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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

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

September 5, 1995

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

4WD-FFB

Ms. Katherine Landman  
Department of the Navy - Atlantic Division  
Naval Facilities Engineering Command  
Code 1823  
Norfolk, Virginia 23511-6287

SUBJECT: Draft Remedial Investigation  
Operable Units 8 & 11  
MCB Camp Lejeune, North Carolina

Dear Ms. Landman:

The Environmental Protection Agency (EPA) has partially completed its review of the above subject documents. Comments are enclosed. Risk Assessment comments will be forwarded as soon as possible. As in the past, comments received from the "Risk Reviewers" will probably be editorial in nature and won't change the plan of action.

If there are any questions or comments, please call me at (404) 347-3016 or voice mail (404) 347-3555 x-6459.

Sincerely,

A handwritten signature in cursive script, appearing to read "Gena D. Townsend".

Gena D. Townsend  
Senior Project Manager

Enclosure

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

**OPERABLE UNIT 8**

## General Comments

1. Section 2.1, Page 2-1, Paragraph 4, indicates that Phase I included an initial survey of sampling locations, and Phase II included a survey of existing sampling locations and monitoring wells. However, a geophysical investigation was not conducted to (1) determine the true dimension of the landfill; (2) identify the location of potential buried drums; (3) aid in determining the depth of the debris; and (4) aid in determining the best sampling locations before another unlined landfill investigation. The site survey should have included a geophysical investigation during Phase I.
2. Section 2.3, Page 2-5, Paragraph 7, Sentence 4, states that monitoring wells 16-MW02 through 16-MW04 were installed downgradient of Site 16. According to Figure 2-3 which depicts the location of monitoring wells at Site 16, monitoring well 16-MW04 is located approximately 400 feet from the site boundary. However, this monitoring well is too far from the site. The distance may affect the determination of the contamination plume.
3. Section 3.4.1 states that the Castle Hayne Aquifer exists below the surficial aquifer and that leakage occurs across and around the clay layers between the aquifers. However, Section 2 states that only shallow groundwater wells were installed as part of this investigation. In order to determine the vertical extent of groundwater contamination, wells must also be screened in the Castle Hayne Aquifer.
4. Figure 3-5 depicts the location and elevation of groundwater during the December 11, 1994, drilling. Figure 3-5 shows that these wells were screened below the water table. However, seasonal variation was not taken into account during the placement of the screen. According to Section 1.5 (Data Limitations), one of the criteria for placing the monitoring well is an investigation of the shallow aquifer. The placement of the screen in these monitoring wells does not capture NAPL constituents in the shallow aquifer. Monitoring wells in a landfill investigation should be screened to intersect the water table and be placed in a location that will allow for seasonal variation without having the water table above the screen at any time of the season.
5. Figures 4-1 through 4-10 show positive detections of constituents of concern at Site 16. However, the figures are unclear, making it difficult to see the migration of the

plume. Isoconcentration maps contouring the horizontal distribution of contamination and the most widely distributed contaminant should be included for clarity. These maps should be developed for each medium: soil, groundwater, surface water/sediment.

6. Section 4.5.2.2, Page 4-14, only discusses iron detected during Round Two Sampling. However, the groundwater's low pH levels are not addressed. The average pH level in Round Two Sampling is 4.89 which is lower than the average 5.54 in Round One. The text should explain why the groundwater pH is at such a low level when EPA requires a level of 6.5-8.5 (EPA, 1993).
7. Section 4.5.3, Page 4-14, Paragraph 4, indicates that the site may be the source of arsenic detected in Northeast Creek. However, the text does not indicate any site activities which could have resulted in high levels of arsenic detection in Northeast Creek. The text should describe the site activities related to arsenic contamination.
8. Section 4.6, Page 4-14, Paragraph 8, states that wide distribution and concentrations of inorganics, similar to Base background levels and those detected in other areas of the base, indicate they are not site related, but naturally occurring. However, the text is ambiguous in its comparison of inorganics and Base background levels. Most inorganics exceed the Base background levels in surface soil (see Table 4-5) which does not necessarily make them similar. In fact, the data in Table 4-5 may suggest that inorganic contaminants are site related, not naturally occurring. The text should be revised accordingly.
9. Section 5.2, Page 5-2, Paragraph 5, Bullets 1 through 7, identifies seven potential contaminant transport pathways. The text later states that subsequent paragraphs describe the potential transport pathways. However, the following paragraphs (Sections 5.2.1 through 5.2.5) only address five transport pathways. The other two transport pathways for migration of contaminants, in surface water and groundwater discharge to surface water body, are not discussed. The text should be revised to provide descriptions of these two transport pathways.
10. Section 5.2.4, Page 5-6, Paragraph 4, concludes the discussion of the general processes which influence the aquatic fate of contaminants at Site 16 by referencing Table 5-2. However, the text offers no interpretation of the table nor provides sufficient explanation to substantiate its argument. The text should be revised accordingly.

11. Section 8, Page 8-1, lists conclusions based on the results of this Remedial Investigation (RI), but this section is incomplete. According to EPA Guidance, recommendations for future work and recommended remedial action objectives must be included in the list of conclusions (EPA, 1988). The text should be revised accordingly.
12. Section 8, Page 8-1, draws various conclusions from the RI and the human health and ecological risk assessment. However, the text lacks references to tables, figures, and comparisons to support these conclusions. The conclusion summaries should be revised to provide reference data that support the results of the investigation and conclusions drawn from the report.
13. This document should use EPA Region 4 Sediment Screening Values instead of criteria by Long and Morgan. However, the use of Region 4 Screening Values should not change the conclusions drawn. Several tables and figures would change if Region 4 values were used.

## Specific Comments

1. Executive Summary, Page ES-4, Paragraph 4.  
The text states that there are potable water supply wells within a one-mile radius of the site. However, the text does not identify the number of potable water supply wells. The text should be revised to state that there are five potable water supply wells within a one-mile radius of the site.
2. Figure 1-3.  
The figure contains a legend, but there are no signs and symbols in the Legend Box. All symbols on the figure that require an explanation should be defined in the Legend Box.
3. Section 2.2.2, Page 2-4, Paragraph 4.  
The text states that test pits were excavated within the boundary of the study area to determine if any remaining trash or debris was present. However, the location of the test pits was based on the physical sighting of debris and not the geophysical survey. There may be other areas within the site that contain large amounts of unburned debris, such as drums or containers, that require trenching investigation.
4. Section 2.2.2.2, Page 2-5, Paragraph 6.  
The text states that several air monitoring and field screening procedures were implemented during drilling. However, the text only identifies one instrument utilized. The text should identify all instruments used during drilling activities.
5. Section 2.7, Page 2-9, Paragraph 3.  
The text lists procedures required for decontamination of sample collection equipment. However, the listed cleaning procedures do not follow the EPA SOP for Region IV (EPA, 1991). The following procedures should be included as decontamination steps.  
Clean with tap water and laboratory detergent.  
Rinse with tap water.  
Rinse thoroughly with deionized water.  
Rinse twice with solvent.  
Rinse thoroughly with organic free water and allow to air dry as long as possible.  
Wrap with aluminum foil, if appropriate.
6. Section 3.  
Table 3-4 describes land uses in the developed areas of Camp Lejeune. Two columns are labeled "CO" and "CM". However, these acronyms are not defined in the document. These acronyms should be added to the list of acronyms or

explained in a table footnote.

7. Figure 3-4.  
The figure contains a legend, but it does not define the symbols on the map. All symbols on the map should be defined and identified on the Legend.
8. Page 4-3, Section 4.2.2.1, Paragraph 1:  
The text states that all organic contaminants that are not common laboratory contaminants and are detected in surface and subsurface soil samples are probably attributable to activities within or near OU 8. This evaluation of the organic contamination at OU 8 is not specific enough to determine the source of organic contamination. Therefore, soil samples containing organic contaminants should be compared to background or control samples in order to verify that OU 8 is or is not the source of organic contamination.
9. Page 4-5, Section 4.3:  
The state and Federal criteria and standards used to screen contaminant levels in all media are discussed in the paragraph; however, the EPA Region III Risk-Based Concentrations Table is not discussed. A brief description of the EPA Region III Risk-Based Concentrations Table should be included.
10. Section 4, Table 4-5.  
Table 4-5 (Groundwater Round 1) lists phenol naphthalene as a contaminant (column 3, row 3). However, the text provides no information or data for this contaminant. The text should be revised to include information and data for phenol naphthalene.
11. Section 5.3.2, Page 5-7, Paragraph 5, Sentence 5.  
The text states: "The presence of PAHs in the soil may be the result of aerially deposited material, and the chemical and biological conditions in the soil which result in selective microbial degradation/breakdown". However, this statement is unclear and hard to follow. The text should be revised accordingly.
12. Section 5.2.4, Page 5-4, Paragraph 4, Sentence 3.  
The text states: "The travel time to reach Northeast Creek could be anywhere from 5 to 45 years depending where the exchange would occur and assuming no attenuation of contaminants in the saturated zone by absorption-desorption processes". However, there are no references or calculations in this section to support this conclusion. The text should be revised to include references or calculations.
13. Page 7-13, Threatened and Endangered Species, Paragraphs 3

and 4:

The habitats of the red-cockaded woodpecker and the American alligator are discussed in the paragraphs; however, the paragraphs do not state whether the habitats include all or portions of OU 8. Clarify whether the habitats of the red-cockaded woodpecker and the American alligator include all or portions of OU 8.

## OPERABLE UNIT 11

1. According to the text, Site 7 was divided into four areas of concern (AOCs): Community Center Area, East Area, North Area and Southwest Area. To determine if an adequate number of soil samples have been collected at each AOC, these AOCs should be shown on the sample location maps.
2. The boundary of the Tarawa Terrace Dump is not provided in the site location maps. Please include the boundary in these maps.
3. The methods of evaluating current military residents exposed to surface water and sediment via ingestion and dermal contact are discussed in sections 6.3.4.7, 6.3.4.8, 6.3.4.9 and 6.3.4.10; however, Section 6.3.2.4 of the exposure assessment states that only future residential children and adults will be assessed for exposure to surface water and sediment. Edit Section 6.3.2 to indicate that current military residents are also evaluated for exposure to these media.
4. Dieldrin was detected above screening levels in surface water and sediment samples collected from the drainage ditch and marsh areas. The samples were collected in order to assess the ecological impacts of contaminants from Site 7. The ecological risk assessment, page 7-34, paragraph 3, states that the pesticides detected in the surface water and sediment samples are likely associated with the historical use of pesticides at MCB Camp Lejeune, as discussed in Section 4.0. Base-wide contamination from 4,4'-DDT, 4,4'-DDE and 4,4'-DDD is discussed in Section 4.5.4; however, base-wide dieldrin contamination is not discussed. In addition, dieldrin was not detected in background surface water and sediment samples. Therefore, the dieldrin detected in the Site 7 surface water and sediment samples appears to have originated from a point source and should not be ruled out as a contaminant of concern for ecological receptors at the site.

## 2.0 SPECIFIC COMMENTS

1. Page 6-12, Section 6.3.2.2:  
The paragraph describes the exposure assessment for subsurface soil. The text states that the only receptors available to subsurface soil are construction workers, but evaluates only the dermal contact and ingestion exposure routes for the construction worker scenario. Fugitive dust and volatilized contaminants from excavation activities are also a threat to the construction worker via the inhalation route of exposure; therefore, the exposure assessment for construction workers exposed to subsurface soil should

include the inhalation exposure route.

2. Page 6-20, Section 6.3.4.6, Paragraph 1:  
The Foster and Chrostowski inhalation model is discussed in the paragraph. However, the parameters, assumptions and calculations of the model as applied in this Draft RI Report are not included in the text. In order for the validity of the model to be expeditiously verified, provide the parameters, assumptions and calculations of the Foster and Chrostowski inhalation model in Section 6.3.4.6, or refer to location in appendix where this information can be found.
3. Page 6-18, Section 6.3.4.3, Future Onsite Residents, Paragraph 2:  
The inhalation rate (IR) for adults and children is given as 0.6 cubic meters per hour. However, adults and children breathe at different rates, as shown by the IR values given in Section 6.3.4.3 (20 cubic meters per day for adults and 10 cubic meters per day for children). Add justification for the 10 m<sup>3</sup>/day for children.
4. Page 6-21, Section 6.3.4.7, Paragraph 1:  
The calculation for CDI shown in Section 6.3.4.7 includes the number of days per year (DY) in the denominator, along with the averaging time (AT). The AT term in the other CDI calculations in the Draft RI Report takes into account the number of days per year. In order to make AT a consistent parameter throughout the Draft RI Report, define the AT as the averaging time in days and delete DY from the calculation.
5. Page 6-22, Section 6.3.4.8, Paragraph 1:  
The calculation for quantifying the CDI of surface water via dermal contact is discussed in the paragraph. However, it appears that the calculation for the CDI of soil or sediment and not surface water was actually presented. Use the correct equation in the paragraph.
6. Page 6-23, Section 6.3.4.8, Future Onsite Residents, Paragraph 1:  
The values for dermal surface area exposed to surface water during recreational activities is given in the paragraph; however, the values, 2,100 cm<sup>2</sup> for children and 8,300 cm<sup>2</sup> for adults, include only the surface area of the hands, forearms and lower extremities. The correct dermal surface area values should include the entire surface area of the body and should be 8,200 cm<sup>2</sup> for children and 18,200 cm<sup>2</sup> for adults.
7. Page 6-29, Section 6.5.1.2:  
It is reported in the section that the incremental cancer risk (ICR) value for future residential adults is within

EPA's acceptable risk range. EPA's acceptable risk range for the ICR is defined as less than  $1 \times 10^{-4}$ . Table 6-25 shows that the ICR calculated for future residential adults exposed to groundwater is  $1.6 \times 10^{-4}$ , which is above the acceptable EPA limit. Clarify this discrepancy.

8. Page 7-15, Threatened and Endangered Species, Paragraphs 3 and 4:  
The habitats of the red-cockaded woodpecker and the American alligator are discussed in the paragraphs; however, the paragraphs do not state whether the habitats include all or portions of Site 7. Clarify whether the habitats of the red-cockaded woodpecker and the American alligator include all or portions of Site 7.
9. Table 1-2 lists EPA MCLs for detected contaminants in groundwater during the 1991 investigation. However, the MCLs for a number of the contaminants are not quoted correctly according to EPA guidances (EPA, 1993 & 1994).
10. Figures 4-1 through 4-10 depict positive detections of constituents of concern at Site 16. However, the figures are unclear, making it difficult to see the migration of the plume. Isoconcentration maps, contouring the horizontal distribution of contamination and the most widely distributed contaminant, should be included. These maps should be developed for each medium: soil, groundwater, surface water/sediment.
11. Section 4 and the analytical results in Tables 4-1 through 4-9 show that cyanide was not included in the 23 inorganics which were selected for laboratory analysis of surface and subsurface soil samples during the 1994 investigation. However, cyanide as a contaminant was detected in both surface and subsurface soil samples at a 100% positive detection frequency during the 1991 investigation (see Table 1-1). There is no explanation why cyanide was excluded from the list of inorganics in the 1994 investigation while other contaminants remained. This report should give a reason why cyanide was excluded in the list of inorganics for the 1994 investigation.
12. Section 4.6, Page 4-15, Paragraph 1, summarizes such issues as pesticides, PCBs, organics and inorganics. However, the text does not address low pH levels found during the investigation. Table 4-13 shows that wells 7-MW02 and 7-MW04 have pH levels below 5 which is far below EPA standard of 6.5 - 8.5 (EPA, 1993). The text should be revised to address the issue of low pH levels.
13. Section 4.6, Page 4-15, Paragraph 2, states that wide distribution and concentrations of inorganics similar to

Base background levels and those detected in other areas of the base, indicate that they are not site-related, but naturally occurring. However, the text is ambiguous in its comparison of inorganics and Base background levels. Most inorganics exceed the Base background levels in surface soil (see Table 4-5) which does not necessarily make them similar. In fact, the data in Table 4-5 may suggest that inorganic contaminants are site related, not naturally occurring. The text should be revised accordingly.

14. Section 8, Page 8-1, in Conclusion No. 5, the text indicates that the organics in surface and subsurface soil exceeding the base background levels do not suggest a gross inorganic contamination problem in either the surface or subsurface soil. However, this report does not present adequate discussion and explanation which supports the conclusion given above. In Section 5.3.4, the text suggests that due to low pH, some of the inorganics in the surface soil may be relatively mobile and migrate towards the groundwater. This statement does not support Conclusion No. 5 either. The text should be revised accordingly.
15. Section 8, Page 8-1, draws various conclusions from the Remedial Investigation and the human health and ecological risk assessment. However, the text lacks references to tables figures, and comparisons to support these conclusions. The conclusion summaries should be revised to provide reference data that support the results of the investigation and conclusions drawn from the report.

## Specific Comments

1. Executive Summary, Pages ES-2 and ES-4, Paragraph 5.  
The Executive Summary states that a total of 35 surface soils samples and a total of 28 subsurface soil samples were collected at Site 7 during the soil investigation (Page ES-2). However, later the text states that a total of 32 surface soil and 30 subsurface soil samples were collected at Site 7. The numbers are contradictory. The discrepancy should be corrected, and the text should be revised accordingly.
2. Section 1, Table 1-2.  
For the contaminant chromium, the text shows 1,000  $\mu\text{g/L}$  as U.S. EPA MCL. However, the MCL for chromium should be 100  $\mu\text{g/L}$  (EPA, 1994). The text should be revised accordingly.
3. Section 1, Table 1-2.  
For the contaminant copper, the text shows no criteria established by EPA. However, EPA has established an Action Level of 1,300  $\mu\text{g/L}$  for copper (EPA, 1994) and a secondary MCL of 1,000  $\mu\text{g/L}$  for copper (EPA, 1993). The text should be revised accordingly.
4. Section 1, Table 1-2.  
For the contaminant lead, the text shows no criteria established by EPA. However, EPA has established an Action Level of 15  $\mu\text{g/L}$  for lead (EPA, 1994). The text should be revised accordingly.
5. Section 1, Table 1-2.  
For the contaminant beryllium, the text shows 4,000  $\mu\text{g/L}$  as the EPA MCL. However, according to EPA National Primary Drinking Water Standards (EPA, 1994), the MCL for beryllium should be 4  $\mu\text{g/L}$ . The text should be revised accordingly.
6. Section 1, Table 1-2.  
For the contaminant cobalt, the text shows the North Carolina Standard as 1,000  $\mu\text{g/L}$  and the EPA MCL is blank. However, according to a previously reviewed document (Site 28, Hadnot Point Burn Dump), there is no criteria for cobalt from the EPA or the North Carolina State agency. The text should be revised accordingly.
7. Section 1, Table 1-2.  
For the contaminant selenium, the text shows 5  $\mu\text{g/L}$  as the EPA MCL. However, the MCL for selenium should be 50  $\mu\text{g/L}$  (EPA, 1994). The text should be revised accordingly.
8. Section 1, Figures 1-3 and 1-4.  
Figures 1-3 and 1-4 are Site Location Maps for Site 7.

However, the map does not fully show the boundary of Site 7. When compared to Figures 1 and 2, the boundary on Figures 1-3 and 1-4 seem to be incomplete. The text should show the entire Site 7 boundary.

9. Section 2.2.2.2, Page 2-5, Paragraph 6, Sentence 1. The text states that several air monitoring and field screening procedures were implemented during drilling. However, the text only identifies one instrument. The text should specify all instruments used during drilling activities.
10. Section 2, Figure 2-1. Also, the figures label the monitoring wells, but the monitoring well located between soil boring 07-CC-SB 02 and 07-EA-SB05 is not identified. The monitoring well should be labeled and all data from well included in this report.
11. Section 3, Table 3-2. The subject heading in column one refers to a footnote. However, the footnote is omitted. The text should be revised accordingly.
12. Section 5.2, Pages 5-2. Section 5.2, Page 5-2, Paragraph 5, Bullets 1 through 7, identifies seven potential contaminant transport pathways. The text later states that subsequent paragraphs describe the potential transport pathways. However, the following paragraphs (Section 5.2.1 through 5.2.5) only address five transport pathways. The other two pathways for migration of contaminants in surface water, and groundwater discharge to surface water, are not discussed. The text should be revised to provide descriptions of these two transport pathways.
13. Section 5.2, Page 5-2, Paragraph 5, Bullet 6. The text refers to surface soil sun-off from Site 7. However, the text contains a typographical error. The text should be revised to "run-off".
14. Figure 7.4 and 7.5 are missing.
15. Appendix F. Appendix F for "Base Background surface soils TAL inorganics" shows a minimum, maximum, average and 2x average for cyanide for surface soil, but this data is not given for subsurface soils. The text should explain why cyanide was not a part of the subsurface soil investigation.
16. Appendix G, Table 5. The table indicates that shaded areas contain inorganics which exceed a MCL and/or NCWQS in groundwater samples.

However, "ND" which means "Not Detected" is found in the shaded area for beryllium at Site 7 and Site 21. The text should correct this discrepancy.