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April 24, 1998

Commanding Officer
Attn: Mark Taylor/1861MT
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P.O. Box 190010
North Charleston, SC 29419-9010

Subject: CTO-094; NSA Memphis RFI, Millington, Tennessee

Document Transmittal: *Assembly C RFI Report - SWMUs 15 and 21 (Revision 2)*, April 24, 1998

Reference: Contract N62467-89-D-0318 (CLEAN II)

Dear Sir:

Please find enclosed one copy of the *Assembly C RFI Report - SWMUs 15 and 21 (Revision 2)*, along with written responses to regulatory agency comments. As requested, copies have been distributed to the BRAC Cleanup Team (BCT) and others as shown on the attached NSA Memphis RFI Distribution List. Green covers and spines have been included to replace the white ones should this version of the document receive final BCT approval.

If you have any questions or comments of a technical nature, please contact me or Jim Rathbone at 901/372-7962. Comments or questions of a contractual nature should be directed to Debra Blagg at the same number.

Sincerely,

EnSafe Inc.

By: Lawson M. Anderson, CHMM
Task Order Manager

Enclosures: As Stated

cc: Contracts File: CTO-094 (w/out enclosure)
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SWMUs 15 and 21
Assembly C RFI Report — NSA Memphis
Revision 2
Response to USEPA Region IV and TDEC Comments

General comment: Update the document as needed to reflect the most recent RBCs, SSLs, and MCLs.

Response: The text, tables, and figures were updated throughout the report to reflect the most recent guidance documents. The USEPA October 22, 1997, Risk-Based Concentration Table document was used for residential and industrial RBCs in soil and tap water RBCs for groundwater. Since the new RBC table does not contain SSLs the USEPA May 1996, Soil Screening Guidance: Technical Background Document was used for SSLs for the migration to groundwater pathway. Note that the Soil Screening Guidance has SSLs for 110 chemicals, whereas the old RBC Table calculated additional SSLs and listed several hundred SSLs. Due to this change in guidance documents, some compounds which had an SSL listed in the previous revision are listed in this revision as not having an established SSL. Also, the RBC Table used a dilution-attenuation factor (DAF) of 10, while the Soil Screening Guidance lists SSLs with a DAF of 20 or 1. To be conservative in our estimate of risk, a DAF of 1 was used throughout this report. Accordingly, most of the SSLs in this report are different than in the previous revision. The USEPA October 1996, Drinking Water Regulations and Health Advisories document was used for MCLs in groundwater.

SWMU 15 Specific Comments:

(1) Comment: Page 4.3.4, page 4-21, line 10. The text states "Groundwater samples were collected and analyzed for FSA from all SWMU 15 monitoring wells during the September 1996 monitoring event. Results for this sampling event will be incorporated in any revisions to this RFI report." Where are these results?

Response: The text was changed to state this revision includes the results of the August 1996, April/May 1997, and November 1997 long-term groundwater sampling events, including a whole new subsection in Section 6 which summarizes the analytical results from the long-term groundwater sampling events.

- (2) Comment: Page 5.2, page 5-3, line 20. The text states "the fluvial deposits were between 46 and 68 feet thick in the study area and terminated at depths between 85 and 96 feet." This sentence seems to contradict the sentence on line 4 page 5-2 which states the fluvial deposits range from 10 to 35 feet thick on the northside.

Response: The text on page 5-2 was changed to state the fluvial deposits range from 10 to 70 feet thick on the northside.

- (3) Comment: Section 6.2.1, page 6-7, line 4. Text states "The SSL was exceeded by on split sample submitted for off-site confirmatory analysis (8,600 $\mu\text{g}/\text{kg}$ in the 15 to 17-foot interval split sample from location 015S0012 versus 1,500 $\mu\text{g}/\text{kg}$ in the primary samples analyzed by the onsite laboratory)." Need to explain reason for large discrepancy between the primary and split sample results.

Response: The reason for the large discrepancy is not known.

- (4) Comment: Section 6.2.4, page 6-29, line 7. Text states "As stated in the Memorandum "This finding indicates that dieldrin levels found at each SWMU do not necessitate remedial action in the absence of other significant carcinogenic risk contributors." This sentence should be clarified by adding "below the background concentration of 131 $\mu\text{g}/\text{kg}$ " after the work "levels".

Response: The sentence was clarified and the requested addition to the sentence was performed.

- (5) Comment: Section 6.3.1, page 6-49, line 2. The text states "These VOCs, not likely related to former fuel storage practices at SWMU 15, were detected only in fluvial deposits groundwater samples collected north of the former tank farm area." This needs further explanation considering VOCs were only detected north of the tank farm area which appears to be down-gradient of this area according to figure 6-10 (nothing detected up-gradient) and page 2-2 line 5 states that paint waste, solvents, and Freon were reportedly stored here.

Response: The sentence was changed to read "These VOCs were detected only in fluvial deposits groundwater samples collected north of the former tank farm area".

(6) Comment: Section 6.4.1, page 6-64, line 8. The note states "Acetone, 2-butanone, and methylene chloride are like laboratory artifacts, as they are present in many soil samples from other Northside SWMUs at similar concentrations." This needs to be clarified. The sentence seems to indicate that these constituents are laboratory artifacts since they are found in many soil samples. Were these artifacts found in blank samples? If so, this seems to make a stronger case that these are laboratory artifacts. It is not appropriate claim that these are laboratory artifacts based on many soil samples containing these constituents.

Response: *The text was clarified to state "Acetone, 2-butanone, and methylene chloride are common laboratory artifacts; however, these compounds were not rejected during data validation and they were not identified in blank samples."*

(7) Comment: Section 7.0. Considering the relatively high risk ratios, why wasn't a BRA conducted? It appears a BRA would be appropriate for this SWMU

Response: *The BCT determined that a PRE would be sufficient to make risk management decisions. A BRA would be beneficial in the exposure assessment, where an upper confidence level mean would be calculated for the exposure point concentration. When high variability exists in a data set, the calculated UCL can be higher than the maximum reported concentration. When this occurs, USEPA Region IV recommends using the maximum reported concentration as the exposure point concentration to represent the entire site. The PRE method uses the maximum reported concentration, so it is unlikely that performing a BRA on such a small site would be more useful than a PRE. It is unlikely that conclusions would be different based on a BRA, because few samples are available for SWMU 15. Therefore, variability in the data has a greater influence on UCLs, increasing them to concentrations higher than maximum concentrations. In addition, it is not generally appropriate to calculate a UCL for data sets with less than 10 samples (Gilbert, 1987).*

(8) Comment: Section 7.0, Page 7-1, Paragraph 1, Line 4. The text states that the contaminants of potential concern (COPC) were selected from "the original set of detected chemicals". It is then stated in the next sentence that the DPT samples (the first samples collected) "were not used in this PRE". This description seems to imply that the DPT data were used to select the COPCs for inclusion in the PRE and then the same data were discarded for the purposes of the PRE. The language should be changed to better define the term "original", or a rationale for using the DPT data for selection of COPCs and subsequently excluding the data in the PRE should be provided.

Response: See Comment 7.

- (9) **Comment:** Section 7.0, Page 7-1, Paragraph 1, Line 7. The text states that DPT data were not evaluated for the purposes of the PRE. Region IV allows for the use in risk assessment of volatile organic compound (VOC) analyses from DPT groundwater samples. The data should have been used with appropriate qualifications. All usable data should be incorporated in the PRE.

Response: See Comment 7. The DPT data was incorporated into the PRE.

- (10) **Comment:** Section 7.0, Page 7-2, Risk Ratio Equations. The source of the risk ratio equations is not cited. As this is an alternative method of calculating risk, a reference to EPA guidance, which specifies the use of these equations, should be made.

Response: See Comment 7.

- (11) **Comment:** Section 7.0, Page 7-2, Paragraph 2, Line 3. In this line, and throughout this section, reference is made in the text to "the EPA memorandum", and multiple EPA memoranda have been discussed. It is uncertain from the text which EPA memorandum is being referenced.

Response: See Comment 7.

- (12) **Comment:** Section 7.0, Page 7-5, Table 7-2. The table indicates that arsenic was detected in a total of 2 out of 4 samples. However, the table also states that the number of samples that exceeds the screening level is four. Conflicting information is provided. The appropriate change should be made to the table.

Response: See Comment 7.

- (13) **Comment:** Table 7-3, page 7-7. What is the source of the screening values for industrial groundwater?

Response: See Comment 7.

(14) Comment: Section 7.0, page 7-11, lines 8 and 15. Line 8 states "The conservative approach includes these assumptions regarding uncertainties". Lines 15 states that on of these conservative assumptions as "The site will be used for residential and/or industrial purposes". Explain why the assumption that the site will be used for industrial purposes is conservative.

Response: See Comment 7.

(15) Comment: Section 7.0, Page 7-12, Paragraph 3, Line 12. The text states, "The residential HI was estimated as 4...". This conflicts with Table 7-4 on page 7-9, which presents a hazard sum of 3 for the residential scenario. The appropriate changes should be made to correct this inconsistency.

Response: See Comment 7.

(16) Comment: Section 8.2, Ecosystem at Risk, Page 8-1. This section describes the ecosystem at risk. In general, the description of the site is too abbreviated. The description should include the community structure, availability of proximate habitat, species identified at the site, site characterization methods, and local meteorological data. These sources of the site-specific information should be cited.

Response: This comment is no longer valid. EnSafe risk assessors met with USEPA, and TDEC risk assessors about these issues and conducted a site visit. After touring the sites, it was agreed that sites with no complete exposure pathways, due to lack of habitat and/or receptors, would be written off with no data presented. All future risk assessments will be conducted following the agreed approach.

(17) Comment: Section 8.2, page 8-2, line 3. The word surficial is incorrectly spelled (surficail).

Response: The text was changed to reflect the correct spelling of surficial.

(18) Comment: Section 8.2, Stressor Characteristics, Pages 8-2, to 8-8. It is unclear whether this section is intended to provide a broad overview of stressor characteristics or if it provides the basis of the ecological risk assessment. The stressor characteristics section does not include equate information about the site-specific chemicals of concern, nor was it specific to the ecosystem at risk. This section should discuss the potential effects of the site-specific ECPCs on the ecosystem at risk, and it should provide examples of the concentrations at which adverse effects may occur.

Response: See Comment 16.

- (19) **Comment:** Section 8.2, Page 8-7, Paragraph 2. The text states that no information is available on the toxicological effects associated with nickel, vanadium, and tin. However, several toxicity studies in the open literature contain information for these elements. This information should be included in the risk assessment.

Response: See Comment 16.

- (20) **Comment:** Section 8.2, Page 8-8, Paragraph 1. The text states that food chain biomagnification for organochlorine pesticides is low, but does not support this statement by citing literature. This statement should be supported by the literature. This statement should be revised if not supported by the literature.

Response: See Comment 16.

- (21) **Comment:** Section 8.3, Pathways and Exposure Scenarios, Pages 8-8 and 8-9. This section presents a conceptual model for the site. Overall, this model is inadequate. Organisms that are identified in the model as being potential receptors are not evaluated in the ecological risk assessment nor is adequate justification given for their exclusion. Specifically, small mammals, plants, and herbivores are identified as having complete exposure pathways but are not evaluated in the risk assessment. These organisms should be evaluated. In addition, the sources of contaminants, the transport mechanisms, and routes to potential receptors should be discussed in the document.

The text states that dermal exposure for amphibians and reptiles is similar to that for mammals. This statement is incorrect and should be omitted from the text. Amphibians and reptiles do not possess the dermal protection capabilities that mammals do.

The presence of rare, threatened, or endangered species is not discussed in the document. This information and the methods for deriving this information should be presented in the text.

Response: See Comment 16.

- (22) **Comment:** Section 8.4, Ecological Effects Assessment, page 8-9. This section presents the basis of the ecological risk assessment. The document states that because applicable, relevant, and appropriate requirements for soil are not available for ecological receptors, literature values will be used to predict ecological risk. Screening level concentrations for some chemicals are available through Oak Ridge National Laboratory (Will and Suter 1995). Literature values derived from relevant studies can also be used for screening criteria, assuming that the endpoints are applicable and uncertainty factors are applied.

The document assumes that if lower-level invertebrates are not at risk, no adverse effects to other food web components will occur. This statement ignores the biomagnification of organochlorine pesticides and other chemicals in the food web. Furthermore, this statement is not supported by the open scientific literature. Potential food web effects must be considered, particularly for organochlorine pesticides.

Response: See Comment 16.

- (23) *Comment:* Section 8.5, Risk Characterization, Exposure Analyses, Pages -9 to 8-14. This section discusses the potential exposure of terrestrial invertebrates to ECPCs. The introduction of the section presents information regarding metal toxicities to earthworms and microarthropods. Other contaminants found on the site are not discussed. These contaminants should be discussed in the introduction or the information presented should be deleted and discussed in the "metals" section.

A summary table for all ECPCs should be included in the document. This table should contain the following information: (1) maximum chemical concentrations in the soil; (2) estimated chemical exposure for each receptor; (3) the relevant literature values that are used as benchmarks and some indication that a review of these values has been conducted (comparing onsite concentrations to a median lethal concentration (LC_{50}) is not sufficient); and (4) a hazard index for each ECPC for each receptor.

Response: See Comment 16.

- (24) *Comment:* Section 8.5, Page 8-10, paragraph 4. This paragraph summarize the potential risks to invertebrates posed by metals found at the site. The document states that metal concentrations observed in surface soil are well below concentrations cited in the literature as producing negative effects to invertebrates. All relevant information, such as exposure concentrations for chemicals in the soil, literature benchmark values, and hazard indices for ECPCs should be presented in a table, as discussed above, to allow verification of conclusions.

Response: See Comment 16.

(25) Comment: Table 8-2, summary of chemical Effects Studies on Terrestrial Infaunal Invertebrates, pages 8-11 and 8-12. This table presents a summary of studies of chemical effects on terrestrial receptors. It does not appear that this table is site specific as only a small number of chemicals in the table are chemicals of concern at the site and the most recent study is 4 years old. Further, many ECPCs at the site are not included here. This table should contain the most recent toxicity information relevant to the chemicals of concern at the site.

Response: See Comment 16.

(26) Comment: Section 8.5, Risk Characterization, Pages 8-13 and 8-14. The discussion on these pages focuses on the potential ecological risks posed by chlorinated pesticides. The information presented is not site-specific. The discussion of chemical effects should be specific to site conditions. Further, line 12 of Page 8-14 compares site concentrations (presumably of dieldrin) to a DDT value of 1,000 milligram per kilogram (mg/kg). This DDT value is inappropriate because screening level risk assessments should be conservative in their assessment of potential risk. Using the highest DDT value presented in Table 8-2 does not provide a conservative estimate.

Further, chlorinated pesticides bioaccumulate and may cause adverse effects throughout the food web. Potential bioaccumulative effects should be addressed in the document.

Response: See Comment 16.

(27) Comment: Section 8.5, Page 8-14, Paragraph 3. The text states that "typically, adverse effects to upper-level invertebrate and vertebrae species will occur at concentrations well above those levels indicated by the previously discussed soil-infaunal studies." The meaning of this statement is not clear. Based on what is known about dose-response relationships, adverse effects always occur at higher concentrations. This statement should be both revised for clarification and supported by literature citations.

Response: See Comment 16.

(28) Comment: Section 8.5, Page 8-15, Lines 5 through 8. The document states that "biotransfer of contaminants up the food chain should not be a concern because contaminant concentrations do not indicate accumulation." This conclusion cannot be supported based on the information presented in this document. Documentation supporting this assertion and/or site-specific bioassay data should be presented in the text or this statement should be removed from the document.

- Response:* See Comment 16.
- (29) **Comment:** Section 8.6, Uncertainty, Page 8-15. The uncertainty section should discuss the sources of uncertainty in this risk assessment, not simply enumerate sources of uncertainty, and indicate whether the source of uncertainty associated with a topic is expected to be low, medium, or high and whether it would tend to result in over or under-estimation of risks at the site.
- Response:* See Comment 16.
- (30) **Comment:** Section 9.3.5, page 9-27, line 18. This sentence identifies beryllium as a COC in the PRE; however, the PRE for does not include beryllium as a COC.
- Response:* The fate and transport section was updated to reflect the new PRE.
- (31) **Comment:** Section 9.4.4, page 9-34, line 10. Text states "Based on the groundwater flow direction and detected concentrations of these contaminants to the east and southeast of SWMU 15, these contaminants may have migrated from SWMU 7". The groundwater flow direction according to figure 6-10 is the the North, not to the west (SWMU to the east).
- Response:* The reference to SWMU 7 was deleted and the text simply reflects the fact that VOCs were detected only in fluvial deposits groundwater samples collected north of the former tank farm area.
- (32) **Comment:** Section 9.4.4, page 9-35, line 9 through 19. See comments 5 and 31.
- Response:* See Comment 31.
- (33) **Comment:** Figures 4-1 and 4-2, add the groundwater flow direction.
- Response:* Groundwater flow directions were added to the figures.
- (34) **Comment:** Figure 5-3, just show the lower fluvial deposits wells.
- Response:* The upper fluvial deposits well were shown in gray so they would blend in with the background and not stand out with the lower fluvial deposits wells.
- (35) **Comment:** Figure 6-2, the text says total VOCs in subsurface and it is not clear what is being presented, does ND equal not detect or no exceedances.

Response: Since no exceedances were shown on Figure 6-2 it was deleted from the revised report.

(36) **Comment:** Table 6-1, add a reference to the SSL exceedances figure.

Response: Reference to the SSL exceedances figure was added to the text.

(37) **Comment:** Figure 6-3, the legend states total SVOCs in subsurface soil, even though the figure is for total SVOCs in surface soil.

Response: The legend was corrected to reflect the figure is for surface soil samples.

(38) **Comment:** Figure 6-6, the figure shows one dieldrin concentration at 146 micrograms per kilogram which is above the background concentration and the figure does not reflect this.

Response: The figure was for total pesticides not for dieldrin concentrations and since the figure did not show any exceedances it was deleted from this revision.

SWMU 21 Specific Comments:

(1) **Comment:** Section 4.3.4, page 4-21, line 9. The text states "The four SWMU21 monitoring wells were sampled for the second time in early September 1996.... The analytical results for the September 1996 sampling event will be incorporated in any revisions to this RFI report." What are these results??

Response: The text was changed to state this revision includes the results of the August 1996, April/May 1997, and November 1997 long-term groundwater sampling events, including a whole new subsection in Section 6 which summarizes the analytical results from the long-term groundwater sampling events.

(2) **Comment:** Section 5.2, page 5-3, line 18. Need to add the word "feet" after 54 and 56.

Response: The requested addition was performed.

(3) **Comment:** Section 7.0, Page 7-1, Paragraph 1, Line 5. The text states that the contaminants of potential concern (COPC) were selected from "the original set of detected chemicals". It is then stated in the next sentence that the DPT samples (the first samples collected) "were not used in this PRE". This description seems to imply that the DPT data were used to select the COPCs for inclusion in the PRE and then the same data were discarded for

the purposes of the PRE. The language should be changed to better define the term "original", or a rationale for using the DPT data for selection of COPCs and subsequently excluding the data in the PRE should be provided.

Response: Both DPT and RFI data were included in the revision. The text was changed to reflect this modification.

- (4) **Comment:** Section 7.0, page 7-1, paragraph 1, Line 7. The text states that DPT data were not evaluated for the purposes of the PRE. Region IV allows for the use in risk assessment of volatile organic compound (VOC) analysis from DPT groundwater samples. The data, therefore, could have been used with appropriate qualifications. The omission of DPT analytical data may be especially important because detectable concentrations of carbon tetrachloride in DPT analytical groundwater data exceeded the detectable concentrations in RFI groundwater analytical data by a range of 2.5 to 80 times (Figure 6-13). Therefore, the true risk may have been understated in the PRE. Additional groundwater analytical data, either from excluded DPT groundwater analytical data or from conventional wells, should be incorporated in the PRE.

Response: See Comment 3.

- (5) **Comment:** Section 7.0, Page 7-2, Risk Ratio Equations. The source of the risk ratio equations is not cited. As this is an alternative method of calculating risk, a reference to EPA guidance, which specifies the use of these equations, should be made.

Response: See Comment 3.

- (6) **Comment:** Table 7-3, page 7-7. What is the source of the screening values for industrial groundwater?

Response: See Comment 3.

- (7) **Comment:** Section 8.2, Ecosystem at Risk, Page 8-1. This section describes the ecosystem at risk. In general, the description of the ecosystem is too abbreviated. The description should include the community structure, availability of proximate habitat, species identified at the site, and meteorological data. Further, the sources of the information should be cited.

Response: This comment is no longer valid. EnSafe risk assessors met with USEPA, and TDEC risk assessors about these issues and conducted a site visit. After touring the sites, it was agreed that sites with no complete exposure pathways, due to lack of habitat and/or receptors, would be written off with no data presented. All future risk assessments will be conducted following the agreed approach.

- (8) Comment: Section 8.2, Stressor Characteristic, Pages 8-4 to 8-6. It is unclear whether this section is intended to provide a broad overview of stressor characteristics or if it provides the basis of the ecological risk assessment. The stressor characteristics section does not include adequate information about site-specific ECPCs, nor information specific to the ecosystem at risk. This section should discuss the potential effects of the site specific ECPCs on the ecosystem at risk, and it should provide examples of the levels at which adverse effects may occur.

Response: See Comment 7.

- (9) Comment: Section 8.2, Page 8-5, Paragraph 1. The text states that no information is available on the toxicological effects associated with antimony or silver. However several toxicity studies in the open literature contain information for these elements. This information should included in the risk assessment.

Response: See Comment 7.

- (10) Comment: Section 8.2, Page 8-6, Paragraph 1. The text states that food chain biomagnification for organochlorine pesticides is low, but does not support this statement by citing literature. This statement should be supported by the literature. This statement should be revised if not supported by literature.

Response: See Comment 7.

- (11) Comment: Section 8.3, Pathways and Exposure Scenarios, Pages 8-6 to 8-7. This section presents a conceptual model for the site. Overall, this model is inadequate. Organisms that are identified in the model as being potential receptors are not evaluated in the ecological risk assessment not is adequate justification given for their exclusion. Specifically, small mammals, plants, and herbivores are identified as having complete exposure pathways but are not evaluated in the risk assessment. These organisms should be evaluated. In addition, the sources of contaminants, the transport mechanisms, and routes to potential receptors should be discussed in the document.

The text states that dermal exposure for amphibians and reptiles will be similar to that for mammals. This statement is incorrect and should be omitted from the text. Amphibians reptiles do not possess the dermal protection capabilities that mammals do.

The presence of rare, threatened, or endangered species is not discussed in the document. This information and the methods for deriving this information should be presented in the text.

Response: See Comment 7.

- (12) **Comment:** Section 8.4, Ecological Effects Assessment, Page 8-7. This section presents the basis of the ecological risk assessment. The document states that because applicable, relevant, and appropriate requirements for soil are not available for ecological receptors, literature values will be used to predict ecological risk. Screening level concentrations for some chemicals are available through Oak Ridge National Laboratory (Will and Suter 1995). Literature values derived from relevant studies can also be used for screening criteria, assuming that the endpoints are applicable and uncertainty factors are applied.

Further, the document assumes that if lower-level invertebrates are not at risk, no adverse effects to other food web components will occur. This statement ignores statement ignores the biomagnification of organochlorine pesticides and other chemicals in the food web and is not supported by the open scientific literature. Potential food web effects must be considered, particularly for organochlorine pesticides.

Response: See Comment 7.

- (13) **Comment:** Section 8.5, Risk Characterization, Exposure Analyses, Pages 8-7 to 8-13. This section discusses the potential exposure of terrestrial invertebrates to contaminants of concern. The introduction presents information only regarding metals toxicities to earthworms and microarthropods. Other contaminants found on the site are not discussed. All ECPCs should be included in the introduction or the information presented should be deleted and discussed in the "metals" section.

A summary table for all ECPCs should be included in the document. This table should contain the following information: (1) maximum chemical concentrations in the soil; (2) estimated chemical exposure for each receptor; (3) the relevant literature values that are used as benchmarks and some indication that a review of these values has been conducted

(comparing onsite concentrations to an median lethal concentration (LC₅₀) is not sufficient; and (4) a hazard index for each ECPC for each receptor.

Response: See Comment 7.

- (14) Comment: Section 8.5, Risk Characterization, Page 8-8, Lines 21 through 24. These lines summarize the potential risks to invertebrates posed by metals found at the site. The document states that metal concentrations observe din surface soil are well below concentrations cited in the literature as producing negative effects to invertebrates. This information is not specific enough. All relevant information, such as exposure concentrations for chemicals in soils, literature benchmark values, and hazard indices for ECPCs should be presented in a table, as discussed above.

Response: See Comment 7.

- (15) Comment: Table 8-2, Summary of Chemical Effects Studies on Terrestrial Infaunal Invertebrates, Pages 8-9 and 8-10. This table presents a summary of chemical effects studies on terrestrial receptors. It does not appear that this table is site specific as only a small number of the chemicals contained on the table are chemicals of concern at the site and the most recent study is 4 years old. This table should contain the most recent toxicity information relevant to the ECPCs at the site.

Response: See Comment 7.

- (16) Comment: Section 8.5, Risk Characterization, page 8-11, Lines 1 through 5. This section discusses the potential risk to soil organisms from volatile organic compounds (VOC). If VOCS are predicted to have n impact on soil organisms, data should be presented to support this assertion. An analysis of the predicted half-life of these compounds in soils, or other fate and transport properties, should be included. In addition, the document states that the only information available regarding the potential effects of VOCS are inhalation studies related to human health. Documentation supporting this assertion should be presented in the text, or this statement should be removed from the document.

Response: See Comment 7.

- (17) Comment: Section 8.5, Risk Characterization, Page 8-11 through 8-13. The discussion on these pages focuses on the potential ecological risks posed by chlorinated pesticides and PCBs. Again, the information presented is not site-specific. DDT is the focus of the discussion, but additional pesticides

are of concern at the site. The discussion of chemical effects should be specific to site conditions. Further, line 13 on Page 8-12 compares site chemical concentrations to a DDT value of 1,000 milligrams per kilogram (mg/kg). This DDT value is inappropriate for following reasons:

- (1) Dieldrin is not the only ECPC. As a result, toxicity values for specific compounds should be obtained or substantial justification for doing otherwise should be presented.
- (2) Risk assessments (particularly at the screening level) should strive to be conservative in their assessment of potential risk. Using the highest DDT value presented in Table 8-2 does not provide a conservative estimate.

Further, certain chemicals, such as dieldrin and PCBs, bioaccumulate and may cause adverse effects in the food web. Potential bioaccumulative effects should be addressed in the document.

Response: See Comment 7.

- (18) **Comment:** Section 8.5, Page 8-13, Lines 8 through 10. The text states that "typically, adverse effects to upper-level invertebrate and vertebrate species will occur at concentrations well above those levels indicated by the previously discussed soil-infaunal studies." The meaning of this statement is not clear. Based on what is known about dose-response relationships, adverse effects always occur at higher concentrations. This statement should be revised for clarification and supported by literature citations.

Response: See Comment 7.

- (19) **Comment:** Section 8.5, Page 8-13, Lines 14 through 19. The document states that "biotransfer of contaminants up the food chain should not be a concern because contaminant concentrations do not indicate accumulation." This conclusion cannot be supported based on the information presented in this document. Documentation supporting this assertion and/or site-specific bioassay data should be presented in the text or this statement should be removed from the document.

Response: See Comment 7.

- (20) **Comment:** Section 8.6, Uncertainty, Page 8-14. The uncertainty section should discuss the sources of uncertainty in this risk assessment, not simply enumerate sources of uncertainty. It should also indicate whether the source of uncertainty is likely to significantly affect the outcome of the risk

assessment. This section should include a gauge of whether the uncertainty associated with a topic is low, medium, or high and whether it would result in an over or under-estimation of risks at the site.

Response: See Comment 7.

- (21) **Comment:** Section 10, page 10-5, line 16. Text states "This suggests carbon tetrachloride may be migrating from an off-site source." This sentence should be re-worded. This could be read to mean that the contamination is coming from off Navy property.

Response: This sentence was reworded to clarify the source could be outside of SWMU 21 not outside NSA Memphis property.