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LETTER AND COMMENTS FROM MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY REGARDING REVIEW OF HUMAN HEALTH RISK ASSESSMENT AND SCREENING LEVEL RISK ASSESSMENT OF DIOXINS AND FURANS FROM HERBICIDE ORANGE SITE 8 NCBC GULFPORT MS

1/31/2001

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

STATE OF MISSISSIPPI
DAVID RONALD MUSGROVE, GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
CHARLES H. CHISOLM, EXECUTIVE DIRECTOR

31 January 2001

Art Conrad
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Re: Human Health Risk Assessment and Screening Level Risk Assessment of Dioxins and Furans Associated With Former Herbicide Orange Storage, Naval Construction Battalion Center, Gulfport, Mississippi, Draft, October 2000.

The Mississippi Office of Pollution Control (OPC) has reviewed the above referenced document and offers the following comments and suggestions.

1. Page 3-2, last paragraph: the text should clarify why the groundwater pathway was not addressed in this Risk Assessment. The text states that Herbicide Orange (HO) related chemicals were addressed in the Groundwater Monitoring Report (1999), although that report does not evaluate risk.

2. Page 3-7 (Table 3-3): 95% upper confidence interval (UCL) for the total toxic equivalency factor (TEQ) is not given for non site 8 surface soil although it is retained as a chemical of potential concern (COPC). The text (page 3-5, paragraph 4) states that the 95% UCL is reported if a contaminant is retained as a COPC.

3. Page 3-11 (Table 3-6) and page 3-13 (Table 3-7): footnote 9 should be worded to indicate that total TEQ was not retained because it did not exceed the risk based screening value.

4. Page 3-14, paragraph 1: the text should indicate the sample number range or prefixes and page numbers so analytical results of the 9 samples analyzed for chlorinated herbicides can be more easily located as referenced in Appendix A. These appear to begin with sample number L8001 and end with number L8027 (not consecutive) beginning on page 1C (Table 5) of Appendix A.

5. Appendix A, Table 1; some samples results are repeated in the analytical data sheets. For example, samples listed on page 3-6 (Table 3-2) for Site 8 surface soil samples used in the Risk Assessment appear twice on Table 1 of Appendix A, beginning on pages 1Q and 1Z.

6. Page 3-14, paragraph 6: clarification is needed in this portion of the text discussion concerning why off base sediment evaluation does not include samples (WL011 through WL 020, Appendix A, pages 1H through 1J) collected from drainage areas north of outfall 3. Locations are given on Figure 3-6 of Appendix C, although this is not included among the figures referenced in the text discussion concerning off base sediments.

7) The exclusion of samples collected from the drainage north of outfall 3 is briefly addressed in the Conclusions Section 5.0, page 5-1. This discussion states that this area is not included in the present study, but will be evaluated in the upcoming Feasibility Study. A risk evaluation of this area should also be incorporated into the off base sediment medium in the present study (Risk Assessment). It should be noted that dioxin concentrations of sediment samples collected from Outfall 3 (up to 418 ppt reported from Sample WL 020, Figure 3-6, Appendix C) were among the highest encountered during the investigation. Exclusion of these samples would probably lower the average concentration, 95% UCL and resulting risk values for receptors in the off base sediment medium.

8) 7. Clarification is needed as to why the future trespasser is not evaluated for exposure to on base sediments (Table 3-8, pge 3-21) as in off base sediments (Table 3-9, page 3-23). The discussion given on page 3-25 indicates that exposure by future trespassers to on base sediments is possible.

9) 8. The text (page 3-33, paragraph 3) states that central tendency (CT) values are given for receptors with a reasonable maximum exposure (RME) risk value greater than 1E-6. The CT value is not shown for exposure by the occupational worker to on base sediments on Table 3-11 (page 3-35) or the discussion on page 3-37 (paragraph 3) although the RME (2E -6) slightly exceeds the 1E -6 threshold.

10) 9. The text discussion provided on page 3-37 concerning risk characterization of on base sediment under the current land use scenario is confusing. Risk values given in the text do not correspond to those shown on Table 3-11, page 3-35.

11) The second sentence in each of paragraphs 2 and 4 of page 3-37 appear in the sediment exposure sections 3.5.2.5 (entitled RME On Base Sediment) and 3.5.2.7 (entitled RME Off Base Sediment), but address soil exposure rather than sediment. In turn, the aggregate on base current land use residential risk by sediment exposure reported in paragraph 2 is 8.0 E-7 and shown on Table 3-11 as 9.0 E-6.

12) 10. Page 3-44: residential risk based remedial goal options (RGOs) presented on Table 3-14 for soil are not risk based, as indicated in Footnote 3 of the table. The minimal risk

(1 E -6) soil cleanup value of 15.0 ppt is based on laboratory limitations rather than risk That value is in turn used to develop the 1 E -5 and 1 E -4 risk based soil cleanup levels simply by increasing the 15.0 ppt value by an order of magnitude (150.0 ppt for 1 E-5 risk and 1500.0 ppt for 1 E -4 risk).

13) Risk based RGOs should be provided in tabular form as shown on Table 3-14, and all values given in the table under specific risk headings should be based on risk. If these cannot be achieved due to technical limitations, then RGOs may be modified in future stages (Feasibility Study or Decision Document) of the process.

14) RGOs for residential sediment exposure provided in the table appear to be risk based, although this should be re evaluated for clarity.

15) Calculations of RGOs and exposure assumptions for each media and receptor category should be provided in the appendices. Table 3-10 (showing exposure parameters for various receptors) could be referenced in the text discussion on page 3-43 to show exposure values used in the risk based calculations from which RGOs are developed. This would provide clarity for understanding the development of RGOs.

16) 11. Clarification is needed concerning total receptor risk values given on Table 3-12. Total values do not appear to reflect the sum of each land use exposure, for example; the total resident (non site 8 soil = 2.0 E-5 + on base sediment = 9.0 E -6) is reported as 4.0 E -5 on Table 3-12, although the sum of the values given for individual land use scenarios given on Table 3-11 (page 3-34) is 2.9 E -5 (rounded to 3 E-5). Similarly, occupational worker total risk is shown on Table 3-12 as 7.0 E -6, although the sum of land use scenario risks indicated on Table 3-12 (for which risk values are reported on Table 3-11) is 8.0 E-6. These differences appears to exceed the effects of rounding.

17) 12. Page 4-6, paragraph 2: the text discussion about fish and wildlife associated with off base drainage describe "WL" and "WM" areas in reference to sample prefix designations for locations although "WL"samples are not shown on Figure 4-1. These (Outfall 3) sample locations are only shown on one figure in the document (Figure 3-6 of Appendix C) to which reference could not be found in any of the text discussions.

18) 13. The text (page 4-6, paragraph 2) gives conflicting information concerning areas that support fish and semi aquatic predators, describing off base drainage associated with Outfall 3 as an area that does not support fish, followed by the statement that areas supporting a diverse fish community include the area associated with Outfall 3.

19) 14. Page 4-7, paragraphs 4 and 6: the text discussion regarding the soil exposure pathway focuses on Site 8 soil. Clarification is needed concerning evaluation of Non Site 8 soil exposure by the various ecological receptors.

20) 15. Page 5-1, paragraph 2: it should be noted that the conclusion that risk to off base receptors is below the threshold value of 1 E -6 is reported in the absence of risk

evaluations of drainage associated with Outfall 3. High sediment TEQ concentrations in this area (up 418.0 ppt, 91% TCDD) would tend to increase risk values for off base sediments. Figure 3-6 of Appendix C provides sample locations and TEQ concentrations detected in samples collected from Outfall 3.

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16. Data collected through the various sampling phases has been evaluated in a general way that gives an overview of risk in two basic categories: on base and off base. Additional evaluation of existing data would enhance risk characterization along drainage routes located on base and off base, increasing the confidence level of risk management decisions involved in the remedial process. The following discussion is intended to provide suggestions for presentation of existing data that will afford more detailed evaluation of areas involved in the Risk Assessment .

The on base sediment sampling strategy was originally developed based on evaluation of 6 drainage areas (page 2-4, paragraph 6 and Figure 2-4) throughout the base. Samples collected on base were identified and labeled according to the particular drainage area from which they were collected as shown on figures 2-1 through 2-6 and figures 3-1 through 3-3 of Appendix C. Analytical results are shown on the figures and tabulated in Appendix A. Risk evaluation of exposure by the various receptors to sediments within each of these drainage areas should be completed in order to better define and characterize the impact of contamination on base.

Off base drainage should be separated into segments and evaluated according to the particular order of drainage in which the stream segment is located. For example, samples collected from off base drainage areas directly associated with each outfall prior to juncture with the main body of Turkey Creek could be evaluated individually and apart from those collected along the main body of the stream. More distal portions of the stream system (Bernard Bayou) could in turn be evaluated separately from the main body of Turkey Creek. Brickyard Bayou and Bernard Bayou sediment samples should also be evaluated separately.

Please feel free to contact me if I can be of further assistance.

Sincerely,

Bob Merrill

Bob Merrill

cc. James Barksdale, USEPA

Response to Comments
Human Health Risk Assessment and Ecological Screening
by Bob Merrill/MSDEQ

Comment Number	Comment	Response
1	Page 3-2, last paragraph: the text should clarify why the groundwater pathway was not addressed in this Risk Assessment. The text states that Herbicide Orange (HO) related chemicals were addressed in the Groundwater Monitoring Report (1999), although that report does not evaluate risk.	The analytical data for groundwater was not complete when the risk assessment was conducted. The groundwater risks will be evaluated as part of the AO-mandated Groundwater Remediation Plan and will be submitted as an addendum to this baseline risk assessment.
2	Page 3-7 (Table 3-3): 95% upper confidence interval (UCL) for the total toxic equivalency factor (TEQ) is not given for non site 8 surface soil although it is retained as a chemical of potential concern (COPC). The text (page 3-5, paragraph 4) states that the 95% UCL is reported if a contaminant is retained as a COPC.	The 95 % UCL was not calculated because there were only 6 surface soil samples. Footnote 5 indicates that the UCL is not calculated when there are less than 10 samples. The text will be revised to clarify this point.
3	Page 3-11 (Table 3-6) and page 3-13 (Table 3-7): footnote 9 should be worded to indicate that total TEQ was not retained because it did not exceed the risk based screening value.	The footnote should read "maximum total TEQ did not exceed the risk-based screening value."
4	Page 3-14, paragraph 1: the text should indicate the sample number range or prefixes and page numbers so analytical results of the 9 samples analyzed for chlorinated herbicides can be more easily located as referenced in Appendix A. These appear to begin with sample number L8001 and end with number L8027 (not consecutive) beginning on page 1C (Table 5) of Appendix A.	We will revise Table 3-2 to show the Site IDs analyzed for chlorinated herbicides. The Site IDs are L8001, L8003, L8005, L8010, L8013, L8013 (duplicate), L8016, L8025, and L8027 (found on Appendix A, Table 5, pages 1C through 1E).

Comment Number	Comment	Response
5	Appendix A, Table 1; some samples results are repeated in the analytical data sheets. For example, samples listed on page 3-6 (Table 3-2) for Site 8 surface soil samples used in the Risk Assessment appear twice on Table 1 of Appendix A, beginning on pages 1Q and 1Z.	The IDs are somewhat confusing. For simplicity Table 3-2 provides the actual sample IDs, however, these are described as "Site" in Appendix A. Due to data rejections, many sampling site had two (or more) samples collected at that location. For example, on page 1AA of Appendix A Table 1, Site L8008 shows two results. Site L8008, sample ID L8008S1P1 was rejected and Site L8008, sample ID L8008S1P2 was valid. Additional sample identification information was necessary to track these samples. To compare Table 3-2 and Appendix A, simply read the first 5 values from the Sample ID or read the Site ID from Table 1 in Appendix A (pages 1Z through 1A1). Table 3-2 and similar tables will be revised to change "Samples" to "Site IDs".
6	Page 3-14, paragraph 6: clarification is needed in this portion of the text discussion concerning why off base sediment evaluation does not include samples (WL011 through WL 020, Appendix A, pages 1H through 1J) collected from drainage areas north of outfall 3. Locations are given on Figure 3-6 of Appendix C, although this is not included among the figures referenced in the text discussion concerning off base sediments.	These samples are part of the Outfall 3 swamp area delineation area. Full horizontal and vertical delineation of this area had not completed when the risk assessment was conducted. Risk to offbase receptors associated with the proposed Brownfields area will be handled according to the procedures established in Risk Evaluation Procedures for Voluntary Cleanup and Redevelopment of Brownfield Sites - Subpart II. We will revise the text to provide clarification.
7	The exclusion of samples collected from the drainage north of outfall 3 is briefly addressed in the Conclusions Section 5.0, page 5-1. This discussion states that this area is not included in the present study, but will be evaluated in the upcoming Feasibility Study. A risk evaluation of this area should also be incorporated into the off base sediment medium in the present study (Risk Assessment). It should be noted that dioxin concentrations of sediment samples collected from Outfall 3 (up to 418 ppt reported from Sample WL 020, Figure 3-6, Appendix C) were among the highest encountered during the investigation. Exclusion of these samples would probably lower the average concentration, 95% UCL and resulting risk values for receptors in the off base sediment medium.	See the above response. We will revise the Conclusions Section to clarify that the Outfall 3 area will be included in Brownsfield action for the Outfall 3 area.

Comment Number	Comment	Response
8	Clarification is needed as to why the future trespasser is not evaluated for exposure to on base sediments (Table 3-8, page 3-21) as in off base sediments (Table 3-9, page 3-23). The discussion given on page 3-25 indicates that exposure by future trespassers to on base sediments is possible.	The future trespasser is listed on page 3-20 at the bottom of the page.
9	The text (page 3-33, paragraph 3) states that central tendency (CT) values are given for receptors with a reasonable maximum exposure (RME) risk value greater than 1E-6. The CT value is not shown for exposure by the occupational worker to on base sediments on Table 3-11 (page 3-35) or the discussion on page 3-37 (paragraph 3) although the RME (2E -6) slightly exceeds the 1E -6 threshold.	The risk for incidental ingestion is 6x10-7 and dermal exposure is 3x10-7. The total risk is 8x10-7 (due to rounding). The spreadsheet will be added as Table D-67 and Table 3-11 will be revised.
10	The text discussion provided on page 3-37 concerning risk characterization of on base sediment under the current land use scenario is confusing. Risk values given in the text do not correspond to those shown on Table 3-11, page 3-35.	The total risk for the aggregate resident sediment exposure should read 9x10-6. The text will be modified. The rest of the risk values are consistent.
11	The second sentence in each of paragraphs 2 and 4 of page 3-37 appear in the sediment exposure sections 3.5.2.5 (entitled RME On Base Sediment) and 3.5.2.7 (entitled RME Off Base Sediment), but address soil exposure rather than sediment. In turn, the aggregate on base current land use residential risk by sediment exposure reported in paragraph 2 is 8.0 E-7 and shown on Table 3-11 as 9.0 E-6.	"Surface soil" will be changed to "sediment" in paragraphs 2 and 4 of page 3-37. The aggregate residential risk due to sediment exposure is 9x10-6. The text will be modified to change this risk result.
12	Page 3-44: residential risk based remedial goal options (RGOs) presented on Table 3-14 for soil are not risk based, as indicated in Footnote 3 of the table. The minimal risk (1 E -6) soil cleanup value of 15.0 ppt is based on laboratory limitations rather than risk That value is in turn used to develop the 1 E -5 and 1 E -4 risk based soil cleanup levels simply by increasing the 15.0 ppt value by an order of magnitude (150.0 ppt for 1 E-5 risk and 1500.0 ppt for 1 E -4 risk).	All of the RGOs, except the residential soil receptors, are risk-based. The RGO for this receptor is 15 ppt based on technical analytical limitations. The actual value is presented in footnote 3. The values for 1x10-5 and 1x10-4 will be removed from the table.

Comment Number	Comment	Response
13	Risk based RGOs should be provided in tabular form as shown on Table 3-14, and all values given in the table under specific risk headings should be based on risk. If these cannot be achieved due to technical limitations, then RGOs may be modified in future stages (Feasibility Study or Decision Document) of the process.	See the above response.
14	RGOs for residential sediment exposure provided in the table appear to be risk based, although this should be re evaluated for clarity.	The RGOs for sediment are risk-based.
15	Calculations of RGOs and exposure assumptions for each media and receptor category should be provided in the appendices. Table 3-10 (showing exposure parameters for various receptors) could be referenced in the text discussion on page 3-43 to show exposure values used in the risk-based calculations from which RGOs are developed. This would provide clarity for understanding the development of RGOs.	The exposure assumptions in Table 3-10 are used to calculate the value "CR" (calculated risk) in the equation presented on page 3-43. Substituting the input parameters from Table 3-10 into the equation on page 3-43 would lead to an incredibly complex equation. Thus, the simple equations provided in USEPA Region IV guidance were used to calculate RGOs.
16	Clarification is needed concerning total receptor risk values given on Table 3-12. Total values do not appear to reflect the sum of each land use exposure, for example; the total resident (non site 8 soil = 2.0 E-5 + on base sediment = 9.0 E -6) is reported as 4.0 E -5 on Table 3-12, although the sum of the values given for individual land use scenarios given on Table 3-11 (page 3-34) is 2.9 E -5 (rounded to 3 E-5). Similarly, occupational worker total risk is shown on Table 3-12 as 7.0 E -6, although the sum of land use scenario risks indicated on Table 3-12 (for which risk values are reported on Table 3-11) is 8.0 E-6. These differences appear to exceed the effects of rounding.	The value for total resident should be 3x10-5. Table 3-12 will be modified to show this value. The occupation worker is 7.4 x10-6 , which is rounded to 7x10-6.

Comment Number	Comment	Response
17	Page 4-6, paragraph 2: the text discussion about fish and wildlife associated with off base drainage describe "WL" and "WM" areas in reference to sample prefix designations for locations although "WL"samples are not shown on Figure 4-1. These (Outfall 3) sample locations are only shown on one figure in the document (Figure 3-6 of Appendix C) to which reference could not be found in any of the text discussions.	The "WL" samples are shown in Figure 4-1 in the enlargement box in the upper left area of the figure.
18	The text (page 4-6, paragraph 2) gives conflicting information concerning areas that support fish and semi aquatic predators, describing off base drainage associated with Outfall 3 as an area that does not support fish, followed by the statement that areas supporting a diverse fish community include the area associated with Outfall 3.	The second reference to Outfall 3 relates to the on base habitat where water is perennially pooled immediately upgradient to the outfall itself. To clarify, the last sentence in this paragraph will be revised as follows: "These include Canal No.1 and the ditch habitat immediately upgradient of Outfall 3, both located on the NCBC base, ..."
19	Page 4-7, paragraphs 4 and 6: the text discussion regarding the soil exposure pathway focuses on Site 8 soil. Clarification is needed concerning evaluation of Non Site 8 soil exposure by the various ecological receptors.	The Non Site 8 "soil" data were evaluated in the screening level ERA. These samples were collected from the various stormwater drainage ditches located throughout the facility. Samples collected from ditches that were dry at the time of sampling were designated as soil, rather than sediment, although they have the potential to provide limited habitat to both terrestrial and aquatic species. These data were all evaluated as sediment because aquatic organisms are a far more sensitive taxon for the purposes of screening potential ecological risks. Section 4.3.3 provides a discussion of the sediment samples collected from these ditches that were evaluated in the ERA; risk results are provided graphically in Appendix H.
20	Page 5-1, paragraph 2: it should be noted that the conclusion that risk to off base receptors is below the threshold value of 1 E -6 is reported in the absence of risk evaluations of drainage associated with Outfall 3. High sediment TEQ concentrations in this area (up 418.0 ppt, 91% TCDD) would tend to increase risk values for off base sediments. Figure 3-6 of Appendix C provides sample locations and TEQ concentrations detected in samples collected from Outfall 3.	Risk to offbase receptors associated with the proposed Brownfields area (where the highest concentrations of offbase dioxin have been discovered) will be handled according to the procedures established in Risk Evaluation Procedures for Voluntary Cleanup and Redevelopment of Brownfield Sites - Subpart II. All other offbase areas (Turkey Creek, Brickyard Creek, Bernanrd Bayou, and Canal No. 1) have levels well below the 1 E-6 threshold values.

Comment Number	Comment	Response
21	Data collected through the various sampling phases has been evaluated in a general way that gives an overview of risk in two basic categories: on base and off base. Additional evaluation of existing data would enhance risk characterization along drainage routes located on base and off base, increasing the confidence level of risk management decisions involved in the remedial process. The following discussion is intended to provide suggestions for presentation of existing data that will afford more detailed evaluation of areas involved in the Risk Assessment. The on base sediment sampling strategy was originally developed based on evaluation of 6 drainage areas (page 2-4, paragraph 6 and Figure 2-4) throughout the base. Samples collected on base were identified and labeled according to the particular drainage area from which they were collected as shown on figures 2-1 through 2-6 and figures 3-1 through 3-3 of Appendix C. Analytical results are shown on the figures and tabulated in Appendix A. Risk evaluation of exposure by the various receptors to sediments within each of these drainage areas should be completed in order to better define and characterize the impact of contamination on base. Off base drainage should be separated into segments and evaluated according to the particular order of drainage in which the stream segment is located. For example, samples collected from off base drainage areas directly associated with each outfall prior to juncture with the main body of Turkey Creek could be evaluated individually and apart from those collected along the main body of the stream. More distal portions of the stream system (Bernard Bayou) could in turn be evaluated separately from the main body of Turkey Creek. Brickyard Bayou and Bernard Bayou sediment samples should also be evaluated separately.	While this approach can provide useful data, it can also cause significant confusion. If, for example the risks were much higher in one area than another, the reader could incorrectly believe that there is little or no risk in one area but a large risk in another. This may not be accurate, especially if sediment moves downstream from areas of higher dioxin levels (closer to Site 8) to areas of lower dioxin levels during a storm event. Another difficulty is the assumption that a receptor would limit his exposure to one area, rather than the entire ditch system. This may be relevant for children who would be more likely to encounter sediment close to the residential areas of the base. However, base workers are likely to encounter sediment throughout the entire base during their work activities. An additional difficulty arises in establishing exposure durations for each drainage area. Longer exposure to areas of either high or low dioxin levels could generate risks that were higher or lower, respectively. Thus, evaluating the overall risk to sediment exposure is likely to give a more realistic estimate. We are now looking at long-term proposed uses for both on-base and off base areas that will drive the assumptions and conditions to determine residual risk (both in the FS and in the Remedial Design). These segments will take into account the remedial activities and proposed uses for each area. To segment before these remedial and land use decisions have been made would be artificial and result in unnecessary costs.