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MAY 08 1998

U.S. Environmental Protection Agency
Region III
Federal Facilities Branch
Attn: Mr. Harry Harbold (3HW50)
841 Chestnut Building
Philadelphia, Pennsylvania 19107

Re: Human Health Risk Assessment for Site 2, NM Slag Pile, Naval Base, Norfolk, Virginia

Dear Mr. Harbold:

Three copies of the Draft-Final "Human Health Risk Assessment, Site 2, NM Slag Pile", dated May 1998, have been forwarded to you under separate cover. Request you review and provide comments by June 19, 1998.

In addition, please find enclosed responses to previous comments from your toxicologist dated October 28, 1997 and November 12, 1997 on the September Draft Risk Assessment. Since these comments were received, the Navy has resampled the groundwater at site 2, re-evaluated the groundwater quality, quantitatively evaluated subsurface soils using the adult lead screening model for industrial soil and revised the risk assessment report.

If you require additional information, please contact me at (757) 322-4587.

Sincerely,

R. M. Jackson

R. M. JACKSON, P.E.
Remedial Project Manager
Installation Restoration Section (North)
Environmental Programs Branch
Environmental Division
By Direction of the Commander

Re: Human Health Risk Assessment for Site 2, NM Slag Pile, Naval Base, Norfolk, Virginia

Enclosures

Copy to:
COMNAVBASE Norfolk (Mr. Tim Reisch, N45)
VDEQ (Mr. Devlin Harris)
Administrative Record File (COMNAVBASE Norfolk)

RESPONSE TO EPA COMMENTS

Response to Linda Watson's (EPA Region III toxicologist) comments dated October 28, 1997 and November 12, 1997 on the "Draft Human Health Risk Assessment, Site 2, NM Slag Pile, Naval Base Norfolk" dated September 1997

October 28, 1997 Comments

1. **Section 1.0, Executive Summary, Table 1 provides the sample collection number for surface soil, surface water and sediment, but does not provide the sample collection number for groundwater and background groundwater. Please provide the sample collection number for all media of concern.**

   Table 1 will be revised. Number of samples collected for groundwater and background groundwater will be added to Table 1. Additionally, information on subsurface soil sampling will be added to Table 1.

2. **a. Section 2.1.1, Data Evaluation and Selection, discusses the use of primary and duplicate samples in the RI and current risk assessment document. Why were different data evaluations used for duplicate and primary samples in the RI and risk assessment? EPA suggests consistent data evaluations be used for both the RI and risk assessment.**

   In the RI, all data were compared with screening values, including primary and duplicate samples. For the risk assessment, the maximum of the duplicate and primary sample was used as the sample concentration. The RI should not have considered the duplicate and primary sample as two separate samples. In the future, the duplicate and primary sample will not be counted as two separate samples. The approach used in the risk assessment was the correct approach and will not be revised.

   b. Generally, EPA Region III recommends taking the average of the duplicate samples however, the method of sample evaluation proposed for the risk assessment offers more conservatism and is therefore acceptable.

   Comment noted.

3. **The sentences referring to Tables C-1, C-2, C-3, C-4, C-5, and C-6 are confusing and should be restated. Perhaps the paragraph could read, "Table C-1 presents the analytical results for contaminants detected in groundwater. Table D-1 summarizes the constituents that were detected in the groundwater samples that were used in the risk assessment." Please restate the sentence for all appropriate sections, 2.1.1.1, 2.1.1.2, 2.1.1.3, 2.1.1.4 and 2.1.1.5.**

   The tables in Appendix C contain analytical results for all constituents analyzed, not just the constituents that were detected. The text will be re-worded, as appropriate, to clarify the description of the tables.

4. **TCLP, Toxic Characteristic Leaching Procedure is listed as the method of testing for subsurface soil and surface water in Tables C-3, D-3, and C-4. This appears to**

be a typing error; however, EPA would like to remind Norfolk Naval Base that the TCLP method is not very useful for risk assessment purposes.

Tables C-3, D-3, and C-4 incorrectly listed TCLP as the analytical method for subsurface soil and surface water sample analysis. The tables will be revised to say TCL instead of TCLP.

5. **Please provide the name of the appropriate EPA document referred to in Table 2, Footnote 2.**

   Footnote 2 of Table 2 will be revised to say EPA Region III *Updated Risk-Based Concentration Table*, March 1997.

6. **Section 2.3.1, Toxicological Profiles for COPCs, ideally, should include a profile of all COC. However, at a minimum, the toxicological profile should include all risk drivers.**

   Toxicological profiles for all risk drivers are included in Section 2.3.1. The text in Section 2.3.1 will be revised to state that toxicological profiles are provided for COCs which are risk drivers.

7. **Although iron is a human nutrient it can also be a COC. Table 2 eliminates iron as a COC, but the maximum concentration exceeded the residential soil RBC value. Iron should be included as a COC. The reference does for iron is (3.00E-01).**

   Iron will be re-included as a COPC in surface soil and any other media where it exceeds the appropriate RBC. Table 2 and Appendix G (and other appendices, as necessary) will be revised to include iron.

8. **Although subsurface soil is only being evaluated qualitatively, the media and corresponding COC's should be included in Table 3.**

   Based on the telephone conference call on October 30, 1997 to discuss the risk assessment, subsurface soil will be evaluated quantitatively in the risk assessment. A water line runs through Site 2. Excavation of subsurface soil at Site 2 for maintenance of the water line is possible. Therefore, information on subsurface soil sampling and the COCs will be added to Table 3.

9. **a. The report states, "subsurface soil will only be evaluated qualitatively in the risk assessment as indicated in the *Draft Human Health and Ecological Risk Assessment Assumptions for Remedial Investigation and Feasibility Study for NM Slag Pile (Site 2)*" however, the rationale for not evaluating subsurface soil quantitatively should be included in the risk assessment and subsequent uncertainty section.**

   Based on the telephone conference call on October 30, 1997 to discuss the risk assessment, subsurface soil will be evaluated quantitatively in the risk assessment. A water line runs through Site 2. Excavation of subsurface soil at Site 2 for maintenance of

the water line is possible.

b. The report appears to only evaluate subsurface soil transfer from soil to groundwater (only) qualitatively. Does the above named document explain the rationale for not evaluating subsurface soil (alone) qualitatively?

See response to 9a.

10. **The RBC values presented in Table 2 for subsurface soil transfer to groundwater are invalid. Region III's Soil Screening Levels for transfer from soil to groundwater and air is no longer used. Norfolk Naval Base should consult EPAs Soil Screening Guidance: User Guide, April 1996 and Soil Screening Guidance: Technical Background Document, May 1996 to determine sites specific soil screening values for transfer from soil to groundwater. In addition, the equations and exposure assumptions should be included in the report.**

Based on the telephone conference call on October 30, 1997 to discuss the risk assessment, direct contact with subsurface soil will be evaluated quantitatively in the risk assessment. Therefore, we will not be evaluating the soil to groundwater pathway qualitatively. Linda Watson agreed that we do not need to evaluate the soil to groundwater pathway during a phone conversation between myself and Ms. Watson on November 19, 1997.

11. **Page 2-8, first paragraph, states that eight SVOCs were detected in the subsurface soil sample, however Table D-3 list fourteen (14) SVOCs detected in subsurface soil.**

Page 2-8, first paragraph, will be revised to indicate that 14 SVOCs were detected in subsurface soil.

12. **Arsenic and lead should be included as COCs. Arsenic exceeded the tap water RBC value and lead exceeds the SDWA screening value. *Note: The groundwater background values are invalid due to insufficient sample collection and cannot be used to eliminate COCs. See comment #19.**

Another round of groundwater samples will be collected, including collecting one sample from each of the two background wells. There will then be a total of 4 background groundwater samples for comparison with the site-related groundwater samples. If the concentration of arsenic (and cobalt and iron) in the site-related wells is not statistically greater than the concentration in the background wells, arsenic (and cobalt and iron) will not be included as a COC. The same rational will apply to lead. If the site-related groundwater concentration is statistically greater than the background groundwater concentration, the constituent will be included as a COC.

Linda Watson agreed during the telephone conference call on November 1, 1997 that four samples would be adequate for a statistical comparison of site data to background data, as long as a discussion is included in the uncertainty section.

RESPONSE TO EPA COMMENTS

13. **The report clearly states that the media, receptors, exposure routes and pathways have already been established between Norfolk Naval Base and the EPA however, future adult ingestion of groundwater while car washing and future potential ingestion of groundwater by a Gardener/Agricultural should be included as potential pathways. The rationale is, if a person becomes thirsty will exerting physical energy (washing an automobile or working in a garden) they will usually drink from the most assessable water source (garden hose). This scenario most likely would occur during the summer months. See Table 4.**

    The report (text, Table 4, Table 8, and risk calculation tables) will be revised to include ingestion of groundwater by gardener/agricultural and car washer. An ingestion rate of 237 mL (8 oz.), as requested by Linda Watson, will be used.

14. **Table 7, Exposure Equations do not show the equation that was used for Groundwater Dermal Contact.**

    Table 7 will be revised to include the equation used for groundwater dermal contact.

15. **Table 2 lists the RBC units as mg/l, while Table I-2 list the RBC values as µg/L. Please correct this error.**

    Table 2 will be revised to show the surface water RBC units as µg/L.

16. **Iron and lead should be included as COCs. Iron exceeded the surface water RBC value and should be included as a COC and lead exceeded the SDWA screening value.**

    Iron will be included as a COC and evaluated quantitatively in the risk assessment. Lead will also be included as a COC, however, there is no method for quantitatively analyzing exposure to lead in surface water.

17. **Why were the Polycyclic Aromatic Hydrocarbons (PAHs) not evaluated for in sediment and surface water? Specifically, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene show no analytical results in samples SD01-SD-08 and SW01-SW04.**

    PAHs were analyzed for during the first sampling event and were determined not to be of concern. Therefore, the more recent sampling did not include analysis of surface water for these parameters. The first round of data was not used in the risk assessment.

18. **The Tables listed under Sections 2.1.3.7 and 2.1.3.8 do not correspond to the entitled background media. Please check for grammar and/or typing errors.**

    Text will be revised to reference correct tables. Background surface soil tables are

included in Appendix L and background subsurface soil tables are included in Appendix M.

19. **a. Section 2.1.2.2, Primary Selection Criteria, page 2-15 discusses how groundwater, surface soil, and subsurface soil data were statistically compared with background groundwater and soil samples. However, the number of background samples collected is insufficient for statistical comparison and thus, cannot be used to eliminate COC. Further, two background groundwater samples and four background surface soil samples will not provide an accurate characterization of the site background conditions. Therefore, background samples were not used to eliminate COCs.**

Linda Watson agreed during the telephone conference call on November 1, 1997 that four samples would be adequate for a statistical comparison of site data to background data, as long as a discussion is included in the uncertainty section. We have four background surface soil samples and will be re-sampling the two background wells in order to collect two additional background groundwater samples. Therefore, the surface soil background statistical comparison will remain unchanged, but the groundwater background statistical comparison will be revised using the additional samples.

b. Were background subsurface soil samples collected? If background subsurface soil samples were collected, the media and appropriate information should be included in Table 3.

Background subsurface soil samples were collected. The background subsurface soil sample information will be added to Table 3.

20. **Section 2.3.1.4, discusses the blood lead toxicity value defined by Centers for Disease Control (CDC) as 25 µg/dl or greater for children and continues by stating that this blood lead level will be revised to approximately 10 to 15 µg/dl. Norfolk Naval Base should note, the blood lead toxicity value (action level) has already been revised by CDC and is currently 10 µg/dl in children.**

Section 2.3.1.4 will be revised.

21. **In light of the extremely high levels of lead identified in soil, sediment, and groundwater and the potential impact to adult adolescent recreational users (specifically those of 6 years of age and adolescent females within child-bearing ages 12-17 years), the EPA highly recommends the use of EPAs "Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil," December 1996. This model was exclusively designed for adult soil exposure (industrial/construction worker and female adult workers within child-bearing age) however, adjusting the lead absorption factor (adults-12%, child-30%) could provide a more accurate estimation of blood lead levels. In addition, peer reviewed Biokinetic Models, for all ages, have been developed by Ellen O'Flaherty at the University of Cincinnati and**

. Richard Leggert at Oak Ridge National Laboratory, Tennessee, although these methods are not currently supported by EPA.

*** Note: Currently there are no established models for estimating blood lead levels for adolescent and adult recreational exposures. The above recommended model can be used to estimate blood lead levels, but the exposure assumptions will have to be modified to reflex the difference in lead absorption between adults and children. There is no scientific evidence that states the specific age when lead absorption decreases, therefore specific details regarding the model inputs should be discussed further between EPA and Norfolk Naval Base. Additionally, the IEUBK Model is recommended for children between the ages of 6 months to 7 years.**

The lead concentration in surface soil was below the residential screening value of 400 mg/kg, however the lead concentration in subsurface soil exceeded the 400 mg/kg screening value. Therefore, the adult lead soil model will be used to evaluate exposure to lead in subsurface soil by an adult construction worker (the only receptor who may contact subsurface soil). According to Linda Watson (telephone conference call November 1, 1997), we also need to evaluate residential exposure to lead in subsurface soil using the IEUBK model if no institutional controls will be applied to the subsurface soil to limit future residential use because the lead concentrations were high.

There are no methods available for evaluating lead in surface water and sediment (which exceeded groundwater and soil screening levels).

The only method available to evaluate exposure to lead in groundwater is the IEUBK model, and since the maximum lead concentration in groundwater exceeded the SDWA lead action level, the IEUBK model will be used. However, additional groundwater data is being collected and the new data will be evaluated prior to determining if it is necessary to run the IEUBK model. Additionally, the groundwater lead exceedance was for unfiltered data and not filtered data. It needs to be determined if it is appropriate to evaluate potable use of filtered or unfiltered groundwater data. Based on Naval Base Norfolk Partnership Human Health Risk Assessment Consensus Agreement #6.C, Evaluation of Potential Groundwater Exposures in the Human Health Risk Assessment, filtered inorganics data should be used for the evaluation of potable use scenarios.

November 12, 1997 Comments

1. **Subsurface soil was not evaluated in this report because the correct risk-based values must be established. Please consult EPA's "Soil Screening Guidance: User's Guide," April 1996 to establish sites specific soil to groundwater transfer values.**

   Based on the telephone conference call on October 30, 1997 to discuss the risk assessment, direct contact with subsurface soil will be evaluated quantitatively in the risk

assessment. Therefore, we will not be evaluating the soil to groundwater pathway qualitatively.

2. **The results for Arsenic in sediment (average concentration, standard deviation, 95% UCL, etc.) cannot be duplicated. The detection values used to calculate the results are unclear. See Table 6 and Table J-1.**

   The values for arsenic in Table 6 and Table J-1 are the same.

3. **Table 8, Footnote K, should read "Professional Agreement between Norfolk Naval Base and EPA's, Region III Toxicologist." In addition, the rationale for using an exposure frequency of 180 days/year for site workers could not be located in the Consensus Agreement.**

   Table 8, footnote K will be revised. The rationale for using an exposure frequency of 180 days/year was not based on the Consensus Agreement. This exposure frequency was chosen based on a discussion with Nancy Rios Jaffola, EPA Region III Toxicologist, prior to Consensus Agreement #6.D being prepared.

4. **Background statistics (e.g., Mann-Whitney U-Test and Wilcoxon-Whitney Rank Sums Test) were not evaluated for either media (groundwater and surface soil) because, the sample collection number was inadequate. Norfolk Navy Base is encouraged to collect adequate background sampling in order to perform the appropriate statistics that will provide an accurate characterization of site conditions. A base wide background study will help determine if contaminants are sites related or not, as well as, establish clean up goals.**

   Linda Watson agreed during the telephone conference call on November 1, 1997 that four samples would be adequate for a statistical comparison of site data to background data, as long as a discussion is included in the uncertainty section. We have four background surface soil samples and will be re-sampling the two background wells in order to collect two additional background groundwater samples. Therefore, the surface soil background statistical comparison will remain unchanged, but the groundwater background statistical comparison will be revised using the additional samples.

5. **Background groundwater and surface soil results (average concentration, standard deviation, 95% UCL) cannot be duplicated. The values reported for groundwater (Table C-6) show different monitoring well locations than values in Table D-6. The report should provide one table indicating the detected concentrations used to calculate results.**

   Table C-6 included the unfiltered samples only and Table D-6 included the filtered samples only. The tables will be revised to include both filtered and unfiltered results.

6. **Background groundwater risk from ingestion and inhalation exposure should be calculated for agriculture and car washer receptors.**

Background groundwater risk from ingestion will be calculated for agriculture and car washer receptors. Ingestion of groundwater by agriculture and car washers was not evaluated in the draft risk assessment for either site-related groundwater or background groundwater, but will be added for both. Inhalation exposure will not be evaluated for background groundwater because no VOCs were retained as COCs.

7. **Background surface soil risk from ingestion, dermal and inhalation exposure should be calculated for the site worker's receptor.**

   None of the constituents detected in the background surface soil samples were retained as COCs for the worker scenario. Therefore, background risks were not calculated for this receptor.

8. **Why was lead included in Table G-6 if the surface soil detection values for lead do not exceed the action level?**

   Lead should not have been included in Table G-6 and will be deleted.

9. **Section 2.2.4, Exposure Quantification, states "For dermal exposure to groundwater, the nonsteady state model was used" however, according to the dermal equation presented in Table 7 the steady state model was used. The EPA, Region III prefers the use of the nonsteady state model for organic dermal risk and steady state model for inorganic risk. Please consult EPA's "Dermal Exposure Assessment: Principles and Applications," January 1992.**

   First, the dermal exposure to groundwater equation was inadvertently left off of Table 7 (see comment 14 from October 28, 1997). However, Tables F-8 through F-13 did not use the nonsteady-state dermal absorption model for trichloroethene, the only organic constituent retained as a COC in groundwater. These tables will be revised and the nonsteady-state dermal absorption model will be used for trichloroethene. There were no organics retained as COCs for surface water, therefore, only the steady-state model was used for dermal exposure to surface water.

10. **Inhalation of groundwater is included as an exposure route in Table 4 for a gardener/agricultural, car washer, and construction workers. However, inhalation risks for these receptors were not calculated.**

    Inhalation of volatiles from groundwater will be added to the assessment.

11. **The lack of quantitative subsurface soil analysis, and thus the limitations on subsurface soil risk evaluation, should be included in the Uncertainty Section.**

    Based on the telephone conference call on October 30, 1997 to discuss the risk assessment, direct contact with subsurface soil will be evaluated quantitatively in the risk assessment.

12. **The report concludes my stating "all cumulative risk and hazards were below or within the EPA's recommended levels" however, the target hazard quotient is slightly above EPA's recommended target index for site workers exposure to groundwater (HQ=1.2) and, therefore exceeds the total cumulative hazard index (HI=1.3). Please include this hazard findings in the Conclusion Section.**

The text will be revised to indicate the site worker hazard exceeds EPA's recommended level of 1.0.

****Note: Although cancer risk for all receptors and pathways were within EPA's acceptable risk range (10E-06 - 10E-04), several receptors and pathways exceeded EPA's "benchmark" cancer risk of 10E-06. These receptors and pathways include: Site Worker inhalation of surface soil (3.5E-06); Recreational Adolescent ingestion of surface soil (3.0E-06) with arsenic driving the risk (2.7E-06); Recreational Adolescent dermal contact with arsenic (3.3E-06) and beryllium (8.8E-06) in surface soil; Recreational Adult ingestion of surface soil (5.3E-06) with arsenic driving the risk (4.7E-06); Recreational Adult dermal contact with arsenic (9.3E-06); Recreational Adult cumulative risk for surface water (1.1E-06); Recreational Adolescent ingestion (1.2E-06) and dermal contact (1.4E-06) with sediment, and Recreational Adult ingestion (2.0E-06) and dermal contact (4.0E-06) with sediment. Background risk was not evaluated because of inadequate sample collection, which causes the statistical validity of the results to be questionable.**

Linda Watson agreed during the telephone conference call on November 1, 1997 that four samples were statistically adequate for background data, as long as a discussion is included in the uncertainty section. We have four background surface soil samples and will be re-sampling the two background wells in order to collect two additional background groundwater samples.