

Baker

Baker Environmental, Inc.
Airport Office Park, Building 3
420 Rouser Road
Coraopolis, Pennsylvania 15108

(412) 269-6000
FAX (412) 269-2002

March 22, 1994

Commander
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street (Building N-26)
Norfolk, Virginia 23511-2699

Attn: Ms. Linda Berry, P.E.
Code 1823

Re: Contract N62470-89-D-4814
Navy CLEAN, District III
Contract Task Order (CTO) 0174
Response to EPA and NC DEHNR Comments
Draft RI for Operable Unit No. 5
MCB, Camp Lejeune, North Carolina

Dear Ms. Berry:

Baker Environmental, Inc. (Baker) has reviewed EPA and NC DEHNR comments regarding the Draft Remedial Investigation (RI) report. Responses to these comments are provided in Attachment A (EPA Comments) and Attachment B (NC DEHNR Comments) The comment letters are provided for convenience in Attachment C. The responses are included on the enclosed disc under the file name "ri-response".

If you have any questions, or would like further information, please do not hesitate to contact me at (412) 269-2038 or Mr. Raymond P. Wattras (Activity Coordinator) at (412) 269-2016.

Sincerely,

BAKER ENVIRONMENTAL, INC.



Donald C. Shields
Project Manager

DCS/jc
Attachments

cc: Mr. Neal Paul
Ms. Lee Anne Rapp (w/o attachments)
Ms. Beth Hacie (w/o attachments)



A Total Quality Corporation

ATTACHMENT A

RESPONSE TO COMMENTS SUBMITTED BY USEPA REGION IV ON THE DRAFT RI REPORT FOR OPERABLE UNIT 5 (SITE 2) MARINE CORPS BASE, CAMP LEJEUNE

I. Comment Letter Dated January 10, 1994

General Comments

1. Two additional shallow monitoring wells have been installed on site and sampled. The LANTDIV Contractor discussed the well locations with Ms. Gena Townsend (Senior Project Manager - EPA). A second round of groundwater samples was collected from the existing monitoring wells. Analytical results will be available in late March.
2. The existing (i.e., installed prior to the RI) wells are all screened at the same depth interval (25 to 10 feet). Groundwater elevations in these wells vary widely. If the existing wells exhibited similar groundwater elevations as a group, it could be argued that their water levels differ from the new monitoring wells due to the relationship between screened interval and stratigraphy. As this is not the case, it would seem more plausible to expect that differences between water levels in the existing and new monitoring wells are the result of well performance factors associated with the existing monitoring wells.
 - 2a. Groundwater may be in contact with monitoring well construction materials (bentonite-cement grout seal), causing the elevated pH readings. A second round of samples was recently collected to evaluate this condition.
3. The report has been revised in response to this comment. Two-times the average background concentrations will be utilized. LANTDIV, however, has reservations regarding this approach. This is due to the statistically insignificant number (six) of background samples available to calculate an average.
4. The correct absorption factors will be utilized (1.0 for organic constituents and 0.1 for inorganic constituents).
5. A TCRA design package is currently being prepared for the Navy's Remedial Action Contractor (RAC). Confirmatory samples are included as part of the design specifications. The text will be revised in order to clarify this.
6. The USEPA uptake/Biokinetic Model for lead is still a draft effort by the USEPA. USEPA Region IV is not recommending the use of this model until it becomes final. Therefore, lead will not qualitatively be evaluated by using this model in this report.
7. The subsurface soil was quantitatively evaluated for the future scenario involving a construction worker.
8. The reviewer is correct in the statement that some chemicals may have been eliminated as a COPC due to the non-association of the chemical to site history. These chemicals will be reevaluated for inclusion into the RA. However, it should be noted that page 5-21 of the Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A) states that historical information should be used as one of the criterion when selecting COPCs.

Specific Comments

1. Please refer to the response to General Comment No. 2.
2. The text has been revised in response to this comment. Shallow groundwater flow on site is to the northeast.
3. The text has been revised in response to this comment.
4. The text has been revised in response to this comment. Reference levels for these constituents have been added in this section.
5. Two additional monitoring wells have been added to the groundwater monitoring network east and south of the mixing pad. Please see response to General Comment No. 1.
6. The text has been revised in response to this comment.
7. This section of the text discusses the possible source of the carbon disulfide in Overs Creek. It is appropriate to note that there is no record of carbon disulfide use at this site. Also, please note that the sample location where carbon disulfide was detected is upstream from the Site 2 drainage pattern. In addition, the need to "remediate" Overs Creek is not required as stated in the comment.
8. The text has been revised in response to this comment.
9. This risk range is not referring to the USEPA-specified range for the excess upper-bound lifetime cancer risk of 10^{-6} to 10^{-4} . It is referring to the risk range when calculating the AWQC. The reference for this statement is USEPA Quality Criteria for Water 1986, USEPA Document Number EPA 44015-86-001.
10. The text has been revised in response to this comment. The exposure scenarios under which the RBCs were developed are now described in the text of Section 6.0.
11. Please see response to General Comment No. 3.
12. Please see response to General Comment No. 7.
13. The text has been revised in response to this comment. Bromomethane was detected only once at a low concentration and was, therefore, not retained as a COPC.
14. The sentence will be revised to indicate that lead was not detected in the filtered sample collected from the background well.
15. Please refer to the response to General Comment No. 4.
16. Please refer to the response to Specific Comment 13.
17. The text has been revised in response to this comment.
18. The text has been revised in response to this comment. As exposure time is 0.25 hours per day.
19. Please refer to the response to Specific Comment No. 13.

II. Comment letter dated February 10, 1994

1. This refers to individual pesticide concentrations. The text will be revised to reflect this.
2. The text has been revised. Specific cleanup levels have been calculated for individual pesticide contaminants.
3. Surface soil samples refer to the ground surface to 6 inches bgs interval. The text has been revised to present this consistently.
4. The text has been revised in response to this comment.
5. The text has been revised in response to this comment.
6. Selection of COPCs will be reevaluated by using the RBCs based on an HI of 0.1 (not 1.0).
7. The elimination of toluene and xylene as COPCs will be reevaluated utilizing the RBCs.
8. Please refer to the response to General Comment No. 3, EPA letter dated January 10, 1994.
9. RBCs will be utilized in the selection of Overs Creek sediment COPCs. In addition, the statement that chemicals were eliminated "because they are not believed to be present due to site related activities" will be removed from the text.
10. The text has been revised, utilizing the correct absorption factors (0.01 for organic constituents and 0.001 for inorganic constituents).
11. The text has been revised in response to this comment. The chemical-soil concentration term has been incorporated and consistent units have been utilized.
12. The text has been revised in response to this comment.
13. The text has been revised in response to this comment. An exposure time of 0.25 hours per day has been utilized.
14. The text has been revised in response to this comment utilizing the recommended exposure time of one hour and a contact time of 0.01 liters per hour.
15. The text has been revised in response to this comment.
16. There was only one positive detect for this chemical. However, all of the ranges of positive detection on tables in Section 6.0 which have one positive detect will be reported as a range of nondetect (ND) to the reported positive concentration.
17. Units for the toxicity factors have been added to the table. Inhalation slope factors have been corrected and spreadsheets affected by these corrections were recalculated. In addition, surrogate toxicity factors have been used for suggested chemicals; arsenic child slope factor has been deleted from the report; and the WOE for arsenic and lead has been corrected.
18. The table has been revised in response to this comment. Please note that the total risk number did not change.

III. Comment letter dated February 18, 1994

1. On page 7-6 under 7.2.1.2, Site 7 will be changed to Site 2.
2. On page 7-15, the plants named "rush" and "burred" were obtained from an existing document. The scientific names of these plants is not known.
3. The text has been revised in response to this comment. This term is clarified.
4. On March 2, 1992, LANTDIV met with EPA Region IV (Michelle Glenn) and members of the ETAG (Waynon Johnson and Lynn Wellman) to discuss how ecological risk assessments would be performed at MCB Camp Lejeune. At that time, EPA/ETAG was interested in conducting a base-wide ecological risk assessment. LANTDIV proposed doing the ecological risk assessment on an "operable unit" basis. Specifically, ecological risk assessments would be performed in conjunction with the RI/FS for a particular operable unit in order to sign record of decisions in an expedited manner. After all of the operable units are investigated, the data would be evaluated and a base-wide ecological risk assessment would be conducted. Data gaps would be identified and addressed. The EPA/ETAG agreed to this approach.

LANTDIV feels that the current approach to performing ecological risk assessments (i.e., in conjunction with the RI/FS for an operable unit) is more feasible than adopting the base-wide ecological risk assessment for several reasons. First, the results of the ecological risk assessment for a particular operable unit can be directly correlated with the RI results. For example, if there appears to be adverse risks to a particular ecological receptor (e.g., fish), the cause of that risk can be better determined since data are available from the RI. Second, the results of the ecological risk assessment can be used to assist in determining the remedial action. For example, at Operable Unit No. 2, the ecological risk assessment concluded that potential adverse impacts to aquatic life and wildlife in Wallace Creek may occur as a result of site-related contaminants. Although the human health risk assessment concluded that the risks to human posed by contaminated soil, surface water and sediment were within the target range, remedial action was determined to be necessary at several areas of concern do to potential ecological impacts. Third, the results of the base-wide risk assessment will not result in determining what site or areas need to be remediated. The purpose of performing an ecological risk assessment is to "provide decision makers with information on threats to the natural environment associated with contaminants or with actions designed to remediate the site" (EPA/540.1-89.001). Given this objective or purpose, LANTDIV feels that the current approach is far more adequate than using the results of a base-wide risk assessment.

Since March 1992, RI/FSs either have been completed or are ongoing at 7 of the 13 operable units. Ecological risk assessments have been performed in conjunction with the RI/FS at each operable unit. The results of the ERA have been or will be used to assist in determining whether remediation is warranted. The ecological risk assessments at the remaining six operable units are anticipated to be completed in the year 1996. At that time, LANTDIV will compile the results of the ecological risk assessments performed at each operable unit into a base-wide ecological risk assessment per the agreement made with EPA/ETAG in March 1992.

5. As indicated in the text (p. 7-25) and Tables 7-4 and 7-5, a hardness value of 50 mg/l CaCO₃ was used to calculate the toxicity of copper, lead and zinc. The reference of 100 mg/l CaCO₃ in the uncertainty analysis section is incorrect and will be changed to 50 mg/l. The use of 50 mg/l of CaCO₃ is fairly conservative; increasing the hardness values would increase the standards. Hardness measurements were not conducted when the surface water samples were analyzed.

Two surface water samples were collected in Overs Creek for metal analysis; copper was the only metal that exceeded the water quality standards in this area. Copper was detected in both

the upstream and downstream samples and was not considered to be site-related. Therefore, since copper was not site-related, developing site specific criteria would not change the results of the ERA.

One surface water sample was collected in the Railroad Drainage Ditch for metal analysis; copper, lead and zinc exceeded the water quality standards in this area. The surface water in this ditch is intermittent, caused primarily by rainfall. The water hardness will fluctuate, depending on the volume of water in the ditch. Therefore, hardness samples collected after the sampling for metal analysis cannot be used to recalculate criteria. In addition, a change in the criteria would not change the conclusion of the ERA, since it was concluded in the ERA that there most likely is not a significant aquatic population in the Railroad Drainage Ditch.

Therefore, because the conclusions of the ERA would not change if the number of water quality exceedances of the hardness dependent metals changed, the water quality standards will not be recalculated using site-specific hardness values.

6. A discussion of pesticides at the Mixing Pad Area is presented in Section 4 of the RI. In addition, Section 4 of the RI includes a comparison of pesticide concentrations in this area with pesticides found throughout MCB Camp Lejeune. These sections will be referenced in Section 7.4.4. In addition, a brief discussion of the pesticide concentrations in the media will be added to this section.
7. The ERA concluded that there would not be any adverse impacts to the terrestrial receptors after the TCRA, therefore, there is no need to develop pesticide concentrations that would create residual risks.
8. Further analysis of the site with food chain models consisting of soil to earthworm to small mammal to raptor will not be conducted. The most contaminated areas will be removed under the TCRA, therefore removing risk to terrestrial receptors based on the soil to plant to mammals/birds model. The following paragraphs discuss why this model was used at Site 2 as opposed to a soil to earthworm to small mammal to raptor model.

Predictive models can result in large uncertainties, especially when attempting to estimate food chain transfer from soil to higher trophic levels (e.g., birds, mammals) (Menzie, 1992). At the time of this ERA, more information was located in the literature for bioconcentration factors of vegetation than for earthworms. Bioconcentration factors usually have a high degree of variability depending upon the species and age of organism tested, and the laboratory conducting the study. Therefore, attempts should be made to limit this uncertainty.

The inorganic vegetation bioconcentration factors were obtained from an Oak Ridge National Laboratory report that compiled and evaluated values obtained from the literature. Their evaluation helped to decrease some of the uncertainty associated with reviewing several data sources to determine the appropriate bioconcentration factors to use in the model.

The organic vegetation bioconcentration factors were obtained from equations developed in an Oak Ridge National Laboratory paper which showed a good correlation between bioconcentration factors and octanol-water partition coefficients and thus decreased some of the uncertainty in these factors. Therefore, since the bioconcentration factors located in the literature for vegetation appeared to have less uncertainty associated with them than those identified for earthworms, the soil to plant to mammal/bird model was used at Site 2. As more data becomes available in the future, the soil to earthworm to small mammal model may be used at other sites at MCB Camp Lejeune.

9. A discussion of pesticides at the Former Storage Area was presented in Section 4 of the RI. In addition, Section 4 of the RI includes a comparison of pesticide concentrations in this area with pesticides found throughout MCB Camp Lejeune. These sections will be referenced in Section 7.4.5. In addition, a brief discussion of the pesticide concentrations in the media will be added to this section.

References

Menzie, Charles A., David E. Burmaster, Jonathan S. Freshman, and Clarence A. Callahan. 1992. "Assessment of Methods for Estimating Ecological Risk in the Terrestrial Component: A Case Study at the Baird & McGuire Superfund Site in Holbrook, Massachusetts." *Environmental Toxicology and Chemistry*, Vol. 11, pp. 245-260.

ATTACHMENT B

RESPONSE TO COMMENTS SUBMITTED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES ON THE DRAFT RI REPORT FOR OPERABLE UNIT 5 (SITE 2) MARINE CORPS BASE, CAMP LEJEUNE

I. Comment Letter Dated January 10, 1994

1. The 7,100 µg/kg estimate presented in Appendix B was a general estimate utilized prior to completion of the risk assessment. The results of the risk assessment were utilized to determine site-specific cleanup levels for individual contaminants. These are presented in the FS report and are utilized in the TCRA design package.
2. There are no boring logs or well construction logs available for these wells. Limited well construction information was obtained from cross-sections presented in existing reports.
3. The Soil Gas Survey Report presented in Appendix E presents the analytical results of soil gas samples collected at several sites within MCB Camp Lejeune, including Site 2. Site 2 results are limited to Table 4 (Task #174). Tables 1 through 3 include results for other MCB Camp Lejeune sites.
4. The text has been revised in response to this comment.
5. The text has been revised in response to this comment.
6. The concerns expressed by DEHNR regarding Section 4.3 will be satisfied by the TCRA. This will be accomplished in the following ways:
 - Site-specific action levels will be developed in the Feasibility Study.
 - Soil exhibiting contaminant concentrations above the action levels will be excavated for disposal.
 - Confirmatory samples will be collected from the excavation floor and walls. This will insure that all soils exhibiting contamination above the site-specific action levels will be removed. This will satisfy DEHNR's concern regarding contamination extending beyond the existing sampling points.
 - The TCRA excavation will include sediments exhibiting contaminant concentrations exceeding the site-specific action levels.
7. Additional geophysical investigation activities were conducted in the area of the potential subsurface anomaly in January 1994. Results of this investigation indicate that there is no subsurface feature in this area. Results of the additional geophysical investigation activities are attached to Appendix A (Geophysical Report) of the Draft Final RI Report.
8. Please refer to the response to Comment 7.
9. The text has been revised in response to this comment.
10. The text has been revised in response to this comment.

11. This figure has been revised in response to this comment.
12. The volumes presented in the TCRA letter (Appendix B) was an initial estimate. LANTDIV is currently preparing engineering design specifications for the TCRA. These specifications will include detailed drawings of the areas to be excavated.
13. Additional copies will be included with the Draft Final RI Report.

II. Comment letter dated March 1, 1994

1. The text has been revised in response to this comment. Toluene is not considered to be naturally occurring and has been reevaluated in the risk assessment.
2. The text has been revised in response to this comment. Site history is not used as a criteria for eliminating COPCs.
3. The text has been revised in response to this comment. The discrepancies on Table 6-1 have been corrected.
4. The text has been revised in response to this comment. The two-times rule is used only to determine if concentrations are significantly above reference levels.
5. The sentence has been deleted.
6. The table has been revised in response to this comment. The correct frequency is 1/46.
7. The table has been revised in response to this comment. Toluene is retained as a COPC.
8. The sentence has been deleted.
9. The table has been revised in response to this comment. Phenol has been retained as a COPC.
10. The text has been revised in response to this comment. The concentration of aluminum exceeded the secondary MCL.
11. The table has been revised in response to this comment. The correct frequency of detection numbers was presented in the text.
12. The Concentration Toxicity Screen will not be utilized in the Draft Final RI Report. RBCs will be utilized instead.
13. The text has been revised in response to this comment. Current trespassers (older children and adult) are included.
14. The text has been revised in response to this comment.
15. The text has been revised in response to this comment.
16. The text has been revised in response to this comment.
17. The concentration is presented correctly as the concentration in air (mg/m³).
18. The text has been revised in response to this comment.

19. The text has been revised in response to this comment. EF refers to Exposure Frequency which is presented in days/year.
20. The text has been revised in response to this comment.
21. The target risk range (10^{-4} to 10^{-6}) is designated as the acceptable risk range in the National Oil and Hazardous Substance Pollution Contingency Plan, Final Rule, March 1990. The 10^{-6} value is not a promulgated regulation in North Carolina.
22. The text has been revised in response to this comment. The fact that this is an acceptable range is clarified.
23. The One-Hit equation for high carcinogenic risk levels will be utilized where chemical intake is high.
24. The text has been revised in response to this comment.
25. The text has been revised in response to this comment.
26. It is assumed that the adult base personnel would have more clothing on in an industrial work setting than an adult doing maintenance work in a residential setting.
27. In general, the calculated carcinogenic risk is greater in the adult than in the child, however, by convention, adult and child exposures to carcinogens are evaluated in baseline risk assessments. This does not mean that the child's risk is given more weight in the decision to remediate. The decision to remediate is a risk management decision that considers the most plausible future use of the site as well as current and future worst-case risk levels.

Attachment C
EPA and NC DEHNR Comments to the Draft RI
for Operable Unit No. 5
MCB Camp Lejeune, North Carolina



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

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

January 10, 1994

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

4WD-PFB

Ms. Linda Berry
Department of the Navy - Atlantic Division
Naval Facilities Engineering Command
Code 1823
Norfolk, Virginia 23511-6287

SUBJ: MCB Camp Lejeune - OU5
Draft Remedial Investigation Report

Dear Ms. Berry:

The Environmental Protection Agency (EPA) has partially completed its review of the "Draft Remedial Investigation Report, Operable Unit 5, Site 2, dated December 7, 1993. Comments are enclosed from EPA (general review) and Dynamac (oversight contractor). Comments from the Risk Assessment Section will be forwarded by the end of the week.

Overall the document is clear and concise in its statement of the results, however, it appears that the extent of groundwater contamination has not been identified in the shallow aquifer. This area will be discussed in more detail within the body of the comments.

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

Sincerely,

A handwritten signature in cursive script, appearing to read "Gena D. Townsend".

Gena D. Townsend
Senior Project Manager

Enclosure

cc: Mr. Neal Paul, MCB Camp Lejeune
Mr. Patrick Watters, NCDEHNR

1.0 GENERAL COMMENTS

The following general comments were developed from review of the Draft RI Report.

1. The text should acknowledge that the extent of groundwater contamination has not been determined at Site 2 and that additional monitor wells are needed downgradient (east) of the mixing pad area. The RI results indicate that the mixing pad area contains the most highly contaminated soils at Site 2. Despite the fact that groundwater flow direction data is inconclusive, interpretations presented in the Draft RI Report indicate that flow is generally east. Therefore the additional wells should be installed east of the mixing pads. ~~The additional wells can be installed during the Remedial Design phase of the project if needed. It is imperative to remember that this could cause an increase in the remedial alternative cost.~~
2. The Draft RI Report presents water-level data from both existing and newly installed monitor wells for the surficial aquifer. The text correctly concludes that not all of the water-level data appears reliable; not included among the explanations for why some data is unreliable, however, is the affect of stratigraphy. The water-level data appears unreliable because water-table gradients vary widely in the Site 2 vicinity in both direction and magnitude. These gradients do not reflect the local topographic surface nor the spatial relationship of Site 2 to local discharge points. The Draft RI Report presents the explanation that the unreliable water-level values are caused by clogged screens in the existing wells which have decreased the efficiency of these wells. This "decreased efficiency" does not account for the observed wide variation in water levels. The more likely explanation is that not all wells are screened at similar stratigraphic horizons. For example, the most permeable zone within the screened interval in "new" monitor well 2GW7 is above a clay-rich unit. The most permeable zone within the screened interval in "existing" monitor well 2GW4 is below what appears to be the same clay-rich zone. The water level data collected on June 5, 1993, indicates a 14-foot difference in water elevation between these two wells, which are only 160 feet apart. These two wells are clearly screened in different stratigraphic horizons and therefore would not be expected to accurately portray the water table surface. The screened intervals in the recommended shallow downgradient wells (see General

Comment No. 1) should be selected to ensure that screens are set in correlative water-bearing units.

- 2a. At well 2GW3D a ph reading of 12.62 was recorded. Is there a reasonably explanation for this occurrence or should there be another round of sampling conducted.
3. The use of "two times the maximum background concentration" to screen contaminants of potential concern (COPC) contradicts current EPA guidance and is unjustified. Under EPA's reasonable maximum exposure (RME) approach, contaminant levels should be compared to two times the average background concentrations, not two times the maximum background concentrations. Comparing COPC concentrations to the "artificially" elevated background levels used for screening could have resulted in incorrectly eliminating some COPCs and subsequently underestimating the potential health risks associated with these COPCs. Therefore the approach used in the baseline risk assessment (BRA) is unjustified.
4. Incorrect absorption factors (i.e., 1.0 for organic constituents and 0.1 for inorganic constituents) have been used in characterizing dermal exposure. The correct absorption factors should be 1.0 percent for organic constituents and 0.1 percent for inorganic constituents per EPA's New Interim Region IV Guidance. The errors in the absorption factors used in the BRA may have contributed to the unusually high risk values calculated for dermal exposure pathways when compared with risk values for other exposure pathways. The dermal exposure risk calculations in the BRA should be revised using the current absorption factors.
5. Throughout the BRA, potential risks associated with soil and sediment exposure were assessed under two scenarios: one before and one after the Time-Critical Removal Action (TCRA). However, the text contains statements which contradict whether the TCRA has already been conducted. Some statements describe the TCRA as a proposed activity while others refer to the apparent existence of post-TCRA confirmation sampling results, implying that the TCRA is complete. Furthermore, the soil cleanup levels that the TCRA is designed to achieve should be described in detail. Confirmatory sampling should be conducted to ensure that the anticipated cleanup levels are attained.
6. EPA's Uptake/Biokinetic Model for lead should be used to qualitatively evaluate lead exposure since lead was retained as a COPC and was detected in groundwater at concentrations exceeding its maximum contaminant level (MCL).

4

7. Because the soil exposure pathways evaluated consider only surface soil exposure, subsurface soil data need not be included or discussed in the BRA.
8. There are numerous statements in the BRA indicating that site history has been used to eliminate COPCs from further consideration or to conclude that a contaminant is not site-related. Site history should not be a criterion for screening potential COCs or site contaminants.

2.0 SPECIFIC COMMENTS

The specific comments are listed on the following pages in the order of their occurrence in the Draft RI Report. The comments are organized by section number, page number, paragraph number, figure and/or table number as appropriate.

1. Page 3-11, Paragraph 3:
The text states that clogged well screens have resulted in the apparent unreliable water-level data, but another contributing factor is likely the relationship between screened interval and stratigraphy. See General Comment No. 2.
2. Page 3-11, Paragraph 5:
The text states that the water table slopes gradually toward the east. However, the previous paragraph states that groundwater flow is to the northeast, and figures 3-7 and 3-8 show flow directions varying from northeast to northwest. The text should be corrected to be internally consistent and consistent with the figures.
3. Page 4-2, Section 4.1.2, Paragraph 1:
Repeated sentence.
4. Page 4-9, Paragraph 2:
The Draft RI Report states that six metals were detected above base-specific reference levels. This section should present the reference-level values to permit verification of these exceedences.
5. Page 4-15, Section 4.2.3:
Section 4.2.3, Groundwater Investigation, should acknowledge that there are no monitor wells located downgradient from the primary source areas identified in the RI. Assuming that groundwater flow is generally east, as asserted in the text, monitor wells should be installed east of the mixing pad area in order to assess the nature and extent of groundwater contamination at Site 2. See General Comment No. 2.
6. Page 4-30, Paragraph 1:
The text states that volatile organic compounds (VOCs) were detected in only 1 out of 15 sampling stations located within the drainage ditch. This understates the frequency of VOC detections; VOCs were actually analyzed in samples at 10 of the 15 sample locations. The text should be modified

14. Page 6-21, Paragraph 1:
Delete the sentence, "Lead was not detected in the background well," as it contradicts the earlier sentence which states that lead was detected in background well 2-GW09-01 for Site 2.
15. Page 6-34, Paragraph 4:
The dermal absorption factor of 1.0 for organic constituents is incorrect. The correct absorption factors should be 1.0 percent (0.01) for organic constituents and 0.1 percent (0.001) for inorganic constituents, as described in the New Interim Region IV Guidance.
16. Page 6-35, Paragraph 4:
See Specific Comment No. 13.
17. Page 6-35, Section 6.3.4.3, Equation:
The symbol "PEF" in the numerator of the intake equation should be replaced by "1/PEF."
18. Page 6-41, Paragraph 1:
The wording, "An exposure time of 0.25 minutes per day . . ." should be revised to read, "An exposure time of 0.25 hours per day . . .".
19. Page 6-93, Table 6-25:
See Specific Comment No. 13.

in this paragraph and throughout Section 4.0 to more accurately characterize detection frequency.

7. Page 4-34, Paragraph 5:
It should be determined if there is carbon disulfide contamination in Overs Creek. The explanation that it is not a site related contaminant is irrelevant. If it is in Overs Creek it should be remediated. The surface water should be re-sampled to verify the presence or absence of the contaminant.
8. Page 5-9, Last Paragraph:
The text presents seepage velocities calculated for three cases corresponding to assumed hydraulic conductivity (K) values of 1×10^{-3} centimeters per second (cm/sec), 8×10^{-4} cm/sec and 2.1×10^{-3} cm/sec. The seepage velocities presented in the text for the 8×10^{-4} cm/sec and 2.1×10^{-3} cm/sec cases are reversed and should be corrected.
9. Page 6-4, Paragraph 2:
The EPA-specified range for the excess upper-bound lifetime cancer risk to an individual is 10^{-6} to 10^{-2} , not 10^{-7} to 10^{-5} .
10. Page 6-4, Paragraph 5:
Because the default values used in deriving the risk-based concentrations (RBCs) may differ from the site-specific values, the RBCs should be applied with caution in selecting COPCs. The exposure scenario(s) under which these RBCs were developed should be described.
11. Page 6-5, Paragraph 2:
The text states that "because the number of site-specific background samples for soil and sediment for the Camp Lejeune area are not statistically significant, twice the maximum concentration of the background sample was used for comparison to the maximum concentration of the chemical detected onsite." This approach is consistent with neither EPA's RME approach nor with current EPA Region IV guidance which directs the use of two times the average background concentration. Therefore, the approach used in the Draft RI Report is unjustified.
12. Page 6-9, Paragraph 4:
Describe the rationale for including subsurface soil data in the BRA; the exposure pathways evaluated in the BRA consider only surface soil exposure.
13. Page 6-18, Paragraph 2:
The last sentence in this paragraph makes no sense and must be revised to clarify its meaning. Rationale should be stated for the elimination of bromomethane as a COPC.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30385

February 10, 1994

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

4WD-PL

Ms. Linda Berry
Department of the Navy, Atlantic Division
Naval Facilities Engineering Command
Code 1423
Norfolk, Virginia 23511-6287

SUBJ: MCB Camp Lejeune - OU5
Draft Remedial Investigation

Dear Ms. Berry:

The Environmental Protection Agency (EPA) has completed its review of the Draft Remedial Investigation, Operable Unit 5, Site 2. The comments from Risk Assessment on the human health aspect are enclosed.

If there are any questions or comments, please call me at (404) 47-3016.

Sincerely,

Gena D. Townsend
Gena D. Townsend
Senior Project Manager

Enclosure

cc: Mr. Neal Paul, MCB Camp Lejeune
Mr. Patrick Watters, NCDEHNR

Post-It™ brand fax transmittal memo 767		# of pages ▶
To	Don Shields/Ray Watters	From Linda Curry
Co.	Baker	Co.
Dept.	CLEAN	Phone # (804) 322-773
Fax #	(412) 269-2002	Fax # (864) 322-4805

FAX TRANSMITTAL

of pages 5

To	LINDA BERRY	From	GENA TOWNSEND
Dept./Agency	NAVAL FAC ENGR	Phone #	(404) 347-3016
Fax #	(804) 322-4805	Fax #	(404) 347-5205

GENERAL SERVICES ADMINISTRATION

Comments

1. Page ES-2, second bullet - "Pesticide contamination was less than 100 µg/kg...throughout the remainder of Site". Do these values of 100 refer to total pesticides or to one particular compound? Please clarify. It should be noted that risk values cannot be determined with total pesticide data.
2. Page ES-3, last paragraph - "The benchmark risk-based concentration is a value (7100 µg/kg) that equates to a 1×10^{-6} cleanup action level." On what chemical(s) is this soil/sediment concentration based? Also, 1×10^{-6} is a risk level, rather than a cleanup action level.
3. Page 2-14 (Sections 2.5.1, 2.5.2.1) - Line 2 of this page refers to "Surface (ground surface to one-foot)"; in the next section, toward the bottom of the page, "Surface (0 to 6 inches bgs)" is mentioned. This discrepancy should be addressed. EPA Region IV generally considers any soil samples taken in the 0 to 12 inch interval as surface for dirt exposure risk assessment purposes; however the contamination may be expected to remain in the first few inches bgs unless fill has been placed over the surface since the contamination occurred.
4. Page 4-6, top of page - EPA does not agree with the statement that "as a general approximation, inorganic parameters detected below these levels [drinking water standards] are assumed to be naturally occurring elements." The elements are naturally occurring, but this statement incorrectly implies that any concentration below the drinking water standard is naturally occurring. This statement should be deleted. It should be noted that "naturally occurring" levels are determined by sample concentrations from background locations.
5. Page 6-4 - There is an error in the discussion of the AWQC. The second value of the AWQC for protection of human health is based on ingestion of aquatic organisms alone (rather than on ingestion of water alone).
6. Pages 6-5, 6-20, 6-21 (text); Tables 6-4, 6-7, 6-10, 6-13, 6-14; all other uses and references to the risk-based concentration values - Risk-based concentration values (RBCs) based a hazard

quotient of 0.1 (not 1.0) should be used in selection of Chemicals of Potential Concern (*Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening*, U.S. EPA Region III, January 1993). The Region III October 1993 Update (based on HQ of 1.0) referred to in this report does not update the Region III January 1993 Table (based on HQ of 0.1). It should be noted that Region III's RBC Table has not been approved Agency-wide for risk-based screening; however Region IV approves its use for the chemicals detected at this particular operable unit. Using RBCs based on HQ of 1.0 may not be adequately protective because of multiple toxicants and exposure routes. Table 6-14 has some groundwater concentrations which will result in retention of additional chemicals as COPCs when compared with the HQ-0.1-RBCs. It appears that selection of COPCs for other exposure media are not affected by the use of HQ-0.1-RBCs.

7. Page 6-7, paragraph 3 - The reasons given for elimination of toluene are not acceptable; however it could be eliminated based on comparison with its risk-based screening concentration (RBC). Xylenes could also be eliminated based on comparison with its RBC. Correct this text accordingly.
8. Page 6-24, Tables 6-18, 6-20 - EPA Region IV policy for comparison with background (or control) concentrations for selection of COPCs is that two times the average background (not two times the maximum background) concentration be compared to the maximum site concentration.
9. Page 6-25, 6-26, Table 6-21 - Eliminating chemicals detected in sediment from the COPC list "because they are not believed to be present due to site related activities" is not acceptable. Comparison with RBCs (as in Table 6-19) is a acceptable criterion for the COPC determination.
10. Page 6-34, last paragraph; Table 6-25; Appendix O - For the dermal absorption factor, EPA Region IV recommends default values of 0.01 (1.0%) and 0.001 (0.1%) for organic and inorganic compounds, respectively (see attachment). The percent values are listed in Table 6-25 (without a percent notation); the risk calculation spreadsheets in Appendixes O.2a, O.2b appear to have used the incorrect value, resulting in dermal risks and HQs that are 100-fold too high. Please check all calculations involving risks from dermal exposure and amend all affected tables in Section 6 of the report.
11. Pages 6-35, 6-36 - The CDI equation for Inhalation of Particulates has omitted the chemical-soil concentration term. Units shown for the 1/PEF term on page 6-35 (mg/m^3) do not agree with units shown on the following page (kg/m^3).

he latter units are correct.

12 Page 6-40 - The "C" term in the equation for inhalation of volatile organics while showering should be defined as "contaminant concentration in air (mg/m³)".

13 Page 6-41 - The exposure time for the shower scenario should be 0.25 hour (not minutes) per day.

14 Page 6-42 - Ingestion of surface water while performing maintenance activities in ditches at Site 2. Since this activity does not actually involve swimming (water in the ditch is intermittent and shallow), I would recommend use of more conservative "default" assumptions for the ingestion rate (IR) and exposure time (ET) terms. I believe that a IR of 200 ml per hour and a ET of 1 hour per event would be more reasonable assumptions. I also recommend that this lower value be assumed for the future resident.

15 Page 6-54 - last sentence of second paragraph - Uncertainty associated with the Toxicity Assessment. The language here misrepresents EPA's position on toxicity from dermal exposure. Please edit to read: "Adjusting oral toxicity values for the dermal contact exposure route may not accurately describe the potential risk of a chemical, since the same systemic toxic effects may not occur from the oral and dermal exposure routes."

16 Table 6-1 - A "range" of positive detections is shown for DDT, but the frequency column lists only one detection. Address this discrepancy.

17 Table 6-30 - Toxicity Factors; Appendixes 0.2.3, 0.2.6 - Units should be shown at the top of each column (Table 6-30). All the values within each column should be in the same units. Values for inhalation slope factor are not all in the same units. This results in miscalculation of risks from inhalation exposures in Appendix 0.2.3 because the exposure is in units of mg/kg-day, but the cancer slope factors used are in units of (µg/m³)⁻¹ for some chemicals. Also, risks must be converted into inhalation reference doses since the calculated exposure is in units of mg/kg-day (Appendix 0.2.6).

Toxicity values which should be corrected or added:

2-Ethyl-naphthalene- use naphthalene as a surrogate (RfD = 1E-2 mg/kg-d);

Fluoranthene- use pyrene as a surrogate (RfD = 3E-2 mg/kg-d);

Chrysene- Inhalation unit risk currently on IRIS, which converts to an inhalation slope factor equal to the oral slope factor [1.3 (mg/kg-d)⁻¹];

Aroclor- what is the source of the "child" slope factor for

oral exposure. The WOE for arsenic says A₁, but the "A" WOE is for the oral route as well.

Barium - source for RfC value is HEAST (March 1993);

Lead - WOE is B₂ (IRIS, 1993);

Manganese - RfC = 5E-5mg/m³ (IRIS, 1993).

10. Appendix O 2.1. Ingestion of Soil - On the spreadsheet for ingestion of soil by the residential child at the low/mid range pad area, there appear to be errors in the calculated risk values shown for DDE and DDT. Please check and amend all affected tables in Section 6 of the report.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

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

February 18, 1994

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

4WD-FFB

Ms. Linda Barry
Department of the Navy - Atlan
Naval Facilities Engineering
Code 1823
Norfolk, Virginia 23511-6287

SUBJ: MCB Camp Lejeune - OUS
Draft Remedial Investigation
Ecological Risk Comments

Dear Ms. Barry:

The Environmental Protection Agency (EPA) has completed its review of the "Draft Remedial Investigation, Operable Unit 5, Site 2. The comments from Risk Assessment on the ecological aspects are enclosed.

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

Sincerely,

Gena D. Townsend
Gena D. Townsend
Senior Project Manager

Enclosure

cc: Mr. Neal Paul, MCB Camp Lejeune
Mr. Patrick Watters, NCDEHNR

Post-It™ brand fax transmittal memo 7671		# of pages 4
To DON SHIELDS	From LINDA BERRY	
Co. Baker	Co. LANTDIV	
Dept.	Phone #	
Fax # (412) 269-2002	Fax # (804) 322-4805	

OPTIONAL FORM NO 17-401		# of pages 4
FAX TRANSMITTAL		
To LINDA BERRY	From GENA TOWNSEND	
Department NAVAL FAC. ENGR.	Phone # (404) 347-3016	
Fax # (804) 322-4805	Fax # (404) 347-5205	
NSN 7540 01 217-7000	5088-101	GENERAL SERVICES ADMINISTRATION

Comments to be Conveyed to the Responsible Party

1. On page 7-6 under 7.2.1.2., first sentence: site 7 should read site 2.
 2. On page 7-15 the plants named "rush" and "burred" should be called by their scientific names.
 3. The statement "base specific reference sample ranges for surface soils at MCB Camp Lejeune" on page 4-13 needs to be explained and defined. A map showing these stations would be very helpful. This information is critical for comparisons to various contaminant concentrations found throughout the base, especially when doing a base-wide cumulative impact evaluation.
 4. Due to the widespread contamination at Camp Lejeune and the large number of sites under study it is appropriate for a cumulative ecological impact evaluation to be developed.
 5. The toxicity of cadmium, copper, lead, and zinc to aquatic organisms increases or decreases based on water hardness. Because water hardness data was not available, a default value of 100 mg/L of calcium carbonate was used. This value may either over or underestimate the potential risks to aquatic organisms from COPCs in the surface water. Criteria values should be adjusted using site-specific information.
 6. Section 7.4.4 should include a discussion of pesticides at the mixing pad area. Also a comparison of pesticide concentrations in this area with pesticides found throughout Camp Lejeune is needed.
 7. In order to develop a ecological risk assessment after the TCRA at the mixing pad area a discussion of pesticide concentrations that would create residual risks should be developed. The data needed for this understanding is scattered and very difficult to decipher in this document.
 8. To better understand ecological impacts that may occur due to elevated contaminants, it is appropriate to use a model that increases in trophic level, i.e. soil - earthworms - small mammals - raptors. This gives a greater understanding of bioconcentration in the food web.
 9. Concentrations of pesticides found in the former storage area in soils need to be included in the text and discussed.
 10. This reviewer is in agreement with the conclusions and recommendations presented in the document which includes removing soil and sediment at the Mixing Pad Area.
-

FORMER STORAGE AREA - In this area the QI of the Chronic Daily Intake to the Terrestrial Reference Value for each of the COPCs were less than unity for the quail, rabbit, and deer. Based on this evaluation there is a low likelihood that the COPCs are decreasing the viability of the terrestrial species. It would be appropriate to include sampling that would validate this possible decrease in viability.

State of North Carolina
 Department of Environment,
 Health and Natural Resources
 Division of Solid Waste Management

James B. Hunt, Jr., Governor
 Jonathan B. Howes, Secretary



January 10, 1994

Commander, Atlantic Division
 Naval Facilities Engineering Command
 Code 1823-1

Attention: MCB Camp Lejeune, RPM
 Ms. Linda Berry, P. E.
 Norfolk, Virginia 23511-6287

Commanding General
 Attention: AC/S, EMD/IRD
 Marine Corps Base
 PSC Box 20004
 Camp Lejeune, NC 28542-0004

RE: Draft Remedial Investigation Report for Operable
 Unit #5 (site 2)

Dear Ms. Berry:

The referenced documents have been received and reviewed by the North Carolina Superfund Section. Our comments are attached. Sections 6.0 and 7.0 are being reviewed by our Toxicologist and those comments will be provided to you as soon as they are completed. Please call me at (919) 733-2801 if you have any questions about this.

Sincerely,

Patrick Watters

Patrick Watters
 Environmental Engineer
 Superfund Section

Attachment

cc: Gena Townsend, US EPA Region IV
 Neal Paul, MCB Camp Lejeune
 Bruce Reed, DEHNR - Wilmington Regional Office

North Carolina Superfund Comments
Camp Lejeune MCB Operable Unit 5
Draft Remedial Investigation Report

1. Page ES-3
The paragraph on the Time-Critical Removal Action specifies a general benchmark risk-based concentration of 7,100 $\mu\text{g}/\text{kg}$ that corresponds to a 1×10^{-6} cleanup action level. The Time Critical Removal Action (TCRA) letter in Appendix B indicates that 7,100 $\mu\text{g}/\text{kg}$ (7.1 ppm) applies only to 4,4'-DDD. The (TCRA) letter also states that the corresponding action level for 4,4'-DDE and 4,4'-DDT is 5 ppm (5,000 $\mu\text{g}/\text{kg}$)
2. Page 1-6, Section 1.3.2
The well construction details for the 5 shallow wells installed in July 1984 are not as detailed as those provided for the newer wells.
3. Page 2-16, Section 2.6
The last sentence of this section states that none of the listed contaminants of concern were detected in any of the soil gas samples for Site 2. A review of Tables 1 through 4 of Appendix E (Soil Gas Survey Report) appears to contradict this. These tables show numerous gas sample analytical results above the indicated reporting limit.
4. Page 2-21, Section 2.7.1
The figure identified as 2-8 in the last sentence of this section should be 2-7.
5. Page 4-5, Section 4.2.1.2
The reference to the State Drinking Water Standards should be the State Groundwater Standards (Title 15, Subchapter 2L).
6. Pages 4-24 through 4-36, Section 4.3
Based on the discussion in this section and the sample results shown on Figures 4-1 through 4-8, we have the following concerns regarding the defined extent of contamination. Further sampling may be needed to fully define the vertical and/or horizontal extent of contamination in these areas.
 - It appears from Figures 4-2 and 4-3 that the surface soil pesticide contamination immediately surrounding the mixing/wash pad areas extends beyond the indicated sample locations.
 - Figures 4-6 and 4-7 show that the sub-surface soil pesticide contamination immediately surrounding the mixing/wash pad areas extends beyond the indicated depths for some of the sample locations.
 - Figures 4-12 through 4-14 show that there are a few areas of high pesticide contamination that extend beyond the indicated sediment sample locations and depths.

7. Page 4-29, Section 4.3.2
The discussion on sources of groundwater contamination makes no mention of the geophysical anomaly ("large buried object") identified near well 2GW3 (Appendix A). The highest concentration of ethylbenzene and total xylenes were found at well location 2GW3. The connection between the groundwater contamination and this geophysical anomaly as a potential source (i.e. UST) may warrant further discussion and possibly some additional investigation. The possibility of USTs is acknowledged in Section 4.1.2 but with no mention of the geophysical study.
8. Page 4-35, Section 4.4, Last Paragraph
The same comment as noted in number 7. There is no discussion of the geophysical anomaly around well 2GW3 as a potential UST source.
9. Page 5-9 and 5-10, Section 5.2.7
The calculations for average linear velocity (V_x) do not show the correct K value. For $V_x = 8.3$ m/yr, the corresponding K value should be 2.1×10^{-3} cm/sec. Likewise, for $V_x = 3.15$ m/yr, the appropriate K value should be 8×10^{-4} cm/sec.
10. Page 6-66, Table 6-1
The column listing the No. of Positive Detects/No. of Samples for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT does not agree with the summary in Appendix H.1. The values noted in H.1 are 33/46, 38/46 and 40/46 respectively.
11. Figure 2-1, Appendix A
This figure is difficult to interpret. It would help to include more Site 2 landmarks. Also, because the figure is reduced, the scale is no longer 1"=20'.
12. TCRA Letter, Appendix B
Page 2 of this letter includes an estimate of soil volume impacted by pesticide contamination that uses a depth of 4 feet. The subsurface soil sample results show that the contamination is below this depth in many locations. Also, it would be helpful to have a figure showing the location of the areas (i.e. the 94'x47' and the 157'x46' rectangles) being considered for the TCRA in relationship to the mixing/wash pads.
13. Soil Gas Survey Report, Appendix E
Our copy of Figure 5-2 of this report does not fold out to show the soil gas survey sampling locations.

Post-It™ brand fax transmittal memo 7671		# of pages <i>4</i>
To <i>DAN SHIELDS</i>	From <i>Linda Berry</i>	
Co.	Co.	
Dept.	Phone #	
Fax # <i>412 249 2002</i>	Fax # <i>804 322 4795</i>	



March 1, 1994

Commander, Atlantic Division
 Naval Facilities Command
 Code 1823-1
 Attention: MCB Camp Lejeune, RPM
 Ms. Linda Berry, P. E.
 Norfolk, Virginia 23511-6287

Commanding General
 Attention: AC/S, EMD/IRD
 Marine Corps Base
 PSC Box 20004
 Camp Lejeune, NC 28542-0004

RE: Draft Baseline Human Health Risk Assessment from
 the Remedial Investigation Report for Operable Unit
 5, Site 2, MCB Camp Lejeune, Jacksonville, NC

Dear Ms. Berry:

The risk assessment portion of the referenced Remedial Investigation Report has been reviewed by the NC Superfund Section. These comments are attached to this letter as a memorandum from David Lilley, our Industrial Hygienist, to myself. Please call me if you have any questions about this.

Sincerely,

Patrick Watters

Patrick Watters
 Environmental Engineer
 NC Superfund Section

Attachment

cc: Neal Paul, MCB Camp Lejeune
 Gena Townsend, US EPA Region IV

February 24, 1994

TO: Patrick Watters
FROM: David Lilley *DBL*
RE: Comments prepared on the Draft Baseline Human Health Risk Assessment for Camp Lejeune, Site 2, Operable Unit 5, Jacksonville, NC

After reviewing the above mentioned document, I offer the following comments:

1. Page 6-7: If it is to be claimed the toluene detected on-site is naturally occurring, the conditions in which naturally occurring toluene in soil is found must be described and matched to conditions on this site. Also, background sampling must be used to confirm this claim.
2. Page 6-7 and throughout the document: A chemical not being historically associated with the site is not a reason to drop it from the list of chemicals of concern.
3. Page 6-8: The frequency of detection of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT do not match the frequency of detection numbers on Table 6-1 as cited. It is claimed dieldrin was retained as a COPC, but it does not appear on Table 6-1.
4. Page 6-8 and throughout the document: The Two-Times Rule cannot determine whether the presence of an inorganic could be site related, it can suggest whether an inorganic is present in concentrations "significantly" above background soil concentrations. Also, see comment # 2.
5. Page 6-9: The rationale for excluding 4-methyl-2-pentanone based on low frequency of detection and low concentrations seems adequate, the rest of the sentence is very confusing and contradicts itself, it should be dropped.
6. Page 6-10, last paragraph: The frequency of detection for heptachlor is given as 1/46, Table 6-5 says 1/11.
7. Page 6-17: It is claimed toluene is retained as a COPC, but it does not appear on Table 6-22.
8. Page 6-18, second paragraph: The last sentence makes no sense.
9. Page 6-19: It is claimed phenol is retained as a COPC, but it does not appear on Table 6-22.
10. Page 6-19, last sentence: According to Table 6-14, the concentration of aluminum did exceed the MCL.

11. Page 6-22: The frequency of detection numbers for the pesticides do not match the numbers given in Table 6-15.
12. Page 6-26: The number 0.01 is defined as a "ratio limit". It is claimed chromium, selenium, and thallium exceed this limit. Table 6-21 provides contradictory information. Copper exceeds this limit but is not listed on page 6-26.
13. Page 6-27: Current trespassers to Overs Creek (older child and adult) are not included in Figure 6-1.
14. Page 6-29: It is claimed future construction workers could be exposed by dermal contact and incidental ingestion to COPCs in on-site surface water and sediment, but the information on page 6-90 contradicts this.
15. Page 6-32: The conversion factor should be $1.0E-06$ kg/mg.
16. Page 6-35: The units for $1/PEF$ are Kg/m^3 .
17. Page 6-40: C should be Contaminant concentration in water (mg/l).
18. Page 6-41, second line: Exposure time should be 0.25 hours per day.
19. Page 6-41: EF needs to be defined.
20. Page 6-43: In the CDI equation, CD needs to be changed to ED.
21. Page 6-52: The risk accepted in the state of North Carolina is $1.0E-06$.
22. Page 6-53, Section 6.5.1.1, Civilian Base Personnel-Current Scenarios: It is stated that a value that falls above the USEPA's target risk range of $1.0E-04$ to $1.0E-06$ suggests carcinogenic effects are possible. Any number suggests carcinogenic effects are possible, the larger the number, the higher the risk. EPA has judged the above range as acceptable.
23. Page 6-54 and throughout the document: Using the equations outlined in this document, the highest risk that can be calculated is $1.0E-02$. Any risk number that comes out higher than this must be reported as exceeding the limits of the model or recalculated using a different equation, such as the one-hit equation for high carcinogenic risk levels described in the RAGS manual.
24. Page 6-56, Residential Child and Adult-Future Scenarios: An ICR of $2.0E-04$ is described as falling below the acceptable risk range, when, in fact, it falls above the acceptable risk range.

25. Page 6-57, Residential Child and Adult-Future Scenarios: An ICR of $5.0E-04$ is described as falling below the acceptable risk range, when, in fact, it falls above the acceptable risk range.
26. Page 6-97: It is unclear why there is a difference in the SA value for residential adults and base personnel.
27. Throughout the document: Adult exposure, not that of a child, needs to be used to determine the risk posed by carcinogens.

dl/DL/wpcommen.doc/24,25,26