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DEPARTMENT OF THE NAVY
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22 MAY 1995

From: Commanding Officer, Navy Environmental Health Center
To: Commanding Officer, Atlantic Division, Naval Facilities Engineering Command, ATTN: Linda Saksvig, 1510 Gilbert Street, Norfolk, VA 23511-2699

Subj: MEDICAL REVIEW OF INSTALLATION RESTORATION PROGRAM DOCUMENTS FOR MARINE CORPS BASE, CAMP LEJEUNE, NC

Ref: (a) Baker Environmental transmittal ltr of 28 Feb 95

Encl: (1) Medical Review of Draft Final Remedial Investigation Report, Operable Unit No. 4 (Sites 41 and 74), and Draft Final Feasibility Study for Operable Unit No. 4 (Sites 41 and 74), Marine Corps Base, Camp Lejeune, North Carolina
(2) Medical/Health Comments Survey

1. As you requested in reference (a), we completed a medical review of the "Draft Final Remedial Investigation Report, Operable Unit No. 4 (Sites 41 and 74)," and "Draft Final Feasibility Study for Operable Unit No. 4 (Sites 41 and 74), Marine Corps Base, Camp Lejeune, North Carolina." The attached comments are included for your information as enclosure (1).

2. Please complete and return enclosure (2). Your comments are needed to continually improve our services to you.

3. The points of contact for this review are Ms. Katharine Kurtz or Mr. David McConaughy, Health Risk Assessment Department. If you would like to discuss this medical review or if you desire further technical assistance, please call them at (804) 444-7575 or DSN 564-7575, extensions 490 and 434, respectively.

Y. P. Walker

Y. P. WALKER
By direction

Blind copy to:
CNO (N-453)
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MEDICAL REVIEW OF
DRAFT FINAL REMEDIAL INVESTIGATION
AND FEASIBILITY STUDY REPORTS
FOR OPERABLE UNIT NO. 4 (SITES 41 AND 74)
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

References: (a) Risk Assessment Guidance for Superfund, Vol. 1, Part A: Human Health Evaluation Manual, Dec 1989 (EPA 540/1-89/002)
(b) Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program, June 1988, NEESA 20.2-047B
(c) The Water Encyclopedia, 2nd Edition, Van der Leeden, Troise and Todd, Lewis Publishers, 1980

General Comment:

1. The draft final documents entitled "Draft Final Remedial Investigation Report, Operable Unit No. 4 (Sites 41 and 74), Marine Corps Base, Camp Lejeune, North Carolina," (Report Volumes 1 and 2 and Appendix Volumes 1, 2 and 3 and "Draft Final Feasibility Study for Operable Unit No. 4 (Sites 41 and 74), Marine Corps Base, Camp Lejeune" dated February 1995 were provided to the Navy Environmental Health Center (NAVENVIRHLTHCEN) for review on 2 March 1995. These draft final Remedial Investigation/Feasibility Study (RI/FS) reports were prepared for the Atlantic Division, Naval Facilities Engineering Command by Baker Environmental, Inc. Our comments and recommendations are provided here.

RI Report Review Comments and Recommendations:

1. Page ES-9, "Groundwater;" Pages 5-6, 5-7, Section 5.3.4, "Inorganics"
   Page 4-11, Section 4.1.3, "Groundwater;" Table 4-20
   Page 6-28, Section 6.6.2, "Exposure Assessment"

Comments:

a. The report discusses the variations in total (unfiltered) metal concentrations detected among different ground water sampling rounds. For the most part, a lower concentration was detected when the low flow purge technique was employed. For example, the lead level in well 41GW11 decreased from 12,600 to 26.3 micrograms per liter (ug/L) depending on the sampling method used. The RI report indicates that the elevated concentrations of total metals probably is due to the turbidity caused by using much higher pumping rates when pulling the samples; however, we feel that the possibility of leaching of these metals from the soil/sediment to the ground water as being the cause of the higher metal concentrations should not be totally discounted. Because the data used to calculate the risk to human health from metal exposure was exclusively from analyses where the samples were pulled by the low flow sampling technique

(where these results were available), the risk potentially could be biased low for metal contamination.

b. Also, the sampling methods used to determine the base background metal levels are not described in the RI report. If the method of sampling the ground water for the base background study differs from the method used to analyze the potential site-related contaminants, a true comparison of data obtained becomes more subject to misinterpretation. (Appendix T provides a draft evaluation of metals in ground water at Camp Lejeune). A more detailed explanation of the different sampling methods that describes the variations in the techniques would be helpful for comparison purposes.

Recommendations:

a. We feel that additional evaluation of the low-flow purge technique versus the higher flow rate method for sampling ground water is needed before the results of the first sampling rounds can be eliminated from the risk assessment calculations.

b. The evaluation should include a discussion of the sampling method used to determine the base (and site-specific) background levels of metals because the Operable Unit No. 4 (O.U. #4) Site contaminants are compared to this background data throughout the RI report.

2. Pages ES-5, 1-4, 3-3, 3-4; Figure 2-10
   Page 3-10, Section 3.7, "Water Supply;" Tables 3-11, 3-12, Figure 3-21
   Page 6-28, Section 6.6.2 "Exposure Assessment"

Comments:

a. The text states that operational supply well HP-654 is not contaminated, based on previous sampling results. The well house appears to be located on Site 74, next to Gravel Road, about 150 feet west of the Former Pest Control Area (Shallow Well 74GW8). The report also indicates that no other supply wells were sampled during this investigation, but did refer to periodic monitoring of certain supply wells for full organic and inorganic analyses. Supply wells HP-629 and HP-621 are located down gradient of Site 74 and reportedly may be impacted by site-related contamination.

b. The report indicated that geologic/hydrologic investigation of nearby Site 82 did not determine a ground water retarding layer beneath Site 82 until a depth of 220 to 230 feet below ground surface (bgs). Although the subsurface investigation of Site 74 was limited to a depth of approximately 20 to 25 feet, the report states that the subsurface geologic conditions at Site 74 are believed to be similar to that described for Site 82. The Castle Hayne Aquifer was identified at a depth of approximately 90 to 100 feet.

c. The report indicates that no deep wells have been installed at Site 74. In addition, the text states that the Surficial Aquifer is not used as a water supply source; therefore, current risk to receptors was not evaluated for the ground water pathway. The total Site risk to receptors is reported to be driven by future potential exposure to shallow ground water from metals contamination. The principal base water supply is reported to be associated with the Castle Hayne Aquifer.

Recommendation: Provide the dates and previous test results for the supply wells mentioned in the report as having the potential to be impacted by site-related contamination. Due to the discontinuous nature of the confining layer between the deep and shallow aquifers, we feel that a discussion should be presented concerning the potential migration of chemicals from the shallow to the deep aquifer and any impact this may have on the supply wells. Consideration should be given to presenting risks for shallow and deep ground water pathways for both the current and future exposure scenarios, as appropriate.

3. Page ES-5; Figure 1-2; Site 69 Rifle Range

Comments:

a. According to the report, Site 69 originally was considered part of O.U. #4, but was evaluated separately because of the documented chemical warfare material (CWM) disposed of at the Site (drums, etc.).

b. The potential for contamination of O.U. #4 Sites from deterioration of Site 69 drums and/or other Site contaminants' movement should be discussed in terms of likely fate and transport of Site 69 Chemicals of Potential Concern (COPC) (any impact of O.U. #4 contaminants on other Sites also should be addressed, if applicable).

c. Information concerning the depth of CWM drum burial at Site 69 would be useful as it may indicate common practices at Camp Lejeune for drum burial depth of chemical agents.

Recommendation: Discuss the possible need for continued monitoring for and/or impact of other Camp Lejeune site's contamination affecting these Sites (and *vice versa*). If this issue is not relevant due to other remediation efforts, and/or fate and transport modeling studies undertaken, provide this information in the RI report.

4. Pages ES-6, "Site 41;" Page 2-15, "Soil Sampling Procedures"

Comment: The text refers to the U.S. Army Technical Escort Unit (TEU) field screening procedure for chemical surety agents. A person unfamiliar with this procedure may not be aware of any potential volatile loss from the site-related samples that could have occurred during the field procedure prior to sample analyses.

Recommendation: The report should describe the field test in greater detail to discount this possibility.

5. Pages 5-1 - 5-6, Section 5.0, "Contaminant Fate and Transport"

Comment: The environmental fate and transport of the possible key Site contaminants and the toxicological characteristics of these compounds were not discussed adequately (i.e., very little information was provided concerning the properties of the potential CWM that may be present). While we understand that actual CWM were not found on the Sites, information on the likely chemical surety agents disposed of, such as physical/chemical properties and environmental fate, would aide in identifying all the media that may receive this potential site-related contamination. Specific information on the CWM and ordnance materials properties/breakdown products/antidotes/etc. would also be required for inclusion in the Health and Safety Plan for safety reasons.

Recommendation: Consider inclusion of this additional material in the RI report.

6. Page 3-9, Section 3.5.2, "Site 41;" Page 8-1 - 8-3, Section 8.0, "Conclusions"

Comment: The report indicates that the Site is used for military training activities but it does not describe the types of activities and whether a potential exists for any digging or soil disturbance during training. As this Site reportedly had thousands of mortars and a case of grenades disposed of, trainees/instructors/Site trespassers/Site investigation-remediation personnel, etc. need to be aware of the potential hazards that may be present. The RI does discuss the need to consider restricting access and/or other institutional control measures for both Site 41 and Site 74.

Recommendation: Provide more details concerning the military training activities on-site to better evaluate the potential exposure to site-related contaminants. Consider posting warning signs, etc. for both Sites 41 and Site 74.

7. Page 1-3, Section 1.3.1, "Site 41 Description"

Comment: The text describes drums of various sizes (i.e., 5 gallons to 55 gallons) present throughout the disposal area at random locations. Information concerning the approximate total capacity of all the drums and any markings possibly indicating former drum contents is not given. This additional data would be useful for Site evaluation, if available.

Recommendation: Provide an estimate of the quantity of material and the type of markings, if feasible.

8. Page 1-3, "Site 41 Description"

Comment: Site 41 apparently contains excavated soil, as identified by the Soil Conservation Service survey (U.S. Department of Agriculture, 1984). The text does not address this fact in the discussion of comparison of Site 41 metals contamination with base background determinations.

Recommendation: Discuss the implications of the presence of excavated soil in regard to base background comparisons.

9. Page 2-1, Section 2.2.1, "Geophysical Investigation;" Figure 2-1
Page 2-12, Section 2.3.2, "Preliminary Site Survey"
Section 2.3.1, "Geophysical Investigation"
Page 4-19, Section 4.1.3.3, "Extent of Contamination"

Comments:

a. A geophysical grid was established at 100 foot intervals for Site 41. The geophysical data "indicated widespread burial of ferrous and non-ferrous metallic objects..." The report stated that the high concentration of total lead in ground water indicates a potential source in the central portion of the Site; however, additional details were not provided concerning possible future attempts that may be made to locate the source of the contamination.

b. Three soil grids were placed at Site 74. The Former Disposal Area (FDA) grid was established on 100 foot by 100 foot spacings; the Former Pesticide Area (FPA) grid was established on 50 foot by 50 foot spacings; and the Pesticide Disposal Area (PDA) grid was established on 200 foot by 200 foot spacings. The text does not provide an explanation as to the criteria used to determine grid spacings.

c. The results of the geophysical survey performed for Site 74 to map the lateral extent of buried waste and to identify buried metal objects and other debris on Site reportedly was ineffective in detecting the boundaries of the disposal trench excavation. The ground penetrating radar (GPR) technique also was unable to detect any debris material "...due to the limited radar signal penetration."

Recommendation: A more detailed explanation of the methods chosen to determine the potential source areas at O.U. #4 appears to be necessary. Indicate if either further site characterization or looking for contamination elsewhere based on probable/known past disposal practices is planned.

10. Page 2-3, Section 2.2.2.3, "Soil Sampling Procedures"

Comments:

a. The text indicated that "Surface (ground surface to 1 foot bgs) and subsurface (deeper than 1 foot bgs) samples were retained for laboratory analysis...only the surface soils, however, were collected for human health...risk assessment evaluation " (*see* Comment #14 given here).

b. Reference (a) defines surface soil samples as samples taken from depths of zero to 6 inches. The *ATSDR Public Health Guidance Manual* (1994) (Agency for Toxic Substances and Disease Registry) defines "surface soil" samples as soil samples taken from depths of zero to three inches, and "subsurface soil" samples are defined as samples taken at depths greater than three inches.

Recommendation: We are encouraging the adoption of "zero to three inches" as the norm for surface soil sample collection for any future site soil sampling investigation and/or monitoring efforts that may be undertaken. The adoption of this sampling protocol will not be in controversy with current EPA guidance since Reference (a), Page 4-12, does direct that surface soil samples should be collected "from the shallowest depth that can be practically obtained" to accurately reflect potential surface soil exposure pathways.

11. Page 2-5, Section 2.2.2.5, "Quality Assurance and Quality Control;" Table 2-4

Comment: The report indicates that field blank samples were taken from Site 69, which is no longer part of O.U. #4. Although in close geographical proximity, Site 41 and Site 74 (O.U. #4) have different disposal histories and would be expected to have different field background conditions present. Field blanks should be taken during the same sampling event as for the samples to determine potential site-related contamination. (A sampling event is considered to be from the time the sampling personnel arrived at the site until they leave for more than a day (Reference (b), Page 18)).

Recommendation: If using Site 69 field blanks for the evaluation of O.U. #4 site-related contamination is expected to impact the analytical results, this should be addressed in the uncertainty section. Indicate if the Site 69 "sampling events" concurred with Sites 41 and 74 sampling events.

12. Page 2-6, Section 2.2.2.6, "Analytical Program"

Comment: CWM, thiodiglycol, mirex, ordnance and cyanide analytical tests were not performed for 10 of the 34 Site 41 on-site soil samples. An explanation is not provided as to why only full TAL inorganics and TCL organics testing were performed for these 10 samples.

Recommendation: State the reason for this decision in the report.

13. Chemical Nomenclature

Comment: Thiodiglycol is misspelled in the report text; e.g., on page 2-6 it is spelled as "thiodyglycol." In addition, the term propanol alcohol appears in the report. The correct terminology would be either 1-propanol or 2-propanol, depending on the position of the "OH" group in the chemical referenced. The "ol" ending designates the chemical as an alcohol; the terminology "propanol alcohol" is not correct (i.e., using isopropyl alcohol as the common name for 2-propanol is acceptable).

Recommendation: Follow the International Union of Pure and Applied Chemistry (IUPAC) and/or the *Chemical Abstracts* rules for the naming of organic compounds. Correct editorial errors.

14. Pages 2-3, 2-14, 2-15, Site 41; Table 2-1, "Summary of Remedial Investigation Objectives" Page 6-29, Section 6.6.3, "Sampling Strategy;" Page 6-8, Section 6.2.2.1, "Subsurface Soil"

Comments:

a. Some of the objectives of the RI listed in the table cited are the following: to assess the human health risks associated with exposure to surface soils at Site 41; to assess the possible migration of buried wastes to the subsurface site; and to assess the health risks posed by potential future usage of both the shallow and deep ground water.

b. In light of these stated objectives, it is not clear why only the surface soils (instead of both the surface and the subsurface soils) were collected for the Human Health Risk Assessment (HHRA) evaluation. The report indicated that subsurface soils were collected to evaluate the nature and extent (both horizontal and vertical) of potentially impacted soils; however, only surface soil samples generally were sent to the laboratory for testing. Data on the potential human health risks posed by subsurface soils exposure would be expected to impact the remediation decisions made (the text indicates that due to the possible presence of buried chemical agents, the subsurface soil investigation did not consider potential "hot spots" through extensive sampling). This statement does not explain why the subsurface soil samples that were taken were not sent to the laboratory for testing.

Recommendation: Explain why only surface soil samples were sent to the laboratory for testing when subsurface soil samples reportedly also were taken (if this is not the case, then explain).

15. Figures 1-1 and 1-2

Comment: These figures depict an "Everett Creek" that appears to be in close proximity to O.U. #4. We were unable to locate a reference to this Creek in the text or in other Figures in the report.

Recommendation: The text should indicate whether this is a surface water body that potentially can be impacted by site-related contaminants.

16. Page 3-9, Section 3.5.3, "Site 74;" Section 3.5.2, "Site 41"
Page 7-10, Section 7.2.4.2.1, "Aquatic Endpoints;" Pages 6-9, 6-12 "Surface Water"

Comments:

a. According to the report, hunting is permitted in the areas of Sites 41 and 74; however, a pass (Site 74) or base command permission (Site 41) is required to ensure that hunting activities do not interfere with military training at the sites. The RI report indicates that sensitive ecological receptors in the area are evaluated as part of the ecological risk assessment. We were unable to locate a discussion of potential human health exposure to site contaminants via the food-chain pathways present. Terrestrial organisms (e.g., deer, rabbits, raccoon, fowl) can serve as food sources for human consumption. These organisms can themselves come into direct contact with site contamination (e.g., dermal absorption from contaminated surface soil) or they can consume smaller mammals and plants that potentially have been contaminated.

b. A brief mention is made in the text of recreational fishing activities for Site 74 Henderson Pond surface water; we were unable to locate any other reference to fishing activities in the RI report for other O.U. #4 surface waters. The RI report does indicate that swimming activities do not occur in these surface waters. Since fishing is an activity conducted at Henderson Pond (or perhaps in some of the other site-related surface waters), the text should discuss the potential human exposure to site-related contaminants that can occur from ingestion of fish and/or shellfish.

c. The text indicates that "Aquatic biota samples (e.g., fish, shellfish and benthic macro invertebrates) were not collected as part of the field activities at Sites 41 and 74." This statement would seem to suggest that these species were present in some/all of the surface waters mentioned in the report.

d. Reference (a), Page 4-16 states that "If only human exposure is of concern, chemical concentrations should be measured only in edible portion(s) of the biota.

Recommendation: We feel that several data gaps need to be addressed in the baseline human health risk assessment (i.e., this document should be a "stand alone" document and should

be separate from an ecological risk assessment). The RI should consider the potential human health risks from consumption of terrestrial and/or aquatic organisms, as described in Reference (a), that are applicable to the Sites.

17. Page 3-10, Section 3.7, "Water Supply"
    Figure 3-19, "Location of Water Supply Wells Within One-Mile Radius of Sites 41 and 74"

Comment: The report cites a "Figure 3-21;" however, we were unable to locate this figure. We feel that the text should read Figure 3-19 instead of Figure 3-21.

Recommendation: Correct the text or provide a copy of the figure cited.

18. Table 3-11, "Summary of Water Supply Wells Within a One-Mile Radius of Site 41"
    Table 3-12, "Summary of Water Supply Wells Within a One-Mile Radius of Site 74"

Comment: According to the well numbers, it appears that "Table 3-11" applies to Site 74 (e.g., HP-654 is included) instead of Site 41 and "Table 3-12" applies to Site 41 (table names are reversed). In addition, Note 3 for Tables 3-11 and 3-12 refers to Figure 3-21, which we could not locate. Neither of the tables provides information or lists well number 621 (one-quarter mile downgradient of Site 74).

Recommendation: Correct errors noted here, as applicable.

19. Page 6-12, Section 6.3.1, "Site Conceptual Model of Potential Exposure"
    Page 8-2, Section 8.0, "Conclusions"

Comment: The RI report mentions the proximity of U.S. 17 to Site 41. If it is possible or probable for trespassers to enter the base and thus become potential human receptors to the various contaminants present throughout Site 41, then trespassers should be considered as a potentially exposed population. (*see* Comment #6 given here concerning possible adoption of institutional controls for both Sites 41 and 74).

Recommendation: Consider the trespasser exposure pathway in the HHRA for the current scenario; if this scenario is not a possibility, then provide strong evidence to justify elimination of this pathway from consideration (e.g., describe security measures that would prevent unauthorized entry).

20. Page 4-4, Section 4.1.1.2, "Background Surface Soils"
Tables 4-5, 4-8

Comments:

a. The tables (in the text) and in the "Table 4" section of the report contain discrepancies concerning the units for the metal concentrations in soil. The units of ug/kg appear to be incorrect (should be mg/kg). These apparent errors need to be corrected.

b. Table 4-5 presents a comparison of site surface soil samples to site-specific and base background levels. As stated in Region IV Risk Assessment Guidance, the criteria for determining the significance of inorganics detected should be two times the background concentration. It is not clear from the text whether the site-specific background levels or the base background metal levels were used to select the chemicals of potential concern (COPC).

Recommendation: Correct unit reporting errors throughout the RI/FS, as applicable. Clarify the rationale used to select COPC for evaluation in the HHRA.

21. Page 4-11, Section 4.1.2.3, "Extent of Contamination"

Comment: The text cites Table 4-11 as a comparison of inorganic levels in subsurface soils to base background. The correct citation is Table 4-8.

Recommendation: Please correct citation.

22. Page 4-13 Table.

Comment: The Federal Maximum Contaminant Level (MCL) for iron is given as 300 ug/l throughout the RI report. Iron does not have a Federal Maximum Contaminant Level.

Recommendation: Make these corrections in the report.

23. Page 4-11, Section 4.1.3, "Groundwater;" Figures 4-16, 4-17, 4-18
Pages 4-18 - 4-20, Section 4.1.3.3, "Extent of Contamination"
Page 3-3, Section 3.4, "Hydro-geology"
Page 8-1, Section 8.0, "Conclusions"

Comments:

a. As already discussed in Comment (2b), the clay layers separating the Surficial Aquifer from the Castle Hayne Aquifer are thin and discontinuous in most of the area. In light of this discontinuity, it appears that contaminants have the potential to migrate from the Surficial Aquifer

to the Castle Hayne Aquifer, which is the aquifer associated with the base drinking water supply wells. Although ground water samples from both aquifers indicated elevated lead concentrations (e.g., lead was detected in ten wells during round two above Federal and State drinking water standards in the shallow aquifer), no discernable pattern was exhibited.

b. The current ground water-pathway scenario was not evaluated based on the fact that "no water supply wells are currently located near the site." This statement does not appear to agree with either Table 3-12 or Figure 3-19, which show the locations of water supply wells within a one-mile radius of Site 41 (TC 190, TC 1000, TC 1001, TC 1225, TC 1258). These wells appear to be located north of the site. The report did not discuss the potential for Site 41-related contamination to migrate to other supply wells located down-gradient of the site.

Recommendation: Consideration should be given to evaluating the risks for the shallow and deep ground water pathways for Site 41 for both the current and future scenarios, as appropriate.

24. Page 4-35, Section 4.2.1.1, "Analytical Results"

Comment: The text states that "Beryllium, cobalt, and thallium were the only inorganics not detected in the surface soil at Site 41." The site under discussion in this section of the report is Site 74 - Mess Hall Grease Pit Disposal Area.

Recommendation: Amend any incorrect reference to location of inorganics analyzed for in surface soil.

25. Page 4-37, Section 4.2.1.3, "Extent of Contamination;" Figure 4-31
Page 6-10, Section 6.2.2.2, "Site 74"

Comment: The text indicates that the semi-volatile *bis*(2-ethylhexyl)ether was present in surface soils of Site 74 FDA and south of the Former Disposal Area (FDA) at one location of the Potential Disposal Area (PDA). Figure 4-31 lists the contaminant *bis*(2-chloroethyl)ether as present at a number of FDA locations. We are unable to locate the chemical *bis*(2-ethylhexyl)ether in the figure. Neither chemical is shown in the figure for the PDA soil sampling grid area.

Recommendation: Correct any discrepancies between text and figure.

26. Pages 4-35, 4-39, Section 4.2.1, "Surface Soil;" Section 4.2.2, "Subsurface Soil"
Figure 4-39

Comment: The concentrations of inorganics are reported in units of ug/kg in Figure 4-39 and in the tables (tables are part of the text and are not located in the "tables" section of the report). These values should be reported in mg/kg.

Recommendation: Correct the units, as appropriate.

27. Page 4-46, Section 4.2.6, "Engineering Parameter Results"

Comment: The report indicates that no analytical data is available from engineering analysis of the soil sample from monitoring well boring 74-GW05 due to problems at the laboratory with reporting (e.g., alkalinity data, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), total phosphorous, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), total Kjeldahl nitrogen and standard plate count. A discussion of the potential impact of this omission of data is not included in Section 6.6, "Sources of Uncertainty." If re-sampling of the soil sample is planned for the wet chemistry analyses, this information should be included. More specific details concerning the nature of the laboratories' problems would prove helpful in evaluating what remedies may be needed for future sampling/testing.

Recommendation: Provide the additional information and explanations requested, as appropriate.

28. Page 4-46, Section 4.2.7, "Quality Assurance/Quality Control"

Comment: The detection of Di-*n*-butylphthalate in the rinsate sample is discussed in the report possibly as being attributed to contamination from phthalates from the gloves used in the field coming into contact with isopropanol used during the decontamination procedure. Selection of glove type to be used in the field should be based on an evaluation of the performance characteristics of the personal protective equipment (PPE) relative to the requirements and limitations of the Site, the task-specific conditions, the hazards and potential hazards identified at the Site including the Site Health and Safety Plan requirements. Other glove types such as neoprene should be investigated for possible use that may meet the criteria given here as well as being specifically impermeable and/or chemically resistant to isopropanol.

Recommendation: Investigate alternative glove types such as neoprene for future sampling/decontamination activities that would provide greater chemical resistance to the task at hand and meet the requirements of 29 CFR Part 1910, Subpart I.

29. Page 4-45, Section 4.2.5.2, "Extent of Contamination;" Page ES-15, Site 41, "Conclusions"
Page 4-47, Section, "Summary;" Pages 8-2, 8-3, Section 8.0, "Conclusions"
Page ES-2, "Site description and History;" Page ES-16, Site 74, "Conclusions"

Comments: It seems apparent from our review of the Draft Final RI report that the total quantitative Site risk for Sites 41 and 74, O.U. #4, as shown in Tables 6-28 and 6-29, does not depict a totally accurate, complete and representative picture of the risk to human health for either the current or future scenarios because of the incomplete nature of the investigation. The explanation for the limited sampling effort performed is discussed briefly in Section 6.6, "Sources of Uncertainty."

Recommendation: Indicate if additional investigations/modeling studies are planned for these sites. (*see* Recommendation #2 given here). The RI should discuss any deed restrictions that may be in place at this time for these Sites to prevent future residential use/construction activities. Additional information concerning any possible avenues to take to ensure deed restrictions are in place should these Sites ever be transferred from Department of Defense ownership need to be addressed in the FS, if possible.

30. Pages ES-2, ES-3, "Site Description and History"

Comment: As stated in the text, the United Stated Chemical Material Destruction Agency (USACMDA) has classified Sites 41 and 74 as "Classification 3, Suspected Burial" of CWM in 1993. The RI report indicates that "Based on information collected during the RI, which may not have been available at the time the USACMDA report was published, Site 41 may actually be classified as a Class 2 site (Likely Burial) and Site 74 may actually be classified as a Class 4 site (Possible Burial)." The report does not address whether the results of the investigation will be reviewed by representatives from the USACMDA for comments, recommendations and possible re-classification of the sites.

Recommendation: Discuss whether USACMDA has also reviewed the findings of the RI and provide any comments they may have made, if appropriate.

31. Page 4-36, Section 4.2.1.2, "Background Surface Soils;" Figures 4-30, 4-32

Comment: Four background surface soil boring locations for Site 74 are indicated in the figure cited here, according to the report. Neither the text, the figure itself or the figure legend provides the reader with sufficient information to be certain of the location of the correct soil boring background sampling areas.

Recommendation: It would be helpful to use a separate symbol in the figure and the legend to differentiate the background soil boring sampling locations from the other sample locations (especially when the same symbol and alpha-numeric designation is given for both. As a suggestion, indicate soil background locations as shown in Figure 4-32, where a different symbol is used (diamond versus circle) and the alphabet designation "BB" is used, with an explanation provided in the legend.

32. Pages 4-46, 4-47, Section 4.2.7, "Quality Assurance/Quality Control Results"
Page 6-28, Section 6.6.1, " Analytical Data"

Comment: According to the report, all Target Analyte List (TAL) inorganics were detected in the Quality Assurance/Quality Control (QA/QC) samples (most were qualified with U, UJ, R and UR qualifiers). The report did not offer any explanations to indicate where the possible sources of contamination occurred (field or laboratory) or if the laboratory and/or data reviewer may have offered suggestions for any procedural changes to prevent future sample and/or

instrument, standards, etc. contaminations. In addition, the report indicated that "B" qualified data was not included in the quantitative risk assessment. Reference (a), Pages 5-12 and 5-13, Exhibit 5-4 indicates that both inorganic and organic data that is "B" qualified should be included in the quantitative risk assessment.

Recommendation: Provide any comments made by the laboratory or the data reviewer concerning the QA/QC data for inorganics and state if all/numerous TAL inorganics are commonly detected in the QA/QC samples run by this laboratory. Follow Reference (a) guidance concerning Contract Laboratory Program (CLP) laboratory data qualifier use in quantitative risk assessment.

33. Pages 1-3, 1-4, Section 1.3, "Site Descriptions and Histories"

Comment: The text refers to a past explosion of High Test Hypochlorite (HTH) on Site 69, in addition to historical information indicating that Site 41 reportedly had received thousands of mortar shells and a case of grenades for disposal. We are concerned that adequate safety precautions are in place for the workers conducting the RI/Feasibility Study (FS) and conducting any additional remediation efforts that may be undertaken. We also are concerned for the safety of the military personnel, military families, civilian workers and any other Site users/trespassers. (The report did mention general safety concerns under the future construction worker scenario). The report does not refer to a Health and Safety Plan that currently may be in place that specifically addresses these issues; nor does it discuss the likelihood of explosion hazards occurring from temperature changes, decomposition of materials or any synergistic effects possible and/or probable under the present/future conditions of the sites.

Recommendation: Provide information concerning Health and Safety Plans, conclusions concerning explosion hazard assessments and likely effects, etc.

34. Page 4-41, Section 4.2.3.1, "Analytical Results;" Table 4-38

Comment: The ground water pH range given for Site 74 is from 4.2 to 7.3 s.u. Except for three pH readings at well 74-GW07, all pH values are below the range of Federal Secondary Drinking Water MCLs (6.5 - 8.5 s.u.). We are concerned that the pH measurements are accurate. Extremely low pH values (i.e., below pH 4) indicate corrosive water that potentially will dissolve metals, minerals, etc. The importance of pH in fate and transport is mentioned in the report. When unrealistically high or low values of pH are reported, the analytical data for the reported contaminant concentrations becomes suspect. No further discussion of the implication of these pH measurements is given in the text. Reference (c) provides additional information concerning this important property.

Recommendation: Determine the validity of the reported ground water pH measurements and discuss the pH results and their potential impact on site contaminant concentrations

35. Page 6-5, Section 6.2.1.7, "Risk-Based Concentrations (RBCs)"
Page 6-4, Section 6.2.1.6, "State and Federal Criteria and Standards"

Comment: The text discusses in a general manner (with only a few specific examples given) how the RBCs developed by Region III are used to help select COPC to be carried through the risk assessment. There does not appear to be a table cited that correlated the site-related contaminants with the RBC values; nor is there a discussion of whether the RBC values were used as a basis to eliminate any of the chemicals from the quantitative risk assessment. The text does identify some chemicals that were eliminated from the study on the basis of this screening tool; however, we were unable to locate a table that compared the values.

Recommendation: Provide a comparison of the site-related contaminant concentrations and the RBC values. Identify any potential COPCs that were eliminated on the basis of Region III's RBC guidelines. A table comparing potential site-related contaminants with current (March 7, 1995) RBC values for individual chemicals would be helpful for review purposes.

36. Page 6-12, Section 6.3.2, "Exposure Pathways"
Figure 6-1, "Conceptual Site Model"

Comment: The RI report limits the potential exposure to subsurface soils to future potential construction workers. We feel that both future residential children and adults could potentially be exposed to subsurface soil via either ingestion and/or dermal contact during various outdoor activities, such as digging/gardening, etc. In addition, the potential exists for inhalation of fugitive dusts emanating from on-site subsurface soils for these receptors under the future exposure scenario.

Recommendation: Include these exposure pathways in the quantitative risk assessment or present strong evidence for their exclusion.

37. Pages 6-20, 6-21, Section 6.3.4.4, "Ingestion of Groundwater"
Section 6.3.4.5, "Dermal Contact with Groundwater"

Comment: We are unable to determine whether the shallow or the deep ground water pathway is referred to in the text, as different pages cite different aquifers.

Recommendation: Please clarify.

38. Table 6-16

Comment: Table does not differentiate between surface and subsurface soils for potential human exposure.

Recommendation: Please clarify.

39. Appendix M, "Sampling Summary"

Comment: The table for soil samples indicates a shipping date of 2/94 with an apparent receipt date of April (e.g., page 1 of 5, sample I.D. #41-OS-SB05-01).

Recommendation: Please describe sample shipment methods and explain/verify lengthy sample turn-around times and possible effect on accuracy of data.

40. Appendix N, "COPC Worksheets"

Comment: Our copy of the worksheets contain illegible writing. The original writing on worksheets should remain readable after correction (i.e., a straight line through the error) with the date and initial of the person making the correction.

Recommendation: Suggest following this standard practice in the future and incorporate it in Quality Assurance/Quality Control (QA/QC) Manuals.

FS Review Comments and Recommendations

41. General Comment

Comment: We feel that the concerns/comments addressed in this review (*i.e.*, additional possible exposure pathways; using results of the low-flow purging technique to access the site-contaminant risk levels) need to be considered prior to presentation and evaluation of the remedial alternative comparisons presented in the FS report.

Recommendation: Amend RI/FS documents, as appropriate.

42. FS, Tables 2-7, 2-8
Pages 2-8, 4-8

Comment: FS Tables 2-7 and 2-8 do not provide Remediation Goal Options (RGO) for lead in ground water. Table 2-8 indicates that no criteria (Risk-based Remediation Goal Options) have been established for lead. The text states that RGOs are based on Federal and State criteria or risk-based concentrations. In addition, the maximum lead level in ground water (low-flow purge technique) for Site 41 reportedly is above the North Carolina Water Quality Standard (NCWQS) and the Federal Secondary Maximum Contaminant Level (SMCL). We were unable to locate an explanation for why a RGO was not set for lead. Lead does have a NCWQS for ground water set, as given in Table 2-8, although a RBC has not been established as of this date. The report also gives two different values for lead (145 ug/L and 26 ug/L), apparently both for the low-flow purge technique for this Site. The value of 145 ug/L for lead has been given

previously for a sample pulled by the original sampling technique (i.e., not the low-flow purge technique).

Recommendation: Please clarify whether RGOs can be established based on Federal or State criteria alone; if this is possible then explain why an RGO was not set for lead or consider providing an RGO for lead. If RGOs have been established solely based on Risk-based RGOs in lieu of federal or State criteria, then the text should be amended to reflect this. In addition, correct any discrepancies in the report concerning maximum lead concentrations and sampling techniques.

FROM: _____
(YOUR NAME/COMMAND)

TO: NAVENVIRHLTHCEN, ENVIRONMENTAL PROGRAMS

FAX: COM: (804) 444-7261/DSN: 564-7261

MEDICAL/HEALTH COMMENTS - YOUR VIEW

Please help us improve our review process by indicating the extent to which you agree or disagree about the comments we provided for to your activity.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. "Value added" to IR/BRAC process?	1	2	3	4	5
2. Received in a timely manner?	1	2	3	4	5
3. High level of technical expertise?	1	2	3	4	5
4. Very useful to the RPM?	1	2	3	4	5
5. Contractor incorporated comments?	1	2	3	4	5
6. Easily readable/useful format?	1	2	3	4	5
7. Overall review was of high quality?	1	2	3	4	5
8. NAVENVIRHLTHCEN was easily accessible?	1	2	3	4	5
9. NAVENVIRHLTHCEN input during scoping or workplan development would be "value added"?	1	2	3	4	5
10. Added involvement in IR/BRAC document needed?	1	2	3	4	5

Please return by fax using the box provided at the top of this page. If you have any other comments, please list them below or call Mr. David McConaughy, Health Risk Assessment Department, at (804) 444-7575, or DSN 564, extension 434, at any time to discuss your viewpoint. As our customer, your comments and suggestions of how we can improve our services to you are important!