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MCAS CHERRY POINT
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TECHNICAL MEMORANDUM REGARDING THE RESPONSE TO REGULATORY AGENCY COMMENTS ON THE DRAFT OPERABLE UNIT 1 (OU 1) REMEDIAL INVESTIGATION ADDENDUM MCAS CHERRY POINT NC

11/17/2008

CH2M HILL

Response to Comments
Draft OU1 Remedial Investigation Addendum
Marine Corps Air Station Cherry Point, North Carolina

PREPARED FOR: Partnering Team

PREPARED BY: CH2M HILL

DATE: November 17, 2008

This technical memorandum presents the responses to regulatory agency comments received regarding the Draft OU1 Remedial Investigation Addendum prepared by CH2M HILL. Comments were received from the United States Environmental Protection Agency (USEPA) Region 4 on September 4, 2008. On September 5, 2008, the North Carolina Department of Environment and Natural Resources (NCDENR) indicated by email that it did not have any additional comments beyond those already submitted by the USEPA. Responses to each specific comment are provided below.

General Comments

Comment 1: There are a couple of references to investigations associated with the petroleum products that may have been released in the OU1 area. Granted, those releases are handled under a separate program and are not a focus of this document. However, there is a synergistic effect for groundwater remediation to have the carbon sources from the petroleum release in the mix with the dissolved chlorinated solvents. Please present the information from the petroleum release program where it geographically overlaps the chlorinated solvent plumes.

Response 1: Agreed. Isoconcentration maps for benzene will be prepared for the upper and lower surficial aquifers, since benzene was the most frequently detected petroleum-related chemical. Areas of free product will also be shown, as measured by the UST Program. Note that the petroleum-related compounds are expected to occur closer to the groundwater table due to the lighter nature of the chemical, whereas the chlorinated solvents tend to sink through the aquifer.

Comment 2: The Industrial Sewer System is Site 47 within OU1 and was used for the transport of industrial waste liquids to the waste water treatment plant. The description of the previous investigation of this site in Section 2.1.3 includes the conclusion that the soil VOC concentrations were the result of seasonal high water. This reviewer has not read that previous report but that conclusion seems unlikely without reviewing the data. Additionally, it has been this reviewer's experience that waste solvents transported in industrial sewer lines from the 1940's have the possibility of acting as 'line sources' for groundwater contamination. In evaluating the integrity of the sewer line for the possibility

of a release, one might ask if a groundwater sample was taken in the immediate vicinity of the repairs performed on the sewer lines. Again, this reviewer has not read any historical report about the investigation of the industrial sewer but that may be a source of uncertainty regarding the completeness of this RI.

Response 2: Agreed. Section 2 of the RI Addendum presents a summary of the results from previous investigations conducted at OU1. The 2002 RI is the primary source for this information. Additional investigations conducted since the 2002 RI did not focus on Site 47. Section 10.3.6 presents a status summary of Site 47 and concludes that the site is a potential source of chlorinated VOC groundwater contamination at OU1, and Site 47 will be addressed as part of the FS for the OU1 Central Groundwater plume.

Specific Comments

Comment 1: Section 3.4.4 describes an investigation in the Site 16 area which is near Sandy Branch and the East Prong of Slocum Creek. The report presents a summary of the work but no analytical results. If the analytical results are presented elsewhere in the report, please note that in the text. Otherwise, please provide the results in this section.

Response 1: Agreed. More details of the results from this investigation will be presented in Section 5.3 – Distribution of Contamination. The technical memorandum titled *Results of Additional Sampling near Monitoring Well 16GW04* dated May 2008 will also be included as an appendix.

Comment 2: Section 4.3.1 describes a groundwater mound in the area of well 16GW15. Please provide an explanation for this mounding. It does not appear to be in an area of dramatic upward gradients as indicated in the cross sections. Also note that this location appears to be labeled 16GW16 on Figure 4-4.

Response 2: Agreed. At the time of the preparation of the Draft RI Addendum, groundwater levels had not been collected simultaneously at all of the monitoring wells located in southeastern OU1 since the 1996 Remedial Investigation (Brown & Root, 1996). To better assess the nature and extent of contamination and groundwater conditions in southeastern OU1, groundwater samples and water levels were collected in August 2008 at 5 monitoring wells (16GW05, 16GW07, 16GW09, 16GW15, and MW30) located in the area of the reported groundwater mounding, as part of the additional monitoring well installation event. Groundwater levels will be evaluated to assess groundwater mounding conditions and the findings will be reported in the Draft-Final RI Addendum.

Groundwater mounding at monitoring well 16GW15 was also reported in the 1996 RI (Brown & Root, 1996) and the 2002 RI (TetraTech, 2002). Both of these RIs concluded that the groundwater mounding was a result of a minor topographic high in the area.

Figure 4-4 included 16GW16 in the cross-section but did not include 16GW15. Monitoring well 16GW15 will also be added to the cross-section.

Comment 3: The data presented in the figures of Section 5 were spot checked against the data tables and the values posted on the map matched the values in the data tables. One

figure of note, Figure 5-8, TCE Occurrence Yorktown Aquifer showed numerous wells sampled in 2006 where the analytical result was reported as a 10U indicating a non detect with a reporting limit of 10 µg/L. Usually, an elevated reporting limit indicates that the sample may have been diluted so as not to harm the analytical equipment. In these cases, there were no major detections, just elevated reporting limits above the MCL of 5 µg/L. As such, there is little confidence that the Yorktown aquifer is free of TCE in this area.

Response 3: Agreed. The 2006 investigation analyzed TCE with a reporting limit (RL) of 10 µg/L and a method detection limit (MDL) of 0.95 µg/L. The RL was selected to prevent damage to the laboratory analytical equipment because the investigation included the sampling of wells that had DNAPL-related concentrations and the location of these concentrations was unknown at the time. Concentrations above the MDL of 0.95 µg/L would be "J"-flagged (estimated concentration) if a positive detection was present.

During the 2002 RI activities, groundwater samples collected from the Yorktown aquifer monitoring wells were analyzed for TCE with a RL of 1 µg/L. Two monitoring wells contained TCE at a concentration of 0.13J (MW56) and 0.56J (MW57) µg/L. During the additional activities, the sampling event in 2004 at MW56 did not detect TCE (0.5U µg/L). As a result, the data from the 2002 RI and the RI Addendum support that the maximum TCE concentrations encountered within the Yorktown aquifer are below the regulatory standards.

If requested, the Navy could resample these monitoring wells with a lower RL. However, the results are not expected to alter the direction of the Feasibility Study for the OU1 groundwater plume.

Comment 4: Figure 5-4 indicates contamination associated with monitoring well 16GW07 located north of Site 18 west of Cunningham Boulevard. Section 5.3 does not address this area. Please revise the report to include information about the possible source of this contamination.

Response 4: Agreed**.** As discussed in the response to Specific Comment 2, additional samples were collected in August 2008 at monitoring wells located in the southeastern portion of OU1, as part of the OU1 additional investigation activities. Details of the findings will be presented in Section 5.3 of the Draft-Final RI Addendum.

Comment 5: The last paragraph of Section 1.2.2, Environmental History, of the Draft Operable Unit 1 Remedial Investigation Addendum, dated July 2008 (Draft RI Addendum), for the Marine Corps Air Station (MCAS) Cherry Point site presents the web address for the web-based Administrative Record for the facility (http://public.lantops-ir.org/sites/public/cherrypoint/AdminRecord.aspx). The link to the web site provided in Section 1.2.2 is not functioning properly. While the web site was generally accessible when the web address was copied into a web browser, application of the username and password provided at the web site did not always provide access to the electronic administrative record. At times, access was allowed; at other times an error message was encountered. Further the Final Remedial Investigation for Operable Unit 1(OU1), Marine Corps Air Station, Cherry Point, North Carolina prepared by TetraTech NUS, Inc. (TetraTech) in November 2002 (denoted as the 2002 RI in the Draft RI Addendum) was not found in the document table for the Administrative Record provided at the referenced web address or in

the electronic administrative record. Access to this document should be provided so stakeholders can verify assertions made in the RI Addendum regarding information contained in the 2002 RI. Review the procedures for accessing the electronic administrative record for Cherry Point and ensure the system is functioning as intended. Further, revise the Draft RI Addendum to provide stakeholders access to the 2002 RI, preferably through the web-based Administrative Record for the facility.

Response 5: Agreed. Additional steps have been taken to establish a system in which the functionality of the administrative record on the web site is proactively checked daily. If additional difficulties are encountered by USEPA with respect to entering a username and password, please contact the CH2M HILL Activity Manager (Doug Bitterman) so that additional troubleshooting activities can be performed.

Comment 6: Section 6.3, Fate and Transport Modeling, of the Draft RI Addendum presents the results of groundwater fate and transport modeling performed for OU1 using two screening-level models: BIOCHLOR Version 2.2 (Aziz et al., 2002) and Natural Attenuation Software (NAS) Version 2.2.0 (NAS; Widdowson et al., 2006). The modeling was performed to predict the source area concentration reductions required to prevent impacts to potential groundwater receptors at OU1. Fate and transport modeling demonstrated that source reduction of chlorinated volatile organic compounds (CVOCs) will be required to prevent the discharge of groundwater to the Sandy Branch Tributary #1 and/or Sandy Branch Tributary #2 above surface water standards. However, the Draft RI Addendum indicates there are extensive limitations to the modeling that was conducted, including assumptions made during model development and calibration. Further, some of the predicted model results were contradictory between BIOCHLOR and the NAS software. Additionally, the models assume reductive dechlorination as the sole biodegradation mechanism responsible for the reductions in CVOC concentrations measured in OU1 groundwater. Review of the dissolved oxygen measurement recorded in groundwater indicates that an aerobic pathway responsible for the degradation of the lesser chlorinated solvents (i.e., vinyl chloride) is also viable. Also, cometabolic reactions responsible for the breakdown of tetrachloroethylene (PCE) and trichloroethylene (TCE) due to the presence of methane dissolved in groundwater are also a viable degradation pathway. During the scoping of the feasibility study (FS) further resolution of the most appropriate path forward regarding source area reductions based on the modeling results needs to be presented. Revise the Draft RI Addendum to address this issue.

Response 6: Agreed. A discussion of additional potential degradation pathways will be added to the RI Addendum.

Comment 7: The discussion entitled EPCs on Page 8-13 of Section 8.5.3, Quantification of Exposure, summarizes the calculation of exposure point concentrations (EPCs) used in the Updated Groundwater Human Health Risk Assessment (HHRA) performed as part of the Draft Operable Unit 1 Remedial Investigation Addendum dated July 2008 (Draft RI Addendum), for the Marine Corps Air Station (MCAS) Cherry Point. According to the discussion, MCAS Cherry Point has determined EPCs for groundwater chemicals of potential concern (COPCs) according to the United States Environmental Protection Agency (EPA) Region 4 recommendations presented in the Supplemental Guidance to RAGS: Region 4 Bulletins (available on line at: http://www.epa.gov/region4/waste/ots/healtbul.htm). EPA Region 4 recognizes two

methods for calculating groundwater EPCs, including the method used by MCAS Cherry Point, with the preferred approach based on site-specific conditions such as the level of characterization of the nature and extent of groundwater contamination. Thus, additional site-specific information supporting the method used by MCAS Cherry Point (i.e., arithmetic average of sample results taken from the center of the plume) should be provided. Revise the discussion of EPCs used in the Updated Groundwater HHRA to address this issue.

Response 7: Agreed. This section will be updated with the following text:

Tables 3.1 through 3.4 in Appendix J list the EPCs for the groundwater COPCs. The method presented in the EPA Region 4 Supplemental Guidance to RAGS: Region 4 Bulletins, Section 4, Exposure Assessment, subsection Concentration Term, was used to calculate the EPC for the groundwater. The EPA Region 4 Bulletin states "Region 4 makes an exception to the use of the UCL as the exposure point concentration for groundwater. Groundwater exposure point concentrations should be the arithmetic average of the wells in the highly concentrated area of the plume." Therefore, the wells from the center of the plume were identified (as shown in Table 8-1), and the arithmetic average concentrations were calculated for the COPCs using these wells. Figures 5-4 through 5-12 present the isoconcentration maps for TCE, 1,2-DCE, and VC in the upper and lower surficial aquifer. The arithmetic average concentrations of the COPCs from these wells were used as both the RME and CTE EPC. However, if the arithmetic average concentration was greater than the maximum detected concentration (due to detection limits in some samples higher than the detected concentrations in other samples), the maximum detected concentration was used as the EPC.

Comment 8: In addition to the approach used to determine groundwater EPCs, Section 8.5.3, Quantification of Exposure, indicates volatile organic compound (VOC) COPC concentrations inhaled during showering were estimated using the model presented in Inhalation Exposures to Volatile Organic Contaminants in the Shower (Foster and Chrostowski shower model). Further, volatilization from standing water in open excavations was estimated using the same equations extracted from the American Society for Testing and Materials (ASTM) Publication E50.04 Provisional Standard Risk-Based Corrective Action Applied for Chemical Releases (Standard Guide for Risk-Based Corrective Action) used in the risk assessment submitted with the Final Remedial Investigation for Operable Unit 1 (OU1), Marine Corps Air Station, Cherry Point, North Carolina (2002 RI). While all the techniques used in the Updated Groundwater HHRA are appropriate for MCAS Cherry Point, each is associated with uncertainties that should be addressed in Section 8.8.2, Uncertainty Associated with Exposure Assessment. Revise Section 8.8.2 to identify and discuss sources of uncertainty associated with the methods used to estimate EPCs in the Updated Human Health HHRA. Ensure the additional discussion addresses the impact of each employed approach on risk and hazard estimates.

Response 8: Agreed. The modeling used to estimate volatile emissions from groundwater while showering and volatile emissions from standing water in an open excavation represents another source of uncertainty in the exposure assessment. Both of these models provide conservative estimates of potential air concentrations associated with the groundwater, and therefore over-estimate the

potential risks associated with exposure through these pathways. Details of the uncertainties will be provided in Section 8.8.2.

Comment 9: The information provided in Table 8-3, Potentially Complete Human Exposure Pathways for Groundwater, Conceptual Site Model, OU1, is not presented in a clear and straightforward manner. For example, the Construction Worker is listed twice under future residential land use. The first listing is in conjunction with the adult and child resident. Ingestion, dermal contact, and inhalation are identified as exposure routes. The second listing under future residential land use focuses solely on the Construction Worker and identifies dermal contact and inhalation as exposure routes. The Construction Worker is also listed under future industrial land use. The exposure media and exposure route information in this entry is in agreement with the accompanying text and Figure 8-1, Conceptual Site Model for Potential Human Exposures at OU1. Revise Table 8-3 to eliminate the Construction Worker as a potentially exposed population under future residential land use.

Response 9: Agreed. A future construction worker is a potential receptor under both industrial and residential site use. However, to make Table 8-3 more straightforward, the first listing for the construction worker under residential land use will be removed, and the second listing, currently industrial land use, will be changed to indicate industrial/residential under the land use.

Comment 10: The Draft RI Addendum indicates that the potential exists for migration of chlorinated VOC vapors from groundwater into the vadose zone and that a soil vapor investigation and risk evaluation are recommended for OU1. Ensure the risk evaluation of the vapor intrusion pathway evaluates exposure to current site workers in industrial buildings, as well as future adult and child residents vapor intrusion into basements.

Response 10: Disagreed. Since the current land use is industrial and residential use is not anticipated within OU1, the proposed vapor investigation will focus on evaluating exposure to site workers in industrial buildings. If future land use changes from industrial to residential, vapor intrusion at OU1 would be reevaluated at that time.

Comment 11: The exposure parameters listed in Table 4.1, RME, Values Used for Daily Intake Calculations Reasonable Maximum Exposure OU1, of Appendix J, Human Health Risk Assessment Calculations, were used in calculating daily intake for reasonable maximum exposure (RME). It is unclear why Table 4.1 lists an exposure frequency (EF) of 350 days per year (days/year) rather than 365 days/year. It appears that an EF of 365 days/year was used to calculate the averaging time for carcinogens, AT-C. Resolve this discrepancy. Additionally, in many calculations the exposure duration (ED) values do not appear conservative. For example, an ED of 24 years is used for adult residents when an ED of 70 years should be used to account for lifetime exposure. Provide an additional table in Appendix J or update Table 4.1 to provide justification for the exposure parameters used in calculations. Update parameter values, where needed, to ensure that appropriate values are being used to calculate daily intake for RME.

Response 11: Disagreed. The exposure frequency (EF) of 350 days/year is the standard residential EF (from EPA guidance) assuming a resident takes a 2 week vacation from home each year. The averaging time (AT) is the number of days in

the time period of exposure that the exposure is averaged over. Since the AT is in years (i.e. 24 years for an adult for noncancer exposure, or 70 years for cancer exposure), it is converted from years to days by multiplying by the number of days in a year (365 days). The EF is not used to convert the AT from years to days, but the actual number of days in the year is used for this conversion. The AT is not expected to represent the number of days the receptor is exposed, but to represent the total number of days during the time period the receptor is exposed, and is different from the EF since vacation time is not incorporated in the time period of exposure.

The exposure duration (ED) of 24 years for an adult resident is the standard reasonable maximum exposure (RME) ED from EPA guidance. A typical resident does not live his or her full life in one location, and the value of 24 years is based on studies examining the duration people live at a residence, as presented in the EPA guidance documents referenced in Appendix J, Table 4-1. As these are standard EPA default values, and the values are referenced to the EPA documents, further documentation in the report is not needed, and the values do not need to be changed.