

Division of Waste Management

Michael F. Easley, Governor
William G. Ross Jr., Secretary
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January 02, 2006

NAVFAC Atlantic
Attn: Daniel R Hood
Code: OPCEV
NC/Caribbean IPT, EV Business Line
6506 Hampton Blvd
Norfolk, VA 23508-1273

RE: Comments on Operable Unit 10, Site 35 Draft Pilot Study Report
Soil and Groundwater
Camp Lejeune, NC6170022580
Jacksonville, Onslow County, North Carolina

Dear Mr. Hood:

The NC Superfund Section has received and reviewed the Draft Site 35 Pilot Study Report, dated December 2005, Operable Unit #10, Camp Lejeune, MCB Superfund Site. The following comments are included for the Partnering Teams consideration.

Specific Comments

1. The last paragraph of Section 1.1.2.2 at the bottom of page 1-2 references Groundwater Elevation data to Figure 1-7. Figure 1-7 is not included in this report. Please make appropriate corrections for the final Report.
2. Next to the last paragraph on page 1-3 states that "three separate areas were identified where soil contamination was sufficiently above the top of groundwater, such that the contamination did not appear attributable to a dissolved plume." Were these areas within the treatment zone of this Pilot Study area or in the zone of the petroleum hydrocarbon area where the air sparging trench is located? If not we should probably further delineate this area to determine if DNAPL is present. This work could be done as part of the Remedial Design and noted in the Record of Decision. Please document these three locations in your response to comments.
3. The paragraph at the top of page 3-14 discusses well purging before sampling groundwater. In the future all work plans should indicate that purging is complete only if chemical parameters are stable and **a minimum of 1 well volume is purged** from the monitoring or extraction well. As we have discussed previously, purging

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less than 1 well volume at low flow purge rates are out of line with EPA guidance. There is much controversy over this issue and we can avoid future problems by purging a minimum of 1 well volume prior to sampling groundwater. We also need to be careful that we do not purge wells too slowly. This could also give bad data that could cause problems for us in the future.

4. In drawing conclusions about the Modified Fenton's injection results I think it is very important to note the Table G-2 data in Section 5.1.3 and other Sections that discuss these results. Based on Table G-2 the Modified Fenton's reagent was detected in groundwater over a month after the initial injection and was therefore, continuing to treat the COCs as we see from the August 2004 data. I understand that Modified Fenton's is generally a very fast reaction however, it should be clear from the Table G-2 data that we were not giving the reagent time to deplete in the aquifer before drawing our conclusions.

The chelated iron catalyst used in this process actually appears to be working effectively to slow the H_2O_2 reaction as designed, therefore providing greater radius of influence created by the natural groundwater flow process and continued treatment, in the immediate source area, of COCs stripped during the initial reactions. Therefore, it appears that we were drawing premature conclusions about the Modified Fenton's effectiveness. The August 04 data clearly supports this conclusion and the April 04 data may well be demonstrating this conclusion, especially in the source area. However, the upgradient and downgradient wells clearly improved after the permanganate injections, showing the effectiveness of the aquifer fracturing.

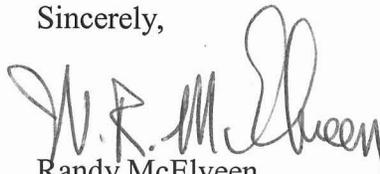
5. The last paragraph of Section 5.1.3 on page 5-3 refers to monitoring well MW-64IW. I think this paragraph and the second paragraph at the top of page 5-4 are referring to monitoring well MW-74IW rather than MW-64IW. Please make appropriate corrections.
6. The last paragraph on page 5-3 and the first paragraph at the top of page 5-4 discuss the third post injection analytical results of the Modified Fenton's injections. 54% to 98% degradation (reduction) over a six month period is not indicative of enhanced biodegradation alone. Biodegradation may have been enhanced, however, due to reasons stated in comment 4 above, this Section should note here that H_2O_2 persisted in the groundwater for over a month after the first Modified Fenton's injection and may have continued for several months after the second injection. H_2O_2 was not tested for after the second injection with a sufficient enough time for travel to adjacent monitoring wells. It appears that the **pre-injection** H_2O_2 concentrations were stripped (post injection H_2O_2) by the air flow and aquifer movement during the injection process but likely returned after the wells stabilized.
7. For reasons stated in the comments above, the State would like details of the modified Fenton's summary of results in Section 5.1.7 on page 5-5 to include the data from the

Appendix G-2 Tables in place of or in addition to the enhanced biodegradation statement. The Table G-2 data indicate that the modified Fenton's reagent and catalyst are working as designed, continuing to treat the solvents in the aquifer for at least a month potentially more after each injection. The iron trend in Exhibit 5-3 on page 5-6 also supports this conclusion. Please make appropriate changes in this and the conclusions Section of the report (Section 6 tic marks 4 and 6).

8. Please include the Table G-2 data and conclusions in the **second paragraph** of Section 6.3 on page 6-2. The iron chelating catalyst appears to have slowed the H₂O₂ reactions and effectively treated groundwater around the injection wells for more than a month potentially several months after the second Modified Fenton's injections. This detail should be included following the statement about Modified Fenton's initial eight feet limited reagent distribution. The Modified Fenton's and its chelating iron were distributed at least as far as the farthest well that was effectively treated based on the August 2004 data and adjacent wells showing significant increases in iron content. This occurred following the initial injection distribution.
9. Please remove the last sentence of the third paragraph of Section 6.3 on page 6-2 since analytical COC data indicates that the oxidant demand was overcome and significantly oxidized contaminants at the Site after injection of Modified Fenton's and before the injection of permanganate. Especially in the areas closest to the injection wells.
10. Based on observation of Tables and Graphs in Appendix H, I, and J, it appears that the modified Fenton's injections effectively treated the COCs in the injection (high concentration) areas and the permanganate injection were effective in polishing the injection areas and effectively treated the upgradient and downgradient areas of the plume due to improved distribution resulting from pneumatic fracturing.

If you have any questions or comments, please contact me, at (919) 508 8467 or email randy.mcelveen@ncmail.net

Sincerely,



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Environmental Engineer
NC Superfund Section

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