04.01-04/01/93-01175

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

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

APR 01 1993

4WD-FFB

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Linda Berry
Department of the Navy - Atlantic Division
Naval Facilities Engineering Command
Code 1822
Norfolk, Virginia 23511-6287

RE: Marine Corps Base Camp Lejeune NPL Site
HPIA Shallow Aquifer
Jacksonville, North Carolina

Dear Ms. Berry:

EPA has reviewed the document titled "Draft 30 Percent Design Submittal Basis of Design Report for the Shallow Aquifer at the Hadnot Point Industrial Area Operable Unit". Comments on the draft document are enclosed. In addition, all issues raised in the March 23, 1993 meeting in Raleigh, NC must also be addressed in preparing the 60% complete Design Report.

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

Sincerely,

Michelle M. Glenn

Michelle M. Glenn
Senior Project Manager

Enclosure

cc: Peter Burger, NCDEHNR
Neal Paul, MCB Camp Lejeune

COMMENTS
DRAFT 30% Design Submittal
Basis of Design Report

GENERAL COMMENTS

1. Special Health and Safety precautions should be taken for workers while excavating in contaminated areas of the facility.

2. The Report does not indicate how disposal of the sludges generated during treatment will be conducted. This should be clarified.

3. The bench-scale and pilot tests were conducted on ground water samples that contained contaminant levels 3 orders of magnitude lower than samples collected in the field, January 1991.

   For example, one monitoring well in 1991 revealed a concentration of 1,2-dichloroethene of 42,000 micrograms per liter (ug/l), while only 40 ug/l were used for the air stripper design. Furthermore, no explanation is given as to why such low concentrations were used. The seriousness of this deficiency in the Draft Design Report cannot be overstated for the following obvious reason: If the treatment system has been designed to treat groundwater at contaminant concentrations which are significantly lower than actual site conditions, the result will be a grossly underdesigned treatment system which will fail. The estimate of influent concentrations should be reevaluated to determine concentrations which would be representative of site conditions. A table should be included in the Draft Design Report listing the influent or initial design concentrations prior to treatment and how those concentrations were determined. In addition, the expected effluent concentrations following treatment should be listed. If higher concentrations (than the ones used to design the treatment system) are believed to exist at the HPIA, an explanation should be given as to how the higher groundwater concentrations will be treated.

4. The method of treating the volatile organic contaminants (VOCs) at HPIA is through the use of a shallow tray air stripper. The EPA document, <u>Cleanup of Releases from Petroleum USTs: Selected Technologies</u> states that removal efficiencies of shallow tray air strippers are usually "between 40 and 60 percent" and also that "this method cannot be used where low effluent concentrations are required." It is not clear why a shallow tray air stripper was selected over a packed tower air stripper, since a

packed tower air stripper is much more efficient. Although the air stripper manufacturer claims to be able to remove VOCs from the groundwater to acceptable levels, this claim was based on influent concentrations much lower than those that currently exist at HPIA. Significantly higher influent concentrations will have a considerable affect on the efficiency of the air stripper system and possibly result in the shallow tray air stripper being incapable of reducing the VOC concentrations to acceptable levels.

5. The issue of metals in the groundwater is of concern, not only from a health standpoint, but also because the presence of iron in the water can adversely affect the air stripper performance. The Draft Design Report claims that the metals are adsorbed to suspended particles and that gravity settling will be used to reduce the metals concentrations via suspended particle settling. However, the gravity settling will not take place in a designated settling tank, but instead in an oil/water separator. The purpose of an oil/water separator is to separate oil and/or grease from water, not to be a settling tank for suspended particles. Admittedly, some settling will occur in an oil/water separator. However, in order to adequately remove the metals from the groundwater through gravity settling via association with suspended particles, a separate settling tank must be incorporated into the design.

   In addition, removal of metals by chemical precipitation was specifically listed as part of the Record of Decision. Careful consideration should be given to the ramifications of changing a specific component of the remedy selected.

6. The purpose of the aquifer test as stated on page 3-6 was to determine surficial aquifer properties and to select appropriate pumping rates of the extraction wells and optimal well locations. Due to well construction, well development, or the location of the recovery well, the data obtained is not representative of aquifer properties for the Hadnot Point Industrial Area (HPIA) and cannot be used to design the extraction system.

7. Previous studies conducted by the USGS estimate the hydraulic conductivity of the surficial aquifer to be approximately 50 ft/d. An aquifer test was not conducted, so this value was based on the lithologic composition of the aquifer. The value calculated from the February 2 aquifer test data was 1.6 ft/d which is much lower than expected for the type of sediment present at HPIA. The value obtained through aquifer test results may represent the hydraulic properties of a clay lense within the aquifer, but does not represent the hydraulic properties of the surficial aquifer for the area of HPIA.

A potential problem that may have caused low yields during the test may be lack of recovery well development. The treatability study (page 4-14) states that the recovery well was developed by removing 150 gallons (5 to 6 well volumes). Removing 5 to 6 well volumes is purging the well. Removing this amount of water will not develop the well properly. Proper development involves overpumping and surging. Improperly developed wells will not free fine grain sediments surrounding the well bore which prevents maximum ground water flow into the well.

8. Another factor that may have caused low yields during the aquifer test could be the lithology the recovery well penetrates. This zone consists of 15 feet of silt and clay according to the lithologic logs provided in Appendix L. This zone has a low permeability relative to surrounding areas and is not representative of the lithology (silty sand) of the surficial aquifer in the HPIA area. The recovery well should be properly developed. If the well continues to provide low production rates, the well should be abandoned and a recovery well at a new location should be used for conducting the aquifer test. Before the aquifer test is conducted, a step drawdown test should be performed. If yields greater than 5 gpm cannot be obtained then this well should not be used, and another location should be selected for conducting the test.

9. Extraction well spacing in the Draft Design Report has been set at 500 feet, based on a calculated radius of influence of 250 feet. According to the Draft Design Report, the well spacing calculations were based on the Theis equation. Using the Theis equation to determine well spacing at HPIA is inappropriate for two reasons: the Theis equation assumes the aquifer is confined and does not take into account the hydraulic gradient. The shallow aquifer at the HPIA is unconfined and the hydraulic gradient is 3 feet per 1,000 feet. While the hydraulic gradient at HPIA is not particularly steep, a slope of 3 feet per 1,000 feet is enough to cause the radius of influence on the down gradient side of the well to be less than 250 feet, particularly if the aquifer discharge is significantly higher than 1.5 gpm as is believed.

10. The recovery well diameter is 6 inches according to the Remedial Design and the Treatability Study. However, according to the well construction description in Appendix L, the diameter is 4 inches. Appendix A of the RD applies a recovery well diameter of 3 inches in calculations of hydraulic properties. This discrepancy should be corrected.

SPECIFIC COMMENTS

1. Page 2-1, Section 2.2, Paragraph 4 - The last sentence of this paragraph includes ". . . in the scope of this treatability study. . . ." However, "treatability study" should be changed to "design report."

2. Page 2-3, Figure 2.2 - Some of the symbols in the figure are not defined; therefore, this figure should contain a more comprehensive legend.

3. Page 2-5, Section 2.4, Paragraph 2 - The text states that "the compound concentrations from the January 1991 data were generally lower than the concentrations identified in the earlier studies." An explanation should be given as to why the concentrations were lower in January 1991 as compared to previous sampling data.

4. Page 2-6 - What is the significance in the "B"?

5. Page 3-1, Section 3.1.1, Paragraph 7 - The text states that the concentrations of oil and grease in samples collected from wells HPGW 24-1 and RW-1 were "all less than 10 mg/l." Explain the significance of 10 mg/l.

6. Page 3-3, Section 3.1.1, Paragraph 1 - The text includes the following statement: "Note that these concentrations are all less than the contract detection limits for oil and grease." However, the text does not state the detection limit for oil and grease.

7. Page 3-3, Section 3.1.2, Paragraph 5 - The text states that "polymer addition could be used to aid in metals removal, if gravity settling alone did not reduce the metals concentrations to a level that meets discharge requirements." This statement gives the impression that only after the treatment system is in operation will a determination be made as to whether polymer addition is necessary. Part of the reason for conducting a treatability study is to reach these kinds of determinations before treatment startup. From the data presented in Table 2-1, actual metals concentrations at HPIA (particularly iron) will likely be anywhere from 2 to 20 times the values used in the treatability study as presented in Table 3-3. Therefore, it is not likely that adequate metals precipitation will occur without polymer addition.

8. Page 3-5, Table 3-3 - The pretreated sample concentrations presented in this table are considerably lower than concentrations listed in Table 2-1. An explanation should be given as to why the concentrations used in the solids

settling test are so low. If sample concentrations used during the treatability study are not representative of actual site conditions, the results will be inaccurate.

Why did the lead concentration increase after polymer addition?

9. Page 3-6, Section 3.2, Paragraph 3 - A maximum sustainable pumping rate of 1.5 gpm is unusually low. Provide an explanation as to why a higher pumping rate could not be achieved. If the low pumping rate is due to poor well installation, it is highly likely that an additional pumping test will be required.

10. Page 3-7, Section 3.2, Paragraph 2 - Pumping radii are listed for a pumping rate of 1.5 gpm and 3.0 gpm; however, the text states on page 3-6 that the maximum sustainable pumping rate during the aquifer pump test was 1.5 gpm. Therefore, the pumping radii corresponding to the 3.0 gpm pumping rate should not be included as they serve no purpose.

    Distance/Drawdown curves and calculations used to determine the radius of influence for the extraction wells should be provided for review. Using the Theis equation to calculate the radius of influence for the surficial aquifer will produce questionable results since the equation assumes a confined aquifer.

    The design of the treatment system is focused on contaminated ground water of the surficial aquifer. The maximum amount of ground water that can be treated is 160 gpm which is probably over the maximum amount the extraction well field will produce from the surficial aquifer. It would be cost effective to design a treatment system that will accommodate the production rate necessary to remediate the Castle Hayne Aquifer. To estimate total ground water that must be extracted from each aquifer and the number, depth, and location of the wells, a ground water model such as Well Head Protection Area or the Aquifer Simulation Model could be utilized to design the extraction system and estimate the total yield necessary to remediate both aquifers simultaneously.

11. Page 3-8 - The sampling results should be included in the next report in a summarized, tabular form.

12. Page 4-1 - The location of the recovery wells should be repositioned in each plume once valid hydraulic data is obtained and accurate values for the radius of influence are calculated. The most down gradient extraction wells should be positioned on the plume boundary so that once the wells are pumped, the down gradient extent of contamination will be captured (i.e., if the radius of influence is 200 feet, the wells should be positioned 200 feet from the edge of the plume.) Also, the wells should be spaced so that the capture zones for each well slightly overlap.

13. Page 4-1 - The text states that the wells shown on Drawings C-2 and C-3 are oriented perpendicular to the hydraulic gradient at the leading edge of the plume. However, recovery wells positioned in the north plume are positioned in hot spot areas of the plume close to the 900 buildings. According to past ground water samples, the leading edge of the plume (north plume) is close to the area of Birch Street (approximately 1800 feet south of proposed well locations). It is recommended that the first batch of recovery wells be installed in this area to prevent the plume from migrating further down gradient.

    Spell out STP. (Section 4.0, paragraph 1).

14. Page 4-4, Section 4.2, Paragraph 2 - The text states that a maximum of 16 recovery wells will be used for each treatment system at a pumping rate of "5 gpm per well." However, as mentioned before, the maximum sustainable pumping rate during the aquifer pumping test was 1.5 gpm. Clarify this discrepancy.

15. Page 4-4, Section 4.2, Paragraph 3 - Explain what will be done with the extracted free product and the settled solids.

16. Page 4-4, Paragraph 7, Section 4.3 - List the maximum concentrations for each contaminant of concern that the sanitary treatment plant can handle, and list what precautions will be taken to ensure that these concentrations will not be exceeded in the HPIA treatment system effluent.

17. Appendix B, Section VII - "Shallow tray air stripper" is not included as part of the equipment list, but should be added.

18. Appendix D - Units should be included at the top of the schedule for clarification.

19. Appendix E - Page numbers should be included on all of the pages for easy reference.

20. Appendix E, Page 1 of Air Stripper Data - As mentioned in General Comment No. 1 the influent concentrations used in the air stripper design are considerably lower than the concentrations presented in the January 1991 sampling data. For example, the design concentration listed in the air stripper data for 1,2-dichloroethene was 40 parts per billion (ppb) while a concentration of 42,000 ppb was detected in well HPGW 24-1 in January 1991. The air stripper should be designed based on influent concentrations representative of actual site conditions.

DESIGN DRAWINGS

21. Drawing C-2 - The Draft Design Report states that the extraction well spacing was determined to be 500 feet. However, two of the three wells on this drawing are greater than 500 feet apart. Furthermore, with a radius of influence of 250 feet, the extraction wells should be no greater than 250 feet from the downgradient edge of the groundwater plume. However, the distance from the extraction wells to the downgradient edge of the plume is over 400 feet in places. Furthermore, if the well spacing is calculated taking the hydraulic gradient into account, then a smaller well spacing as well as a smaller capture zone will likely result.

22. Drawing C-3 - As in the previous comment, the proposed well configuration on this drawing is inadequate to fully capture the contaminant plume, as two of the well spacings are greater than 500 feet, and the lateral edge of the contaminant plume is outside the 250-foot radius of influence. In addition, two of the wells are in line parallel to the groundwater flow. A more efficient well configuration would be to have all of the wells in a line perpendicular to the groundwater flow, rather than having two wells perpendicular and two wells parallel to groundwater flow.