

State of North Carolina  
 Department of Environment,  
 Health and Natural Resources  
 Division of Solid Waste Management

James B. Hunt, Jr., Governor  
 Jonathan B. Howes, Secretary



January 10, 1994

Commander, Atlantic Division  
 Naval Facilities Engineering Command  
 Code 1823-1

Attention: MCB Camp Lejeune, RPM  
 Ms. Linda Berry, P. E.  
 Norfolk, Virginia 23511-6287

Commanding General

Attention: AC/S, EMD/IRD  
 Marine Corps Base  
 PSC Box 20004  
 Camp Lejeune, NC 28542-0004

RE: Draft Remedial Investigation Report for Operable  
 Unit #5 (site 2)

Dear Ms. Berry:

The referenced documents have been received and reviewed by the North Carolina Superfund Section. Our comments are attached. Sections 6.0 and 7.0 are being reviewed by our Toxicologist and those comments will be provided to you as soon as they are completed. Please call me at (919) 733-2801 if you have any questions about this.

Sincerely,

*Patrick Watters*

Patrick Watters  
 Environmental Engineer  
 Superfund Section

Attachment

cc: Gena Townsend, US EPA Region IV  
 Neal Paul, MCB Camp Lejeune  
 Bruce Reed, DEHNR - Wilmington Regional Office

North Carolina Superfund Comments  
Camp Lejeune MCB Operable Unit 5  
Draft Remedial Investigation Report

1. Page ES-3

The paragraph on the Time-Critical Removal Action specifies a general benchmark risk-based concentration of 7,100  $\mu\text{g}/\text{kg}$  that corresponds to a  $1 \times 10^{-6}$  cleanup action level. The Time Critical Removal Action (TCRA) letter in Appendix B indicates that 7,100  $\mu\text{g}/\text{kg}$  (7.1 ppm) applies only to 4,4'-DDD. The (TCRA) letter also states that the corresponding action level for 4,4'-DDE and 4,4'-DDT is 5 ppm (5,000  $\mu\text{g}/\text{kg}$ )

2. Page 1-6, Section 1.3.2

The well construction details for the 5 shallow wells installed in July 1984 are not as detailed as those provided for the newer wells.

3. Page 2-16, Section 2.6

The last sentence of this section states that none of the listed contaminants of concern were detected in any of the soil gas samples for Site 2. A review of Tables 1 through 4 of Appendix E (Soil Gas Survey Report) appears to contradict this. These tables show numerous gas sample analytical results above the indicated reporting limit.

4. Page 2-21, Section 2.7.1

The figure identified as 2-8 in the last sentence of this section should be 2-7.

5. Page 4-5, Section 4.2.1.2

The reference to the State Drinking Water Standards should be the State Groundwater Standards (Title 15, Subchapter 2L).

6. Pages 4-24 through 4-36, Section 4.3

Based on the discussion in this section and the sample results shown on Figures 4-1 through 4-8, we have the following concerns regarding the defined extent of contamination. Further sampling may be needed to fully define the vertical and/or horizontal extent of contamination in these areas.

- It appears from Figures 4-2 and 4-3 that the surface soil pesticide contamination immediately surrounding the mixing/wash pad areas extends beyond the indicated sample locations.
- Figures 4-6 and 4-7 show that the sub-surface soil pesticide contamination immediately surrounding the mixing/wash pad areas extends beyond the indicated depths for some of the sample locations.
- Figures 4-12 through 4-14 show that there are a few areas of high pesticide contamination that extend beyond the indicated sediment sample locations and depths.

7. Page 4-29, Section 4.3.2  
The discussion on sources of groundwater contamination makes no mention of the geophysical anomaly ("large buried object") identified near well 2GW3 (Appendix A). The highest concentration of ethylbenzene and total xylenes were found at well location 2GW3. The connection between the groundwater contamination and this geophysical anomaly as a potential source (i.e. UST) may warrant further discussion and possibly some additional investigation. The possibility of USTs is acknowledged in Section 4.1.2 but with no mention of the geophysical study.
8. Page 4-35, Section 4.4, Last Paragraph  
The same comment as noted in number 7. There is no discussion of the geophysical anomaly around well 2GW3 as a potential UST source.
9. Page 5-9 and 5-10, Section 5.2.7  
The calculations for average linear velocity ( $V_x$ ) do not show the correct K value. For  $V_x = 8.3$  m/yr, the corresponding K value should be  $2.1 \times 10^{-5}$  cm/sec. Likewise, for  $V_x = 3.15$  m/yr, the appropriate K value should be  $8 \times 10^{-4}$  cm/sec.
10. Page 6-66, Table 6-1  
The column listing the No. of Positive Detects/No. of Samples for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT does not agree with the summary in Appendix H.1. The values noted in H.1 are 33/46, 38/46 and 40/46 respectively.
11. Figure 2-1, Appendix A  
This figure is difficult to interpret. It would help to include more Site 2 landmarks. Also, because the figure is reduced, the scale is no longer 1"=20'.
12. TCRA Letter, Appendix B  
Page 2 of this letter includes an estimate of soil volume impacted by pesticide contamination that uses a depth of 4 feet. The subsurface soil sample results show that the contamination is below this depth in many locations. Also, it would be helpful to have a figure showing the location of the areas (i.e. the 94'x47' and the 157'x46' rectangles) being considered for the TCRA in relationship to the mixing/wash pads.
13. Soil Gas Survey Report, Appendix E  
Our copy of Figure 5-2 of this report does not fold out to show the soil gas survey sampling locations.



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

## REGION IV

345 COURTLAND STREET, N.E.  
ATLANTA, GEORGIA 30365

January 18, 1994

4WD-OHA

MEMORANDUM

**SUBJECT:** Risk review comments on human health aspects, MCB Camp Lejeune NPL Site

**FROM:** Kevin P. Koporec, Toxicologist  
Office of Health Assessment *KPK*

**THRU:** Elmer W. Akin, Chief  
Office of Health Assessment *EWA*

**TO:** Gena Townsend, RPM  
Federal Facilities Branch

Per your request, I have reviewed the draft Remedial Investigation document for the Operable Unit #5 (Site 2) at the MCB Camp Lejeune, North Carolina NPL Site. My comments provided below are divided into two sections, i.e., (1) comments specifically to you the RPM and (2) comments that, if you concur, can be conveyed verbatim to the party responsible for preparation of the document. To facilitate the verbatim conveyance, I will be pleased to provide on request a copy of this memo via cc: mail.

General Comments to the RPM

It is the policy of the EPA Region IV Office of Health Assessment to require written responses to review comments provided by this office before any meeting held to discuss these comments. We also request that any risk assessment comments received from the State or any other source be provided to the Office of Health Assessment for our site file. If risk comments from sources other than this office are forwarded to the PRP contractor, the source should be clearly identified unless concurrence of this office is sought. In this case, we should formally review these comments and provide you with our response before they are forwarded.

Comments to be Conveyed to the Document Preparer

1. Page ES-2, second bullet - "Pesticide contamination was...less than 100 µg/kg...throughout the remainder of Site 2."  
Does this value of 100 refer to total pesticides or to one particular compound? Please clarify. It should be noted

- that risk values cannot be determined with total pesticide data.
2. Page ES-3, last paragraph - "The benchmark risk-based concentration is a value (7100 µg/kg) that equates to a  $1 \times 10^{-6}$  cleanup action level."  
On what chemical(s) is this soil/sediment concentration based? Also, " $1 \times 10^{-6}$ " is a risk level, rather than a "cleanup action level".
  3. Page 2-14 (Sections 2.5.1, 2.5.2.1) - Line 2 of this page refers to "surface (ground surface to one-foot)"; in the next section, toward the bottom of the page, "Surface (0 to 6 inches bgs)" is mentioned. This discrepancy should be addressed. EPA Region IV generally considers any soil samples taken in the 0 to 12 inch interval as surface for direct exposure risk assessment purposes; however the contamination may be expected to remain in the first few inches bgs unless fill has been placed over the surface since the contamination occurred.
  4. Page 4-6, top of page - EPA does not agree with the statement that "as a general approximation, inorganic parameters detected below these levels [drinking water standards] are assumed to be naturally occurring elements." The elements are naturally occurring, but this statement incorrectly implies that any concentration below the drinking water standard is naturally occurring. This statement should be deleted. It should be noted that "naturally occurring" levels are determined by sample concentrations from background locations.
  5. Page 6-4 - There is an error in the discussion of the AWQC. The second value of the AWQC for protection of human health is based on ingestion of aquatic organisms alone (rather than on ingestion of water alone).
  6. Pages 6-3, 6-20, 6-21 (text); Tables 6-4, 6-7, 6-10, 6-13, 6-14; all other uses and references to the risk-based concentration values - Risk-based concentration values (RBCs) based a hazard quotient of 0.1 (not 1.0) should be used in selection of Chemicals of Potential Concern (*Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening*, U.S. EPA Region III, January 1993). The Region III October 1993 Update (based on HQ of 1.0) referred to in this report does not update the Region III January 1993 Table (based on HQ of 0.1). It should be noted that Region III's RBC Table has not been approved Agency-wide for risk-based screening; however Region IV approves its use for the chemicals detected at this particular operable unit. Using RBCs based on HQ of 1.0 may not be adequately protective because of

multiple toxicants and exposure routes. Table 6-14 has some groundwater concentrations which will result in retention of additional chemicals as COPCs when compared with the HQ-0.1-RBCs. It appears that selection of COPCs for other exposure media are not affected by the use of HQ-0.1-RBCs.

7. Page 6-7, paragraph 3 - The reasons given for elimination of toluene are not acceptable; however it could be eliminated based on comparison with its risk-based screening concentration (RBC). Xylenes could also be eliminated based on comparison with its RBC. Correct this text accordingly.
8. Page 6-24; Tables 6-18, 6-20 - EPA Region IV policy for comparison with background (or control) concentrations for selection of COPCs is that two times the average background (not two times the maximum background) concentration be compared to the maximum site concentration.
9. Pages 6-25, 6-26; Table 6-21 - Eliminating chemicals detected in sediment from the COPC list "because they are not believed to be present due to site related activities" is not acceptable. Comparison with RBCs (as in Table 6-19) is an acceptable criterion for the COPC determination.
10. Page 6-34, last paragraph; Table 6-25; Appendix O - For the dermal absorption factor, EPA Region IV recommends default values of 0.01 (1.0%) and 0.001 (0.1%) for organic and inorganic compounds, respectively (see attachment). The percent values are listed in Table 6-25 (without a percent notation); the risk calculation spreadsheets in Appendixes O.2.2, O.2.10 appear to have used the incorrect value, resulting in dermal risks and HQs that are 100-fold too high. Please check all calculations involving risks from dermal exposure and amend all affected tables in Section 6 of the report.
11. Pages 6-35, 6-36 - The CDI equation for Inhalation of Particulates has omitted the chemical-soil concentration term. Units shown for the 1/PEF term on page 6-35 ( $\text{mg}/\text{m}^3$ ) do not agree with units shown on the following page ( $\text{kg}/\text{m}^3$ ). The latter units are correct.
12. Page 6-40 - The "C" term in the equation for inhalation of volatile organics while showering should be defined as "Contaminant concentration in air ( $\text{mg}/\text{m}^3$ )".
13. Page 6-41 - The exposure time for the shower scenario should be 0.25 hour (not minutes) per day.
14. Page 6-42 - Ingestion of surface water while performing maintenance activities in ditches at Site 2. Since this

4

- activity does not actually involve swimming (water in the ditch is intermittent and shallow), I would recommend use of less conservative "default" assumptions for the ingestion rate (IR) and exposure time (ET) terms. I believe that a IR of 0.01 liters per hour and a ET of 1 hour per event would be more reasonable assumptions. I also recommend that this lower IR value be assumed for the future resident.
15. Page 6-64, last sentence of second paragraph - Uncertainty associated with the Toxicity Assessment. The language here misrepresents EPA's position on toxicity from dermal exposure. Please edit to read: "Adjusting oral toxicity values for the dermal contact exposure route may not accurately describe the potential risk of a chemical, since the same systemic toxic effects may not occur from the oral and dermal exposure routes."
16. Table 6-1 - A "range" of positive detections is shown for DDT, but the frequency column lists only one detection. Address this discrepancy.
17. Table 6-30, Toxicity Factors; Appendixes 0.2.3, 0.2.6 - Units should be shown at the top of each column (Table 6-30). All the values within each column should be in the same units- Values for inhalation slope factor are not all in the same units. This results in miscalculation of risks from inhalation exposures in Appendix 0.2.3 because the exposure is in units of mg/kg-day, but the cancer slope values used are in units of  $(\mu\text{g}/\text{m}^3)^{-1}$  for some chemicals. Also, RfCs must be converted into inhalation reference doses since the calculated exposure is in units of mg/kg-day (Appendix 0.2.6).  
Toxicity values which should be corrected or added:  
2-Methylnaphthalene- use naphthalene as a surrogate (RfD =  $4\text{E}-2$  mg/kg-d);  
Phenanthrene- use pyrene as a surrogate (RfD =  $3\text{E}-2$  mg/kg-d);  
Chlordane- inhalation unit risk currently on IRIS, which converts to an inhalation slope factor equal to the oral slope factor [ $1.3$  (mg/kg-d) $^{-1}$ ];  
Arsenic- what is the source of the "child" slope factor for oral exposure? The WOE for arsenic says  $A_1$ , but the "A" WOE is for the oral route as well.  
Barium- source for RfC value is HEAST (March 1993);  
Lead- WOE is B2 (IRIS, 1993);  
Manganese- RfC =  $5\text{E}-5$ mg/m<sup>3</sup> (IRIS, 1993).

5

18. Appendix O.2.1. Ingestion of Soil - On the spreadsheet for ingestion of soil by the residential child at the lawn/mixing pad area, there appear to be errors in the calculated risk values shown for DDE and DDT. Please check and amend all affected tables in section 6 of the report.

If further questions arise, I can be reached at 347-1586.





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.  
ATLANTA, GEORGIA 30365

January 24, 1994

OPTIONAL FORM 88 (7-90)

FAX TRANSMITTAL

# of pages 5

**CERTIFIED MAIL**  
**RETURN RECEIPT REQUESTED**

4WD-FFB

Ms. Linda Berry  
Department of the Navy - Atlantic Division  
Naval Facilities Engineering Command  
Code 1823  
Norfolk, Virginia 23511-6207

|                                 |                           |
|---------------------------------|---------------------------|
| TO<br>LINDA BERRY               | FROM<br>GENA TOWNSEND     |
| Dept./Agency<br>NAVAL FAC ENGR  | PHONE #<br>(404) 347-3016 |
| FAX #<br>(804) 322-4805         | FAX #<br>(404) 347-5205   |
| GENERAL SERVICES ADMINISTRATION |                           |

SUBJ: MCB Camp Lejeune - OUS  
Draft Feasibility Study

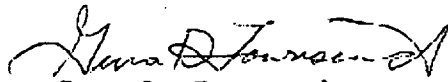
Dear Ms. Berry:

The Environmental Protection Agency (EPA) has partially completed its review of the "Draft Feasibility Study, Operable Unit 5, Site 2, dated December 21, 1993. Comments are enclosed from EPA (general review) and Dynamac (oversight contractor). Comments from the Risk Assessment Section will be forwarded as soon as possible.

Please keep in mind that some of the conclusions used in developing the feasibility study are being questioned at the remedial investigation stage. This may require a recalculation of the remedial alternatives.

If there are any questions or comments, please call me at (404) 347-3016.

Sincerely,

  
Gena D. Townsend  
Senior Project Manager

Enclosure

cc: Mr. Neal Paul, MCB Camp Lejeune  
Mr. Patrick Watters, NCDEHNR

### 1.0 GENERAL COMMENTS

The Draft FS provides an adequate evaluation of potential remedial alternatives that may be appropriate for treating contaminated groundwater at Camp Lejeune. Furthermore, the Draft FS adequately follows the guidelines for conducting a feasibility study as set forth in the above-referenced EPA guidance document and provides reasonable costs for each remedial alternative. However, due to some issues in the Draft FS which are unclear, Dynamac Corporation developed the following general comments from its review of the Draft FS.

1. Based on results from the remedial investigation (RI), the Draft FS states that groundwater contamination is limited to the vicinity of the Former Storage Area. However, the extent of groundwater contamination has not been determined at Site 2. Although groundwater flow direction data is inconclusive, interpretations presented in the Draft RI Report dated December 1993, indicate that flow is generally east. The RI results indicate that the mixing pad area contains the most highly contaminated soils at Site 2. Therefore, until additional monitoring wells are installed downgradient (east) of the mixing pads, the extent of groundwater contamination at Site 2 will not have been determined.
2. The use of "two times the maximum background concentration" to screen contaminants of potential concern (COPC) contradicts current EPA guidance and is unjustified. Under EPA's reasonable maximum exposure approach, contaminant levels should be compared to two times the average background concentrations, not two times the maximum background concentrations. Comparing COPC concentrations to the "artificially" elevated background levels used for screening could result in incorrectly eliminating some COPCs and subsequently underestimating the potential health risks associated with these COPCs.

## 2.0 SPECIFIC COMMENTS

The specific comments are listed on the following pages in the order of their occurrence in the Draft FS. The comments are organized by page number, paragraph number, figure and/or table number as appropriate.

1. Page ES-1, General:  
A list of acronyms should be included between the Table of Contents and the Executive Summary for reference.
2. Page EG-5, Paragraph 4:  
The text states that "contaminant concentrations detected in the groundwater were compared to the preliminary remediation goals presented on Table ES-1. The contaminants which exceeded at least one of the remediation goals have been retained as [contaminants of potential concern] COPCs." The only contaminants shown to have been retained are ethylbenzene, trichloroethene and total xylenes. However, this list is inconsistent with the text on page 2-7, paragraph 5, which states that "the main groundwater contaminants of concern are naphthalene, acenaphthalene, trichloroethene, ethylbenzene, xylene (total), 4,4'-DDD, 4-4'-DDT, phenol, 2,4-dimethylphenol, arsenic, and lead." Furthermore, concentrations of chromium also exceeded at least one of the remediation goals and should therefore be retained as a COPC. These discrepancies should be clarified.
3. Page ES-6, Table ES-1:  
The "J" qualifier should be defined in the footnotes. Also, Table ES-1 has the same title as Table 2-7 on page 2-23, yet the two tables. These inconsistencies should be addressed.
4. Page 1-2, Paragraph 6:  
The text states that following the Time Critical Removal Action (TCRA), "the only remaining COPCs will be organic contaminants in groundwater." Explain why chromium and lead are not considered COPCs. Also, until monitoring wells are installed downgradient of the mixing pad area, the nature and extent of contamination will not have been determined. See General Comment No. 1.
5. Page 1-3, Paragraph 1:  
The text states that subsequent to the TCRA, "it is anticipated that no human health or ecological risks will exist." Confirmatory sampling must be performed to demonstrate that no risk will exist.

6. Page 1-7, Paragraph 4:  
The text states that trace amounts of pesticides were detected in only one well (2GW1). However, no monitoring wells are located immediately downgradient of the mixing pads to confirm the nature and extent of contamination.
7. Page 1-9, Paragraph 5:  
The text states that the area of highest volatile organic compound contamination is at monitoring well 2GW3. Additional monitoring wells are needed downgradient of this well, however, to determine the extent of contamination in the vicinity of the former Storage Area.
8. Page 1-14, Figure 1-3:  
Explain how the areas to be removed in the TCRA were determined. A map or figure showing soil sampling locations with concentrations in these cross-hatched areas would be helpful in evaluating the TCRA area.
9. Page 1-16 through 1-29, Tables 1-2 through 1-16:  
In these tables, several inorganic compounds show concentrations above "twice the base-specific maximum concentration," such as aluminum, barium, chromium, lead, magnesium, manganese and zinc. Explain why these constituents were not listed as COPCs.
10. Page 1-21, Table 1-7:  
The table indicates that BTEX compounds were found. Benzene was not listed as a contaminant, the list only contains (TEX). The text states that it is uncertain of the origin of the contamination and labeling it BTEX can give a false representation.
11. Pages 1-30 and 1-31, Tables 1-16 and 1-17:  
The cleanup level units should be milligrams per kilogram, not milligrams per liter.
12. Page 2-0, Paragraph 2:  
The text states: "The general approach used for development of groundwater containment and treatment scenarios in the FS was to estimate the downgradient edge of contaminated areas based on available information while making only limited assumptions concerning any upgradient extent of contaminant plumes." Yet, there is an insufficient number of downgradient wells to accurately estimate the downgradient edge of the contaminated groundwater. See General Comment No. 1.

13. Page 4-6, Paragraph 1:

The text states that "residuals generated from the pretreatment system such as sludges will need to be tested and disposed of properly. Based on the metals concentrations of the residuals, disposal may be at an off-site landfill." Explain how these options were figured into the cost estimate since it is not clear whether disposal will be at an offsite landfill or whether testing will be required.

14. Page 4-12, Paragraph 1:

The text states that soil vapor extraction (SVE) "is an in situ soil and groundwater remediation process." Furthermore, the text states that "there are various names used for this process, including air sparging, soil venting, in situ volatilization and vapor extraction." These statements imply that these remedial technologies are equivalent. However, there are significant differences between SVE, air sparging and soil venting. First, SVE is used as an in situ soil remediation process since it removes contaminated vapors from the vadose zone. In order to remediate the groundwater, other technologies must be used in conjunction with SVE, such as air sparging. Air sparging is technology in which air is pumped into the groundwater causing the organic compounds to volatilize into the vadose zone. Once in the vadose zone, the vapors can be removed using technologies such as SVE or soil venting. Furthermore, while the name "soil venting" might be used synonymously for SVE, technically, the two are slightly different. Normally, SVE is classified as an active vapor extraction system whereby a vacuum pump is used to draw the vapors out of the ground. Soil venting typically is classified as a passive extraction system, which can simply be a pipe installed into the ground to passively allow vapors in the vadose zone to slowly escape into the atmosphere or some type of containment device. Technically, then, there are two in situ treatment technologies being proposed: air sparging and SVE.