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**CH2MHILL**

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June 13, 2007

*Via First Class Mail*

328432.RI.FR

Mr. David Lilley  
North Carolina Department of Environment and Natural Resources  
401 Oberlin Road, Suite 150  
1646 Mail Service Center  
Raleigh, North Carolina 27699

**Subject: CTO 0026 – Site 88 Draft Remedial Investigation**

Dear Mr. Lilley:

CH2M HILL is pleased to submit the Response to Comments for the draft Remedial Investigation for Site 88, Operable Unit No. 15 at Marine Corps Base Camp Lejeune. These comments include those submitted by Ms. Ginny Henderson (NCDENR) dated December 18, 2006; Mr. Randy McElveen (NCDENR) dated January 17, 2007; Mr. David Lilley (NCDENR) dated February 1 and May 8, 2007; and Ms. Gena Townsend (U.S. EPA) dated February 28, 2007.

If you have any questions or require additional information, please contact me at (704) 329-0073 x224.

Sincerely,  
CH2MHILL

A handwritten signature in cursive script that reads "Renee M. Clore".

Renee Clore, P.E.  
Project Engineer

Attachments

cc: Tegwyn Williams, CH2M HILL  
File

**Response to Comments**  
**Site 88 Draft Remedial Investigation**  
**MCB Camp Lejeune, North Carolina**

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**Introduction**

The purpose of this document is to address comments to the Draft Remedial Investigation for Site 88, Operable Unit No. 15. The North Carolina Department of Environment and Natural Resources (NCDENR) and the United States Environmental Protection Agency (USEPA) provided the comments listed. The responses to comments are provided in bold. Following acceptance of these responses, the document will be revised and provided as Final.

**Ginny Henderson - North Carolina Department of Environment and Natural Resources**  
**Comments dated December 18, 2006**

***Specific Comments***

1. The water table was not contoured in Figure 3-13 for the very deep aquifer. The text for this section (page 3-5) stated, "The spacing of the wells is insufficient to determine the groundwater flow pattern for this aquifer." DWQ believes that the spacing of the wells is adequate for contouring.

Whilst it may be technically possible to contour the data from the three monitoring wells screened within the very deep aquifer, the alignment of these wells is not optimal for contouring purposes. Therefore, any interpretation of the data from these wells would be questionable. Consequently, it is recommended that Figure 3-13 be revised to include an arrow indicating the "approximate direction of groundwater flow".

2. On page 4-1, in Section 4.1, in the second sentence, the "of" between depths and ranging should be removed.

Accepted

3. On page 5-3, the report states, "The PCE reported in MW19DW (2.4 µg/L) appears to be an isolated instance. MW-19DW is located more than 1,600 feet southwest of the former building 25 location." Does this mean that there is another source of contamination in this location that needs to be investigated?

The available information suggests that the detection of PCE in a sample collected from MW19DW is related to the release at Building 25. The text will be modified accordingly.

4. The dissolved contaminant plume appears to be undelineated vertically and the very deep plume in undelineated horizontally (Figure 5-5).

As detailed in the technical memorandum entitled *Investigation of Deep Groundwater Impacts at Site 88* dated January 8, 2007 to the Partnering Team, multi-port sampling devices will be installed at depths ranging from 100 to 200 ft below ground surface in three monitoring wells to better delineate the contaminant extent. The findings of this phase of investigation will be reported in the Feasibility Study.

Randy McElveen - North Carolina Department of Environment and Natural Resources  
Comments dated January 17, 2007

**Specific Comments**

1. Table 6-1 and other search results indicate that the Solubility of PCE is between 137,000ug/l and 150,000ug/l. Why was 200,000 ug/l used for the 10,000 ug/L (5 Percent of the solubility of PCE) calculation of the PCE concentration as discussed in the fourth paragraph on Page ES-4? Should we be using lower concentrations for establishing the presence of DNAPL PCE at our Sites?

**The PCE solubility value is 150,000 µg/L, which is referenced in Table 6-1. Therefore, the sentence "PCE concentrations in excess of 10,000 µg/L (5 percent of the solubility of PCE), as reported for several Site 88 wells, may indicate the presence of DNAPL PCE." will be replaced with "PCE concentrations in excess of 7,500 µg/L (5 percent of the solubility of PCE), as reported for several Site 88 wells, may indicate the presence of DNAPL PCE."**

2. The second paragraph under the Human Health Risk Assessment heading on page ES-5 states that "A detailed indoor air emission evaluation was not performed as part of this study..." A vapor intrusion study of Building 25 and surrounding buildings was completed by the Base in 2003-2004. We may wish to include this fact in this Section of the report.

**An indoor air emission evaluation was performed as part of the remedial investigation. The executive summary will be modified to include this information.**

3. As we now know the DPT data (15 – 55 feet bgs) and the Deep Monitoring Wells (80-85 feet bgs) were not sufficiently deep to confirm the vertical depth of contaminated groundwater west of McHugh Boulevard. See Figure 4-1. Please include some discussion of this fact in this and other Sections of the report and note that a Technical Memo detailing the plan has been submitted for review in its draft form.

**Discussion of the on-going additional vertical extent delineation efforts will be added to appropriate sections of the report.**

4. The bottom of Page 5-9 and the top of page 5-10 discusses the ORP range "where reductive dechlorination occurs." Based on studies that I have read, ideal Oxidation-Reduction Potential (ORP) for methanogenesis is in the range of -400 mV too less than -500 mV.

**Although ideal ORP for reductive dechlorination by methanogenesis may be less than or equal to -400 mV, reductive dechlorination can also occur under ferric iron, manganese, nitrate, and sulfate reducing conditions which may occur at ORP values ranging from 740 to -550 mV.**

5. The last sentence of the 5th paragraph on page 6-5 should be changed as follows: "It should be noted that DNAPL PCE [in the source area under and around former building 25] has been observed and treated under a separate NTCRA at the site."

**Accepted**

6. The second paragraph on page 7-3 states that: "A residential land use scenario is assumed to estimate the worst-case exposure conditions, although it is highly unlikely that housing would be built on this site." The State disagrees with this statement. We all know that a plan is presently in place that would restrict the construction of residential housing or other sensitive receptors such as a day care center.

However, presently there is a residential barracks housing a large number of Marines within 50 to 100 feet of the Site 88 source area, and the entire length of the groundwater plume is surrounded by barracks on both sides. Even if a drinking water supply well were constructed within a mile of this plume the high concentrations of the DNAPL could easily be drawn into the drinking water well. This has been observed in drinking water wells at other sites over distances of 6000 feet from the source plume. Please qualify the statement on page 7-3.

**Although construction of residential housing may be restricted at the site, the use of a residential land use scenario for the human health risk assessment assumes the worst-case scenario exposure conditions and is a conservative assumption.**

7. The period or decimal in the last two sentences of the second paragraph on page 8-2 should be change to commas (97,000 ug/L and 11,000 ug/L).

Accepted

8. The second paragraph on page 8-3 states that: "The plume appears to be migrating west, primarily within the intermediate zone and to a lesser extent in the deep zone..." Please qualify this statement. I am not sure that we have confirmed that the plume is migrating to a "lesser extent in the deep zone."

The sentence "This plume appears to be migrating west, primarily within the intermediate zone and to a lesser extent in the deep zone, which ultimately discharges to the New River." Will be replaced with "This plume appears to be migrating west within the intermediate and deep zones."

9. The Summary and Recommendations Section 8.5 is incomplete. There is no discussion of the undefined deep and very deep zone. Nor is there any discussion of the plan to further delineate the deep or very deep zone of the plume. Please include a discussion of this information in the report and in Section 8.5.

Discussion of the on-going additional vertical extent delineation efforts will be added to appropriate sections of the report.

10. Dave Lilley with the NC Superfund Section will be reviewing the risk assessment information in this report. His comments will be forwarded to the team after he completes them.

This comment has been noted.

David Lilley - North Carolina Department of Environment and Natural Resources  
Comments dated February 1, 2007

**Specific Comments**

1. Appendix F, Table 3: The 2L standard for cis-1,3-dichloropropene is 0.19 ug/L. Please correct.

The value of 0.19 ug/L will be used in Table 3.

2. Appendix F: The exposure point concentration tables (Tables 3.1 to 3.3 RME according to Table 5) are not included in my copy of the report. Please submit for review.

Tables 3.1 to 3.3 are being submitted to the State for review, and the tables will be included in the revised document.

3. Please submit all lab data for review.

All lab data has been submitted to the State for review.

4. Because the items in comments 2 and 3, a full review of this risk assessment cannot take place.

This comment has been noted. All appropriate information has been provided to the State for review.

5. Appendix F, Table 7: Region 9 provides an inhalation RfD for tetrachloroethene of 1E-02 mg/kg-day.

The inhalation RfD for tetrachloroethene cited by Region 9 will be included in the risk assessment.

6. Appendix F, Table 5: The justification for the event time for industrial and construction workers is unclear. Was this supposed to be five 3-minute events (15 minutes or 0.25 hours) or was a justification made for a single 3-minute event (0.05 hours). Please explain.

For the industrial and construction workers, it was assumed that they would contact groundwater by hand washing only. They were assumed to wash their hands 5 times per day (EV – Event Frequency of 5 events per day) for 3 minutes at a time ( $t_{\text{event}}$  – Event Time of 0.05 hr/day). Taken together, it results in exposure of 0.25 hours per day. This explanation will be clarified in the footnote to Table 5.

7. Appendix F, general comment: Each table should have its own, unique number. Future human health risk assessments will need to be in the RAGS Part D, 2001 format.

Future human health risk assessments will be in the RAGS Part D 2001 format.

8. Page 2-2: Is the storm sewer system that discharges to the New River the same underground sewer line where contaminants were identified in Section 2.4.2? If so, an ecological risk assessment should be completed to determine the impact of the contamination on the surrounding ecosystem.

No, the storm sewer system that discharges to the New River is not the same sewer line under which contaminants were identified. Contaminants were identified along the sanitary sewer line, which is located to the south of the storm sewer line.

9. Pages 5-1 and 5-2: Change Region III RBCs to Region 9 PRGs.

Accepted

10. Page 7-2, first bullet item: It is unclear to the reader where the comparison of soil results to Region 9 PRGs took place. Please explain.

A comparison of soil results to Region 9 PRGs was performed. A reference to the soil screening table will be included in this bulleted item of the document.

11. Page 7-3: How was the determination made that future receptors could not contact soils? How is it possible that future construction worker could come in contact with shallow groundwater but not the contaminated soil?

A further explanation of soil conditions at the site will be added to the discussion in Section 7. The impacted soils were originally located beneath and adjacent to Building 25. However, the NTCRA subsequently treated these soils by mechanical augering and addition of zero-valent iron, down to a depth of 21 feet below ground surface. Following the soil mixing project, the upper five feet of the mixed soil was amended with Portland cement and capped with clean fill material and asphalt. Therefore, the on-site soils are no longer representative of past site conditions when impacted soils were available for contact by receptors. Soil samples have been collected from the mixed soils and were screened against Region 9 PBC values, but the soil data was not quantitatively evaluated in the risk assessment.

Consequently, a future construction worker conducting an excavation would encounter several feet of treated soil before reaching groundwater.

12. Page 7-4: It is stated that the industrial worker was assumed to be exposed to VOCs that have migrated to indoor air from shallow groundwater. The risk calculation takes place in Appendix F, Table 6, page 19 of 19. Where does the EPC calculation using the J & E model take place?

The EPC calculation takes place in Table 3.1 to 3.3 of Appendix F, which has been provided to the State for review. These tables will be included in the revised document.

13. Page 7-7: The ABSGI values provided by EPA Region 4 are outdated and should not be used.

The report text will be modified to indicate that the RAGS Part E guidance for dermal risk assessment will be used as the basis for the ABSGI values. The guidance will be followed for those chemicals that do not have a listed ABSGI value.

14. Because of the issues above, I cannot agree or disagree with the conclusions of this risk assessment.

This comment has been noted.

**Specific Comments**

1. Please include bromodichloromethane and chloroform as VOC exceedances in Figure 5-3.

Bromodichloromethane has been included in Figure 5-3. As chloroform does not exceed the NC 2L standard, it has not been included in Figure 5-3. A note has been added to Figures 5-2, 5-3, 5-4, and 5-5 to clarify that only constituents exceeding NC 2L standards are reported on these figures.

2. Table 3.2 lists the high concentration of cis-1,2-dichloroethene as 450 J ug/L. Figure 5.3 lists the high concentration as 780 ug/L in sample IR88-GW05IW-05D. Please correct this inconsistency.

IR88-GW05IW-05 was inadvertently not included in the risk assessment data, the risk assessment text and related tables have been modified to correct this omission.

3. Figure 5-3 and Table 3.2: It is unclear how the concentrated area of the plume was determined. The well between GW-16IW-05D and IR88-GW03IW-05D (IR88-GW05IW-05D) had higher concentrations of tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, and vinyl chloride than found in IR88-GW03IW-05D. Why were the sample results from IR88-GW05IW-05D not included in the EPC calculation?

IR88-GW05IW-05 was inadvertently not included in the risk assessment data, the risk assessment text and related tables have been modified to correct this omission.

4. Figure 5-4: Please list chloroform at a concentration of 0.4 J ug/L on this figure for sample IR88-GW18DW2-05D.

As chloroform does not exceed the NC 2L standard, it has not been included in Figure 5-4. A note has been added to Figures 5-2, 5-3, 5-4, and 5-5 to clarify that only constituents exceeding NC 2L standards are reported on these figures.

5. Figure 5-4: Please list the hits of cis-1,2-dichloroethene on this table [Figure] for samples IR88-GW18DW-05D and IR88-GW05DW-05D.

As cis-1,2-dichloroethene does not exceed the NC 2L standard, it has not been included in Figure 5-4. A note has been added to Figures 5-2, 5-3, 5-4, and 5-5 to clarify that only constituents exceeding NC 2L standards are reported on these figures.

6. Table 3.2RME: Using the information provided in this table, Figure 5.3, and Appendix D, the EPC for trichlorethene cannot be reproduced. Please double-check this calculation.

IR88-GW05IW-05 was inadvertently not included in the risk assessment data, the risk assessment text and related tables have been modified to correct this omission.

7. Table 3.1RME: I don't agree that the three wells listed (IR88-GW02-05D, IR88-GW16-05D, and IR88-GW05-05D) are the wells that best represent the center of the plume. The concentrations of both tetrachloroethene and trichloroethene in IR88-GW02-05D exceed the concentrations in the other two wells by more than an order of magnitude, therefore the risks associated with using this water would be at least an order of magnitude higher. The Region 4 guidance does differ from the national guidance in that Region 4 considers it acceptable to use only one well if it is representative of the center of the plume, which I believe would be appropriate in this case.

This calculation has been modified using only IR88-GW02-05D.

8. My comment 6 [referring to comments from February 1, 2007]: I'm not clear on the response. Are you saying that the  $t_{\text{event}}$  as it appears (0.05 hr/day) is incorrect and will be corrected to 0.25 hours/day with an additional explanation that the 0.25 hr/day was derived as follows: 5 handwashings x 3 minutes/handwashing = 15 minutes/day, or 0.25 hr/day?

Yes – the value of 0.25 hr/day reflects the best professional judgment regarding exposure during five handwashing events per day (3 minutes each) for a total of 15 minutes (0.25 hr/day). The  $T_{\text{event}}$  will be modified to say 0.05 hr/event (instead of hr/day). It was multiplied by 5 events per day, resulting in the 0.25 hr/day value.

9. My comment 12 [referring to comments from February 1, 2007]: The response to this comment refers back to the EPC calculation for ingestion and dermal contact to groundwater in units of ug/L. The EPC calculation for air will be in units of ug/m<sup>3</sup> and is not included in Table 3.1 through 3.3.

The EPC for the Shower Model are provided on Supplemental Tables in Appendix F. These tables will be listed in the text in the appropriate section.

**Gena D. Townsend - United States Environmental Protection Agency Comments**  
**Comments dated February 28, 2007**

**General Comments**

1. Figures 3-4 through 3-9 of the Draft Remedial Investigation Site 88 – Operable Unit No. 15, Building 25 (Draft RI) present geologic cross-sections across various portions of Site 88, Operable Unit (OU)-15. These cross-sections present several key monitoring wells with the screened intervals indicated and significant hydro-stratigraphic layers within the various aquifer zones depicted. These cross-sections would be more informative if the significant concentrations (exceedances) of the various detected contaminants were also presented for the appropriate screened interval.

Additionally, several of the well locations presented on the cross-sections do not have all of the various screened interval wells depicted. For example on Figure 3-4, Geologic Cross-Section A-A', only the deep screened interval well (88-MW18DW) and the very deep screened interval well (88-MW18DW2) are depicted. The intermediate screened interval well at this location (88-MW18IW) is not depicted on Figure 3-4. Including the locations of all of the cluster wells traversed by the cross-sections will allow for a more comprehensive visual confirmation of the extent of the subsurface contaminant boundaries in the various aquifer layers as constrained by the sample data. Provide this additional information on the depicted cross-sections in future revisions of the Draft RI.

**PCE, TCE, cis-1,2-DCE, and vinyl chloride concentrations at each screen interval will be added to Figures 3-4 through 3-9 to illustrate the vertical distribution of each contaminant. Additionally, Figures 3-4 through 3-9 will be modified to include missing screen intervals.**

2. The chlorinated volatile organic compound (CVOC) plumes present in the groundwater at Site 88, OU-15 are discussed in several sections of the Draft RI (Executive Summary, Section 6.2.4.1, General Conceptual Model of Groundwater Flow, Section 8.2, Nature and Extent of Contamination and Section 8.5, Summary and Recommendations) and described in terms of locations and dimensions within the shallow, intermediate, deep and very deep aquifer zones. However, none of the figures provided in the Draft RI provide a depiction of the CVOC plume boundaries as described in the text. For clarity, and to aid in the determination that the vertical and horizontal extent of dissolved contamination has been determined in groundwater, the Draft RI should provide maps of the CVOC plumes (preferably with concentration contours) as they have been detected in the various aquifer units (shallow, intermediate, deep and very deep).

The labeling and designation of the monitoring wells is slightly different from what is reported in the text of the Draft RI (e.g., 88-MW16DW2) and what is reported in the supporting contaminant results tables for the same well (e.g., IR88-GW16DW2-05D). It was not clearly indicated in the Draft RI why the different well designations were utilized. Revise the Draft RI to clarify this issue.

**New figures will be created to illustrate the PCE, TCE, cis-1,2-DCE, and vinyl chloride plumes within the shallow, intermediate, deep, and very deep aquifer units. These figures will be included in Section 5.**

As stated in Section 5.2.1.1, the groundwater samples are designated with a "GW" identifier and are associated with a monitoring well that is designated with an "MW" identifier.

3. A section should be added to summarize/discuss the changes in plume conditions between the 2005 data and the initial investigations. It should identify if there has been an increase/decrease in concentrations and impacted area.

Accepted

4. Information should be included in Section 2.4.6 to discuss the 2005 contaminant levels in the wells that were associated with the RABITT technology. The information presented in the text reports of rapid degradation of PCE and TCE. It would be interesting to review the current conditions of this area.

The wells associated with the RABITT technology study were not sampled as part of the 2005 RI sampling effort.

### ***Specific Comments***

1. Section 5.2.1.1, Volatile Organic Compounds, Page 5-3

Section 5.2.1.1 of the Draft RI discusses the concentrations of the volatile organic compounds (VOCs) detected during the November 2005 sampling event at Site 88. The last paragraph on Page 5-3 states that the maximum concentration of tetrachloroethene (PCE) in the deep zone was 10,000 micrograms per liter (ug/L) reported at 88-MW18DW. However, Figure 5-4, VOC Exceedances in Deep Monitoring Wells, indicates that the maximum concentration of PCE in the deep zone is 11,000 ug/L in sample IR 88-GW16DW2-05D (collected from monitoring well 88-MW16DW2). In the text of the Draft RI, the last paragraph on Page 5-3 goes on to report elevated concentrations of PCE in other wells screened in the deep interval including MW16DW2, which it reports as 8,100 ug/L. An examination of Tables 5-2, Validated Groundwater Detections November 2005, and Table 5-3, Validated Groundwater Exceedances of Water Quality Standards November 2005, sheds some light on these apparent discrepancies. In both tables, sample number IR88-GW16DW2-05D report PCE concentrations at 8,100 ug/L as indicated in the text of the Draft RI. However, both tables also include sample number IR88-GW16DW2-P-05D which is the field duplicate of IR88-GW16DW2-05D and reports a PCE concentration of 11,000 ug/L. Additionally, the text in the "Nature and Extent" subsection in the Executive Summary on Page ES-3 indicates that the highest concentration of PCE detected within the deep aquifer was reported at well 88-MW16DW2. Typically in this situation the higher value is considered as the maximum detection in the interest of conservatism as is the case on Figure 5-4. Revise the text in this section to present the higher detected PCE concentration (field duplicate sample) as the maximum PCE detection for the deep interval, or explain the two detected concentrations and include both results. Also, correct Figure 5-4 to indicate that the PCE concentration indicated as sample number IR88-GW16DW2-05D is actually the PCE concentration detected in sample number IR88-GW16DW2-P-05D. Also, add a footnote to Tables 5-2 and 5-3 indicating that "P" in the

sample designation indicates a field duplicate sample. This information currently only exists in Appendix E, Data Validation Summary Reports.

The text "The maximum concentration of PCE within the deep zone (10,000 µg/L) was reported at 88-MW18DW. Monitoring well 88-MW18DW is located approximately 550 feet west of the former building 25 location, as shown on Figure 5-4. Elevated concentrations of PCE were also reported in monitoring wells 88-MW05DW (1,800J µg/L), 88-MW11DW (3.4 µg/L), MW16DW2 (8,100 µg/L), MW19DW (2.4 µg/L), MW23DW (7.4 µg/L), and 88-MW33DW (96 µg/L) during the November 2005 sampling event." will be replaced with "The maximum concentration of PCE within the deep zone (11,000 µg/L) was reported at 88-MW16DW2. Monitoring well 88-MW16DW2 is located approximately 350 feet west of the former building 25 location, as shown on Figure 5-4. Elevated concentrations of PCE were also reported in monitoring wells 88-MW05DW (1,800J µg/L), 88-MW11DW (3.4 µg/L), MW18DW (10,000 µg/L), MW19DW (2.4 µg/L), MW23DW (7.4 µg/L), and 88-MW33DW (96 µg/L) during the November 2005 sampling event."

Figure 5-4 will be modified to include the VOC exceedances from both IR88-GW16DW2-05D and IR88-GW16DW2-P-05D. Additionally, a footnote will be added to Table 5-2 and 5-3 to indicate that "P" represents a field duplicate sample.

2. Figure 3-6, Geologic Cross Section C-C'

One of the wells depicted on Figure 3-6 that lies between wells 88-MW5DW2 and 88-MW2DW has no well identifier. For consistency, revise Figure 3-6 to provide the appropriate identifier for this well (88-MW30IW ?).

Accepted

3. Figure 3-7, Geologic Cross Section D-D'

The well locations identified on Figure 3-7 as 88-MW35DW and 88-MW35IW are incorrectly identified. The three screened intervals depicted at this location correspond to wells 88-MW06, 88-MW6IW(R), and 88-MW6DW. Correct Figure 3-7 to indicate the appropriate well identifiers for this location.

Accepted

4. Section 5.2.1.1, Volatile Organic Compounds

This section discusses elevated concentrations of PCE and TCE in well MW19DW and states that this appears to be an isolated instance. There is not enough data to support this claim. Data presented in Appendix D for monitoring well MW19IW includes an estimated value for 1,1-dichloroethene. Monitoring well MW22IW-05D has elevated concentrations of PCE and TCE, while monitoring well MW22DW has no detectable concentrations. Monitoring well MW22 is approximately 250' North of MW19DW. Both of the well points (MW19 and MW22) are downgradient of the source. There is also a small clay lens that pinches out around well MW19 (figure 3-9). These are just a few

factors that bring into question the claim of an isolated source. This could be from source and is just a matter of fate and transport, the disappearing clay lens and/or monitoring well placement. Remove the statement "isolated instance" from the bottom of pages 5-3 and 5-4.

On page 5-3, the text "Monitoring well 88-MW23DW is located approximately 800 feet west of the Site 88 source area. The PCE reported in MW19DW (2.4 µg/L) appears to be an isolated instance. MW-19DW is located more than 1,600 feet southwest of the former building 25 location." will be replaced with "Monitoring wells 88-MW23DW and MW19DW are located approximately 800 feet and 1,600 feet downgradient of the source area, respectively."

On page 5-4, the text "Monitoring well 88-MW23DW is located approximately 800 feet west of the Site 88 source area. The TCE reported in MW19DW (3.8 µg/L) appears to be an isolated instance. MW-19DW is located more than 1,600 feet southwest of the former building 25 location." will be replaced with "Monitoring wells 88-MW23DW and MW19DW are located approximately 800 feet and 1,600 feet downgradient of the source area, respectively."

### ***General Comments on the Risk Assessment***

#### **1. Screening Level Ecological Risk Assessment**

The Draft Remedial Investigation, Site 88 – Operable Unit No. 15, Building 25 (Draft RI) is incomplete as the Draft RI did not include an analysis of ecological risks associated with releases from the site, only human risks were addressed. This is a significant oversight as the Draft RI indicates that vertical migration of elevated levels of tetrachloroethylene (PCE) has impacted all four aquifer units resulting in extensive plumes of chlorinated volatile organic compounds (CVOCs). PCE was detected at concentrations as high as 48,000 micrograms per liter (ug/L) in the shallow aquifer; 97,000 ug/L in the intermediate aquifer; 11,000 ug/L in the deep zone; and 10 ug/L in the very deep zone. The fate and transport analysis presented in the Draft RI states that the dissolved phase plumes are migrating to the west and northeast of the site towards the New River and Beaverdam Creek, respectively. However, the potential for the plumes to reach these water bodies was not demonstrated or evaluated. Furthermore, the presence of dense non-aqueous phase liquid (DNAPL) serves as a continuing source of groundwater contamination. Based on the level of groundwater contamination, the direction of groundwater flow towards the New River and Beaverdam Creek, information should be included to indicate that the plumes have or will be contained/remediated before discharge occurs into the surface water bodies. Revise the Draft RI to address this issue.

**The Draft RI will be revised to include an evaluation of the potential for impacted groundwater to discharge to nearby surfacewater bodies, and associated ecological risk.**

## 2. Quantitation of Risks Associated with Soil

Section 7.2.1, Potential Exposed Populations, of the Draft RI excluded the quantitative analysis of risks to soil because no impacted soils at the site are available for contact by current or future receptors. However, no justification was provided to substantiate this exclusion. Not until Section 7.5.1, COPC Selection, is it understood that surface soil has been removed from the site, that the site has been capped with clean soil and asphalt, deeper soils are currently being remediated and analytical results from subsurface soil samples indicate that remediation of the CVOCs is occurring. However, the Draft RI does not indicate if the "clean soil" and subsurface soils comply with health-based cleanup goals thus, justifying that the soil medium does not require further risk evaluation. The site is an active industrial area; therefore, the potential exists for future utility repair or site redevelopment to support base activities. Without a clear understanding of the cleanup goals being achieved in surface and subsurface soil, risk management decisions cannot be supported for the site. Revise the Draft RI to clarify the cleanup goals for surface and subsurface soil at the site and state whether these goals have been achieved so that fully informed decisions on the restricted or unrestricted use of the site soils can be made.

**The report will be revised to clarify the cleanup goals for surface and subsurface soil and to describe the ongoing remediation of site soils following the NTCRA.**

## 3. Vapor Intrusion

The primary contaminants of concern at the site are CVOCs; however, the Executive Summary states that the vapor intrusion pathway to indoor building air was not evaluated because Building 25 has been demolished. Section 7.2.1, Potential Exposed Populations, indicates that vapor intrusion had been evaluated. Vapor intrusion should be evaluated to determine whether future buildings can be constructed at the site and whether vapor mitigation measures are required in new building construction. Revise the Draft RI to clarify and ensure consistency across the Draft RI regarding how the vapor intrusion pathway was evaluated. Vapor intrusion is required to be evaluated under current and future land use assumptions in order to support risk management decisions on the site.

**The vapor intrusion pathway to indoor building air was evaluated as part of the remedial investigation. The executive summary will be modified to include this information.**