.

18. Page 7-25, Section 7.10, "Ecological Significance"  
Page 7-26, Section 7.10.1, "Aquatic Endpoints"

Comment: On page 7-25, it states that "Potential contamination from Site 65 to the ponds could result from two release mechanisms, surface soil runoff and/or groundwater recharge." The text further states that "it does not appear that any of the contamination detected in the surface water or sediment in either pond are related to Site 65." On page 7-26, it states that "Evidence of surface water runoff from the heavy equipment training area into this pond was apparent during the time of sampling." Page 7-25 and page 7-26 seem to provide contradictory information.

Recommendation: Clarify whether surface soil runoff impacts the contamination of the ponds.