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

James B. Hunt, Jr., Governor
Wayne McDevitt, Secretary
William L. Meyer, Director

DEHNR

October 14, 1997

Commander, Atlantic Division
Naval Facilities Engineering Command
Code 1823
Attention: MCB Camp Lejeune, RPM
Ms. Katherine Landman
Norfolk, Virginia 23511-6287

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

RE: Comments on the Draft Final Basewide Remediation Assessment Groundwater Study (BRAGS)
Marine Corps Base Camp Lejeune, North Carolina

Dear Ms. Landman:

The referenced document has been received and reviewed by the North Carolina Superfund Section and our comments are attached. Please call me at (919) 733-2801, extension 278 if you have any questions.

Sincerely,

David J. Lown, LG, PE
Geological Engineer
Superfund Section

Attachment

cc: Gena Townsend, US EPA Region IV
Neal Paul, MCB Camp Lejeune
Diane Rossi, DENR - Wilmington Regional Office

North Carolina Superfund Comments
Draft Final Remedial Assessment Groundwater
Assessment Study (BRAGS) MCB Camp Lejeune

1. Page 3-4, Section 3.4.3 Castle Hayne Aquifer, Second Paragraph. The Castle Hayne is described as containing layers of indurated and fracture limestone. The limestone layers can have a higher hydraulic conductivity than the remainder of the Castle Hayne Aquifer. The water supply wells may rely on these zones for most of their productivity. Has the impact of these zones on contaminant migration been adequately considered and modeled? Would additional field data on the nature and distribution of the limestone beds contribute to our understanding of the contaminant migration at Camp Lejeune?

2. Page 4-5, Section 4.3 Steady-State Modeling Process: This section implies that an accurate model is a realistic model. Model parameters can be adjusted several ways to reproduce observations. The accuracy of the model does not measure how realistic the model is; the realism of the model will be determined by its ability to predict previously unknown field conditions and future monitoring results.

3. Page 4-5, Section 4.3.1 Calibration Targets, Second Paragraph: Water level data for Layer 5 are derived from water supply wells. In Section 4.1 the text states that the supply well cells were put into Layer 4. Is this correct?

4. Page 4-10, Section 4.4.5.2 Output, First Paragraph: The pumping wells near Hadnot Point are attributed to causing groundwater elevations near sea level. Shouldn't this refer to Paradise Point?

5. Page 4-11, Section 4.4.6 Cross-Sectional Groundwater Flow. Instead of Figures 4-16 and 4-17, the construction of flownets, at a proper scale, would improve our understanding of groundwater flow at the site.

6. Page 4-12, Section 4.5.6 Recommended Changes to Model, Second Paragraph: The text states that "Figure 2-24 shows that increased recharge and/or reduced drain cell conductance would improve the ARM." According to Figure 2-24, reduced river cell conductance, not drain cell conductance, would improve ARM.

7. Most of the maps for Section 4 lack scales, and Figures 4-4 through 4-6, lack north arrows and scales.

8. Page 5-4. Section 5.4.1.1 Prepumping Input. Paragraph two should refer to Figure 5-3, not 5-2. Remaining references, on the same page, should refer to Figure 5-4 and not Figure 5-3. The mislabeling of figures continues onto the following page.

9. Page 5-4. Section 5.4.1.1 Pre-pumping Input. For a drainage conductance of 500 ft^2/day, the calculated value of K=0.10 ft/day as indicated below:

$$K = \frac{M\ C_D}{L\ W} \qquad K = \frac{(2)\ (500)}{(100)\ (100)} = 0.10 ft/day$$

10. Page 5-5. According to McDonald and Harbaugh (1988; p.5-16), the equation for calculating the $Vcont_{i,j,k+1/2}$ is

$$Vcont_{i,j,k+1/2} = \frac{K_{zc}}{\Delta Z_c}$$

where,

$\Delta Zc =$ thickness of confining bed.

For the equations shown on page 5-5, the thickness of the confining bed is 10, not 180 feet. In the first equation, Kv of the confining unit = 0.002 ft/day ($7x10^{-7}$ cm/sec) and in the second equation, Kv of the confining unit = 0.036 ft/day ($1x10^{-5}$ cm/sec). These values suggest clayey soils.

11. Page 5-6. First equation. See comment above. The thickness of the confining unit is 10 feet and, therefore, $Kv_{i,j,k+1/2} = 5.0$ ft/day or 1.8×10^{-3} cm/sec.

12. Page 5-6, Last Paragraph, and Figure 5-12. How were the production rates of the screened intervals determined?

13. Figure 5-8 has no scale and the well numbers are not displayed.

14. Figure 5-9 needs a scale and to show the supply well locations and identification numbers.

15. Figures 5-10 and 5-11. Where is water supply well HP-651 located?

16. Page 5-8. According to model, what adjustments to the extraction wells are necessary to capture the contamination at well 6GW-37D (60 ug/l chlorinated organics)?

17. Appendix A. Several figures are missing and the distance-drawdown graphs are not labeled with figure numbers.

18. In the USGS comments on the first draft of the BRAGS (from David Breedon, dated 6/11/96), there were several suggestions that the water budget summary generated by MODFLOW be presented and discussed. This information should improve our understanding of the Base hydrogeology and we recommend that it be included in the report.