The Dow Chemical Company
Midland, MI 48674

April 4, 2011

Ms. Mary Logan
Remediation Project Manager
U.S. Environmental Protection Agency
Mail Code SR 6J
77 West Jackson
Chicago, IL 60604

Re: Final Segment 1 Response Proposal
Settlement Agreement No. V-W-10-C-942 for The Tittabawassee River/Saginaw River & Bay Site
Dow Submittal Number 2011-024

Dear Ms. Logan:

With this letter, we are submitting the Segment 1 Response Proposal for the Tittabawassee River/Saginaw River & Bay Site. This submittal has been prepared in accordance with the requirements of Administrative Settlement Agreement and Order on Consent (AOC) and Section 1 of the Statement of Work (Attachment A of AOC) (effective January 21, 2010) ("Settlement Agreement").

The draft Segment 1 Response Proposal was submitted to the U.S. Environmental Protection Agency (EPA) and the Michigan Department of Environmental Quality (DEQ; collectively the "Agencies") in November, 2010. Dow received written comments from the Agencies in a letter dated February 16, 2011. Dow revised the Response Proposal in response to the Agencies' comments and prepared written responses to each comment, as requested by the Agencies. The Agency comments and Dow's responses are included as Attachment 1 to this letter.

Please let me know if you have any questions or concerns.

Sincerely,
The Dow Chemical Company

Todd Konechne
Project Coordinator

CC: Al Taylor, DNRE
Diane Russell, U.S. EPA
Joseph Haas, U.S. Fish and Wildlife
Steve Lucas, Dow
Peter Wright, Dow
Greg Cochran, Dow

Attachment 1

Agencies' Review Comments on Draft Tittabawassee River Segment 1 Response Proposal
Tittabawassee River, Saginaw River & Bay Site, Michigan
Dated November, 2010

A. Major Comments

1. Product Recovery Investigation – The report must be updated to include results from the fall 2010 product recovery investigation.

   Response: ***Comment noted. The Response Proposal has been revised to include a summary of the fall 2010 product recovery investigation.***

   a. The response action alternatives for SMA 6 should be modified consistent with discussions in our December 2010 and January 2011 technical meetings. Also, updated discussions of effectiveness, implementability, and cost must be developed for the revised alternatives.

      Response: ***Comment noted. The Response Proposal has been revised to include the following alternatives:***

      1. ***Alt 1: Removal of nearshore EP-impacted sediment and product removal/treatment with MNR of remainder of SMA 6***
      2. ***Alt 2: Removal of nearshore EP-impacted sediment, product removal/treatment and in situ containment with hydraulic control of remainder of SMA 6***
      3. ***Alt 3: Removal of sediment***

      The alternatives evaluation presented in Sections 6 and 7 have also been revised to reflect these new alternatives.

   b. The uncertainties of the testing, particularly related to SMAs 3, 4, and 5 should be discussed.

      Response: The Response Proposal has been updated to reflect the results of the product recovery investigation that was conducted in November and December of 2010. The uncertainties of this testing is also discussed in the revised Response Proposal.

   c. The Report should indicate that additional work on product recovery will be needed during design. See Section D below.

      Response: The Response Proposal has been revised to reflect the additional product recovery investigation/engineering necessary to be performed during the remedial design phase.

d. Discussion in many sections of the text must be updated.

Response: ***References to the product recovery investigation have been updated throughout the Response Proposal.***

2. Updated database – It was reported that certain data for Segment 1 was not in the database used for this report. The updated database should be used to re-evaluate the analysis and proposed SMAs. Specifically, further work that should be performed by Dow using the most recent database should include:

a. Confirmation of the 100 ppm total chlorobenzene contour from the 3D model – Dow will need to re-estimate the 100 ppm total chlorobenzene contour as they did in this report. It would be helpful if Dow can provide the parameters used for the 3D kriging previously used to define five of the six SMAs. Without these parameters, it will be more difficult for the FIELDS Groups to replicate Dow's results. The parameters in question relate to variography (e.g., data transformation, bandwidth, lag spacing) and kriging (e.g., data transformation and back transformation, search radius).

Response: The additional samples not included in the first draft of the Response Proposal are located in Reaches B-D. The 3-D interpolation of total chlorobenzenes was performed downstream of the Dow Dam (Reaches E-H), therefore the additional data did not impact the 100 mg/kg total chlorobenzene contours. All surface and subsurface samples analyzed for total chlorobenzenes above the Dow Dam, were less than their respective PLER values. Thus, 3-D total chlorobenzene interpolations upstream of the Dow Dam were not performed.

The Response Proposal now includes the input parameters (see Table 3-9) used in the 3-D interpolation of the total chlorobenzene sediment concentrations.

b. Confirmation of the SMA boundaries based on the SCOIs – The Agencies recommend that Dow re-estimate the boundaries of the SMAs based on the SCOIs using the updated data. Also, Dow should confirm that there are not other areas that need to be considered as SMAs, based on the current proposed criteria (notwithstanding resolution of other comments in this review).

Response: The additional sample data in Reaches B-D do not alter the current Segment 1 SMAs. All additional sample data outside the Reach D remediated area are below the chlorobenzene PLER value at all depths (no other target SCOI was measured for the additional Reach B-D samples). A thorough evaluation of the additional Reach B-D sample data was presented at the Agency Meeting on March 1, 2011. The additional data has been incorporated into Section 3 of the revised Response Proposal.

3. Figures. All map figures, including bathymetry, need to include stationing and most should include the footprints of the proposed SMAs.

<u>Response</u>: Map figures within the Response Proposal have been revised to include stationing and the SMA footprints where relevant.

4. RGIS:

    a. For alternatives that utilize the RGIS system for a portion of the response, it is of paramount importance that the primary function of the RGIS system – control of the plant groundwater – is not jeopardized. Any such alternatives, should they be selected, must be designed in a manner that ensures this, and a contingency plan to protect the RGIS system may be required as part of design. This should be discussed in the implementability assessments for those alternatives.

    <u>Response:</u> The Response Proposal has been revised to clarify that the selected response action will not interfere with the ability of RGIS to maintain the existing groundwater control.

    b. Because source control is a fundamental principle for contaminated sediment sites, please augment the discussion of the RGIS system as it relates to source control. Please include a discussion of past operational history, including any past operational interruptions or failures. Perhaps these items should be included in the discussion and their impacts on the river. Please also include an expanded discussion about current/future O & M and the reliability to prevent future releases. This should be addressed in Section 2.5.6.

    <u>Response:</u> The Response Proposal includes a discussion of RGIS and its role in source control. The discussion includes RGIS evaluations, past operational history, reliability and current/future O&M practices.

5. Implementability and Cost – The report needs to include a more thorough evaluation of disposal of materials that would be generated by the various alternatives. In particular, considering the contaminant levels within the SMAs, the report should evaluate whether disposal without pre-treatment is feasible. Please consider this issue when discussing cost and implementability for various alternatives**.**

    <u>Response</u>: The Response Proposal text and associated cost estimates for removal options that may require treatment of sediments prior to disposal have been refined to acknowledge this potential requirement.

6. Effectiveness:

    a. Short-term effectiveness – Please expand the discussion of the timescale and expected species order for benthic recolonization post-construction for both dredging and capping remedies. The report calls this “rapid” but does not discuss expectations.

<u>Response</u>: The Response Proposal has been revised to include a discussion of the timescale expected for benthic recolonization post-construction for dredging and capping remedies.

b. The short-term effectiveness discussion of dredging alternatives should probably consider the following in more detail: potential releases associated with the installment and removal of sheet piling, if it is used to isolate the dredged area; transport of adjacent sediments; and effects to fish and benthos from dredging (this is discussed in the capping discussion, but no mention of effects here). The short-term effectiveness of containment alternatives that include sheet piling should probably consider the following in more detail: potential releases associated with the installment of sheet piling; and transport of adjacent sediments.

<u>Response</u>: The Response Proposal discussion has been expanded to look at short-term effects of dredging.

c. Long-term effectiveness and permanence – The alternatives that remove water and treat it through the WWTP would permanently treat dissolved contaminants. The alternatives that remove product would permanently treat the recovered product. Both of these would support long-term effectiveness.

<u>Response</u>: The Response Proposal has been revised to acknowledge that water treatment and product treatment will result in a reduction of toxicity, mobility, and volume through treatment, thereby contributing to the effectiveness of the alternative as defined by the EE/CA evaluation criteria.

d. Reduction of TMV through treatment – The alternatives that remove water and treat it through the WWTP would result in reduced toxicity and volume by permanently treating dissolved contaminants. The alternatives that remove product would result in greater reduction of toxicity and volume by permanently treating the recovered product. Both of these would support long-term effectiveness.

<u>Response</u>: See response to Comment 6c.

7. Two major areas were identified as uncertainties during the Agencies' review: 1) depth of the active bed layer; and 2) direct contact for ecological receptors (including determination of the PLERs). EPA has determined that these two major uncertainties do not hinder the development and selection of response options for the identified SMAs, but may result in additional Segment 1 analysis/work, post-construction monitoring, and/or Task 10 analysis/work. At this time EPA is directing that resolution of these uncertainties will occur on a separate track from finalization of the Response Proposal, but concurrently, so if additional response work is required, it is identified in a timely manner. Please be aware that even if the Response Proposal is finalized for the purposes of soliciting public input on the options for SMAs 1 through 6, the Agencies reserve our rights to comment on the technical analysis around these issues.

Response: ***Dow and the Agencies will discuss a process to resolve these stated issues on a separate but concurrent track from finalization of the Response Proposal/Remedial Design for Segment 1.***

8. Consumers Energy Floodplain – The Superfund non-time critical removal authority is being used for this Response Proposal. As such, and pursuant to the AOC, any decision made by EPA, in consultation with the DNRE, will not constitute the final remedy for Segment 1 – a final remedy will be selected in a later Record of Decision. At the time of the final Record of Decision (or earlier, if warranted) the Agencies will evaluate whether additional response actions (including institutional controls) for the Consumers Energy floodplain may be necessary. In the interim, EPA will require Dow to document periodically that land use in that floodplain area is unchanged from current industrial use. Additionally, we may need to evaluate other COIs before a final determination about this area can be made.

   Response: ***Comment noted.***

9. The equations are missing in Appendices B and C, both the hard copy and the CD. Therefore review of these sections could not be completed.

   Response: ***The equations have been added to the revised Response Proposal.***

10. General. With respect to Dow's 2007 wild fish study data set which is referenced in support of the SCOI evaluation, it is important to remember that Dow did not use the DNRE approved Target Analyte List - and therefore did not analyze for a number of Dow specific compounds that the DNRE determined could be important in fish. In addition, the 2007 wild fish study was undertaken prior to the completion of the H-12 study and therefore needs to be evaluated in the context of contaminants that have been routinely detected in sediment samples adjacent to **th**e Dow site to ensure that key contaminants have not been missed in the fish study. Finally, Dow has not yet provided the QA/QC data for the non-dioxin like compounds analyzed in the 2007 study.

    Response: ***A summary of all analytes measured in fish tissue is provided in the revised Response Proposal including those not detected in the fish tissue samples and therefore, not reported in the Draft Response Proposal. Dow acknowledges that the 2007 fish study was conducted prior to the H-12 study. In addition, Dow is working to track down and will provide the QA/QC data requested for the 2007 study.***

B. Specific Comments

11. page 3, Section 1, last paragraph: Please mention the discussion of remedial versus removal that occurred at the 2/25/10 scoping meeting, and that EPA made a determination that a NTCRA is appropriate in its 11/8/10 EE/CA Approval Memorandum.

    Response: ***The revised Response Proposal includes the requested text.***

12. Page 5, Section 2: Please check for endangered species and NHPA properties and include the information here – may affect the ARAR section discussed below. Also there should be a discussion of wetlands along Segment 1 (either that there aren't any or there are some).

Response: ***Much of this information was compiled in the 2008 ENVIRON Current Conditions Report for the Tittabawassee River and has been summarized in the revised Response Proposal.***

13. Section 2.3.2. Geologic Stratigraphy Below the River. Last paragraph on page 7, first paragraph on page 8. These paragraphs need to be revised to indicate that additional investigation for the presence and location of additional till sand units (beyond those identified in this section) is scheduled to be conducted under the on-site corrective action program. In addition, the till sand unit that "daylights" in the sediments of the Tittabawassee River above the Dow dam is laterally as well as vertically extensive (extends westerly beyond the facility boundary to the closed Poseyville and to the east below the older portion of the Dow plant site). The first sentence on page 8 needs to be revised to indicate that "In these localized areas, the sand units within the glacial till ***are*** in hydraulic communication with the river.

Response: ***Section 2.3.2 has been revised to further describe the sand lenses and to indicate which sand lenses are known to be in hydraulic communication with the river.***

14. Section 2.5. The report documents historical waste management and source control activities and provides a historical context of disposal practices and outfall locations. The information provides reasonable assurance that potential contaminant sources from groundwater, wastewater/runoff, and sediment have been identified or controlled. However, findings such as those described in Section 2.6.1 (in-river chlorine cell debris found in 2009) and 3.2 (SCOI detections that led to the Historical Outfall Investigation) indicate that there may be secondary sources.

Response: ***The primary sources of contamination to Segment 1 have been addressed as described in Section 2.5 of the Response Proposal and the goal of the Response Proposal is to address past releases that may be persisting in Segment 1.***

15. Section 2.5. Please add additional discussion about the NAPL/product recently found at some SMAs and the reliability of the source controls to prevent future NAPL release. Since dense non-aqueous phase liquids have been identified in river sediments it will be helpful to discuss source controls compared to Dow's long operational history. It will be particularly important to ensure no future releases occur.

Response: ***Additional discussion about the NAPL/product recently found at SMA 2, 3, and 6 and source controls has been added to the revised Response Proposal.***

16. Section 2.5.1. Wastewater Management. Page 12, paragraph 2. This section needs to be revised to reflect that the reason for removing low concentrations of dissolved solids via ballasted clarification and sand filtration is to reduce and control the permitted discharge of dioxins to the Tittabawassee River under the NPDES permit.

    Response: Section 2.5.1 has been revised to reflect the NPDES permit as it relates to the use of ballasted clarification and sand filtration.

17. Section 2.5.3. Solid Waste Disposal. Page 12, paragraph 4. This section should be revised to indicate that groundwater contamination from Poseyville Landfill is being address via corrective action. Note that the groundwater contamination is in the till sand that "daylights" into the Tittabawassee River

    Response: Section 2.5.3 has been revised to indicate that groundwater from Poseyville Landfill is being addressed via a RCRA corrective action.

18. Section 2.5.6.1. Revetment Groundwater Interception System (RGIS). Page 13, paragraph 4. The first sentence in this paragraph indicates that the RGIS was constructed to "further" protect the river from groundwater discharges, incorrectly suggesting that there was protection of the river from venting contaminated groundwater prior to the installation and effective operation of the RGIS. This sentence needs to be revised to reflect the absence of structures to protect the river from groundwater contamination of the river prior to the installation of the RGIS.

    Response: The subject sentence in Section 2.5.6.1 has been revised.

19. Section 2.5.6.1. Revetment Groundwater Interception System (RGIS). Page 13, paragraph 6. The last sentence of this paragraph needs to be clarified by adding the following text (shown in italics): …effectively preventing groundwater discharge from the Dow Midland facility from entering the Tittabawassee River when properly operated, monitored and maintained.

    Response: Section 2.5.1 states: "Regular maintenance and monitoring activities are conducted for RGIS to ensure that system performance is maintained." Section 2.5.6.1 has also been revised.

20. Section 2.6.1. Reach B Capping. Page 16, first paragraph. The second to the last sentence in this paragraph states: "The chlorine cell debris was presumed to contain relatively high concentrations of contaminants…" The DNRE has documented through sampling and analysis that high levels of furans and other site contaminants are present in the debris from the bank and sediments of the Reach B interim response area. The word "presumed" needs to be replaced by "documented."

    Response: The subject sentence in Section 2.6.1 has been revised.

21. 2.6.2. The scouring that occurred adjacent to the steel piling surrounding Reach D removal area provides important context for sediment erosion that can occur under increased shear stresses. This experience is an important example of the usefulness of the differential bathymetry analyses in understanding river dynamics. The project team has done a nice job developing this useful tool. Further, this understanding may be useful in supporting design.

Response: ***Comment noted.***

22. Page 19, Section 3.1, first paragraph – The second sentence states that the studies "evaluated the potential human health and ecological risks …" This statement may be misunderstood – a general basis for action was established, but no risk assessments consistent with the SOW were conducted or approved.

Response: ***A footnote was added to the sentence in Section 3.1 to clarify this issue.***

23. Section 3.2. Nature and Extent of Contamination. Page 20, paragraph 2. This paragraph describes samples collected from 2006 and 2007 as being surficial and from deeper sediments located above the clay till. The January 29, 2010 Compliance Schedule Task H-12 Historic Outfall Investigation Summary Report summarizes the results from the 2006 – 2008 sampling events. Samples from intervals other than those described by Dow in this paragraph are reported in the Summary Report, including composite samples from the entire core. Please review this information and revised the paragraph as appropriate. Also please ensure that all to the H-12 investigation data has been captured in the Task 7 Geodatabase.

Response: ***The description of the samples collected in 2006 – 2007 has been revised to be consistent with the H-12 report. All H-12 investigation data has been included in the Task 7 Geodatabase.***

24. Section 3.2.1. Primary Constituents of Interest. General. Please augment this Section with additional information about the Surface Weighted Average Concentration (SWAC). A figure(s) that shows polygons used in the Segment 1 SWAC calculations should be included and the TEQ value associated with each polygon needs to be posted on the maps.

Response: ***A map of Segment 1 TEQ Thiessen polygons has been added to Section 3 of the Response Proposal (Figure 3-3).***

25. Section 3.2.2 Secondary Constituents of Interest, p. 23 – In the second paragraph from the bottom, were the Thiessen polygons created about every sample location or were they created by excluding the secondary sampling results?

Response: ***Thiessen polygons are shown for all sample locations analyzed for the target SCOIs in the top 2 ft of sediment (sample mid-depth of 2 ft or less). No samples were excluded in creating the Thiessen polygons.***

26. Section 3.2.2 Secondary Constituents of Interest, p. 23 – In the third paragraph, the statistical difference between the two sampling events (2006/2007 versus 2008/2009) is not unexpected as their objectives were entirely different. Moreover, the conclusion the authors make, i.e., that the 2008/2009 results can be used to complete the overall Segment 1 SCOI site characterization, is not accurate. These results can be used to characterize the areas in which they were taken; they do not add information to areas that did not have focused sampling.

    Response: The revised text includes an expanded discussion of the statistical analysis and its relevance to the Response Proposal. The discussion addresses the overall success of the outfall sampling strategy, as originally requested by the Agencies.

27. *p. 24: "Given the complexity of the various data collection programs and other confounding factors such as the varying number and magnitude of chemicals exceeding PLERs, detailed statistical evaluations of these data would provide limited value. Nonetheless, a simple illustrative statistical test suggests that there is a statistically significant difference in PLER exceedance frequencies between the two sampling programs (i.e., 11 vs. 31 percent; significant at the 2 percent probability level based on a one-tailed test of the z-score; Fleiss et al. 2003). This result supports the use of the 2008 and 2009 focused sampling design in completing the overall Segment 1 SCOI site characterization, which is described in more detail in the sections below."*

    Comment: Why aren't all the secondary constituents of interest (SCOI) sediment data used? The justification for excluding available analytical data is inadequate; all the available data should have been used in the analysis.

    Response: The revised Response Proposal includes further clarification.

28. Section 3.2.3, page 25, Core Log Review – Please include a brief discussion about observations in the wells such as gravel that may have influenced recovery and chemical results.

    Response: A brief discussion of gravel observations in the cores and their potential influence has been included in Section 3.2.3.

29. Section 3.2.3. SCOI Deposit Characterization. Page 25, last paragraph, Retain Sample Inspection. This section needs to be modified to reflect findings of the product recovery testing.

    Response: Section 3.2.3 has been modified to reflect findings of the product recovery testing.

30. Section 3.2.3, page 27, Composition

a. Please revise the discussion of Figure 3-8B given the results of the product recovery investigation.

Response: Results of the product recovery testing have been added to Section 3.2.3 of the Response Proposal.

b. Please clarify in the footnote whether the Reach H sample included analysis of all of the chlorobenzenes, or a sub-set.

Response: The footnote has been revised to clarify that all chlorobenzene compounds were included.

c. Section 3.2.3. SCOI Deposit Characterization. Page 27, Composition, and Figures 3-8A and 3-8B. Figures 3-8A and 3-8B show that non-chlorobenzene volatile organic compounds (VOCs) make up a fraction of the contaminants present at each of the currently identified SMAs. Please include a discussion of these compounds in this section.

Response: A discussion of the non-chlorobenzene volatile organic compounds has been added to Section 3.2.3.

d. Section 3.2.3. SCOI Deposit Characterization. Page 27, Composition, and Figure 3-8A and 3-8B. Figures 3-8A and 3-8B show that Tentatively Identified Compounds (TICs) make up a fraction of the contaminants present at each of the currently identified SMAs. Please include a discussion of these compounds in this section.

Response: A discussion of the TIC compounds has been added to Section 3.2.3. Figures 3-8A and 3-8B have been consolidated into a single figure (Figure 3-9).

31. 3.2.3 Total Chlorobenzene Concentrations in SCOI Deposits. To this point in the document, nothing has been provided to indicate whether 100 PPM chlorobenzene is a reasonable value for a "conservative initial screening criterion". Depending on the remedy selected, this value may be re-evaluated.

Response: Comment noted.

32. 3.2.3. Top of Till Evaluation. The elevation and concentration profiles (Figs 3-7a-e) were used to conclude that CB deposits were "generally confined to low elevation till areas". It's unclear if this means simply that "higher contaminant concentrations are lower in the sediment column" or the till was confining them. In the summary (p. 27), it is stated that the deposits are bound vertically and laterally by the till surface. This is a strong statement that has limited support from the evidence provided. Figures 3-7a-e, a primary line of evidence, only show that the highest concentrations are typically at the base of the cores, sometimes within the till that is to be confining them vertically (e.g. Fig 3-30A). This begs the question of what's below them. A lack of chlorobenzene below the cores is not demonstrated by the

analytical data. Further, sediment sites are replete with examples of where we thought we'd hit a confining layer but did not, particularly in areas like the Tittabawasee that had historical logging industry. At sites like the Hudson River, Cumberland Bay, and Manistique Harbor, logs and wood debris were mistaken for impenetrable stratum. Depending on the remedy selected, analytical and geotechnical data may be needed to delineate uncontaminated till, or the argument may need to be made with other evidence that the underlying stratum is clean and represents the vertical extent of the contamination. In the proposed SMAs there are not deep samples to verify the lack of contamination.

Response: ***Dow understands that additional data/evaluations may be needed to vertically delineate SCOI concentrations in the underlying till at the SMAs. As stated in Section 3.5.2 and the Executive Summary of the draft Response Proposal, "The SMA boundaries delineated for this Segment 1 Response Proposal are subject to further refinement during the remedial design phase, including additional sampling as necessary."***

33. Section 3.2.3 Summary of SCOI Deposit Evaluation, p. 27 – In the second paragraph from the bottom, three of the four "approaches" used to evaluate the presence of the five SCOI deposits are from the same method: a core sample. As such, using the term "independent approaches" is not accurate. These four methods provide useful information on the locations were they were collected. As presented in this document, they do not provide information for unsampled locations.

Response: ***Section 3.2.3 has been revised to address the concern.***

34. Section 3.2.3. SCOI Deposit Characterization. Page 27, paragraph 5. Summary of SCOI Deposit Evaluation. This section needs to be revised based on the product recovery testing.

Response: ***Section 3.2.3 has been revised to reflect the results of the product recovery investigation.***

35. Section 3.2.3 Origin of SCOI Deposits, p. 28 – In the second paragraph, what is the evidence that the material in the SCOI deposits in Reaches G and H are "likely old, weathered residual material"?

Response: ***Section 3.2.3 has been revised to reflect the results of the recent product recovery testing.***

36. Section 3.2.3. SCOI Deposit Characterization. Page 28, paragraph 2. Origin of SCOI Deposits. The first sentence in paragraph 2 states: "There are no continuing SCOI sources to Segment 1 sediments…" This sentence should be revised to reflect that there are no ***known*** continuing SCOI sources to Segment 1 sediments. Further investigation being conducted under the on-site corrective action program may identify currently unknown sources to river sediments. This paragraph also needs to be revised to reflect the product recovery results.

Response: ***Section 3.2.3 has been revised to reflect the product recovery results and to reflect that there are no known continuing SCOI sources to Segment 1 sediments.***

37. Section 3.2.3. SCOI Deposit Characterization. Page 28, paragraph 3. Origin of SCOI Deposits. The first sentence in this paragraph states that the SCOI deposits in Reaches E and F predate source control work conducted in the 1970's and 1980's. This statement should be qualified as follows "…are also old in that they ***are presumed*** to pre-date the RGIS…" In the alternative "*are likely*" could be used in the place of "*presumed*." The actual dates and mechanisms of the releases to these areas are unknown.

    Response: ***The sentence has been revised to convey the point made in the comment.***

38. Section 3.3.1 – Are there sections missing from the bottom of pg.28-top of pg 29? Last sentence on 28 has an error. The numbering of the bullets is 4 through 6. Are there points 1 through 3, or is this a typo?

    Response: ***The numbering of the bullets on the bottom of page 28 and top of page 29 was incorrect; there are only three bullets and they have been relabeled 1 through 3.***

39. *p. 30: ". . . multi-beam surveys were conducted in the spring of each year and consisted of the collection of bed elevations across the entire river bottom that were aggregated up to a density of one measurement for every square ft of river bottom . . . ."*

    Comment: How was horizontal position determined for the creation of the bathymetry grid [e.g., differential global positioning system (GPS)], and what is the horizontal uncertainty on these position measurements? Given a 1-ft resolution bathymetry grid and a mobile bed, how does the uncertainty in lateral position factor into the determination of the differential bathymetry maps presented in Section 3.3?

    Response: ***The Response Proposal has been modified to reflect the horizontal and vertical accuracies.***

40. Section 3.3.1 Segment 1 Bed Stability Evaluation. Please see General Comment 7 above. The Agencies have a number of questions and uncertainties related to this analysis. Please indicate in this section that additional work to evaluate bed stability is underway, on a separate but concurrent track from finalization of the Response Proposal. Please note that detailed questions and comments will be provided separately. Please note that this analysis cannot be considered approved, but that development of response alternatives for the identified SMAs may proceed despite the ongoing analyses.

    Response: ***See response to Comment 7 above. Dow and the Agencies will discuss a process to resolve these stated issues on a separate but concurrent track from finalization of the Response Proposal/Remedial Design for Segment 1.***

41. 3.3.2 The calibrated and validated sediment transport model is being used to simulate changes in the bed elevation. Modeling results show a maximum increase in depth of 1 ft during a 50 year event. This does not correspond to the differential bathymetry data which indicate isolated areas of greater than 2 feet; albeit the flows are not described. This apparent discrepancy and reasons why it is or is not relevant should be mentioned.

    Response: Additional discussion has been added to the text in section 3.3.2 to clarify the differences in spatial scales between model predicted bed elevation changes and differential bathymetry data.

42. Section 3.3.2. Hydrodynamic and Sediment Transport Modeling. General. In addition to modeling high flow events, Dow needs to model reasonable scenarios where the river channel is modified on a temporary basis – such as when major (but routine) maintenance is done on the RGIS system. Depending on the section of the RGIS that requires maintenance; it is not unusual for Dow to build a temporary road in the river with a driving surface that is 25 feet wide (the actual footprint of the road is larger as the gravel needs to be placed at a stable angle below the water surface). These types of predictable activities need to be evaluated to determine their potential effects on the river bottom and their potential to expose contaminated sediments that may not be directly addressed by the proposed SMAs. This section needs to be revised to address this issue.

    Response: The evaluation of potential effects of the RGIS temporary road, which was discussed during the Agency meeting on December 15, 2010, will be summarized in a stand-alone technical memorandum and provided to the Agencies. Comments and suggestions provided by Agency personnel during that meeting regarding modifications to the model simulations and output processing will be incorporated into the analysis.

43. Section 3.3.2. Hydrodynamic and Sediment Transport Modeling. Page 35, paragraph 5, first bullet. This bullet makes the point that the sediment bed is in a state of dynamic equilibrium with little net deposition or erosion when spatially averaged over the entire bed. While this is likely true, it is important to remember that we are also concerned with local erosion, even on a short time frame, and its potential impact on exposure or remobilizing contamination that is not currently exposed at the surface.

    Response: See response to Comment 41. The sediment transport CSM includes components relating to both short-term (i.e., episodic) localized effects and longer-term (i.e., annual) average effects. Additional discussion has been added to the text to clarify the dynamic characteristics of temporal and spatial variations in predicted bed elevation change within Segment 1.

44. Section 3.3.3

    a. *p. 36: ". . . the low permeability till prevents further downward migration of the product."*

Comment: This statement needs to be revised. Many of the core profiles in Figures 3-6 and 3-7 show contaminants penetrating to depths > 1 ft into the till. In addition, recent reports by Dow indicate additional areas on the site where downward migration into the till is occurring (e.g., URS, 2006). Downward migration is likely to be slow, but does seem to be occurring.

Response: Section 3.3.3 has been revised to discuss contaminants found in the top layer of the till.

It is important to note that the 2006 URS document referenced above is an investigation work plan, and does not report additional areas on the plant site where downward migration into the till is occurring. Rather, this work plan presented a scope of work to investigate the possibility for downward migration of contaminants into the till. Subsequent investigation activities, as presented in the September 2009 and June 2010 H-4 Compliance Schedule summary reports have shown that significant downward migration into the till has not occurred.

b. Section 3.3.3. Mobility Potential of SCOI Deposit. Page 36, paragraph 4, first bullet. The first sentence states: "There are no continuing SCOI sources to the Segment 1 Channel." This sentence should be revised to reflect that there are no ***known*** continuing SCOI sources to the Segment 1 channel. Further investigation being conducted under the on-site corrective action program may identify currently unknown sources to river sediments. Further language in this bullet also needs to be qualified to read that all ***known*** product releases have been identified and eliminated.

Response: Section 3.3.3 has been revised.

c. The second bullet indicates that releases are old. How is this relevant to mobility? Superfund sites have all manner of "old" mobile contaminants that are prone to transport or currently being transported.

Response: The second bullet in Section 3.3.3 has been revised.

d. Section 3.3.3. Mobility Potential of SCOI Deposit. Page 36, paragraph 4, second bullet. It is more accurate to state that …"potential subsurface migration pathways to the river ***began to be*** intercepted by RGIS starting in 1980.

Response: Section 3.3.3 has been revised to more accurately depict timing.

e. The third bullet is an interesting interpretation. The "top of till evaluation" relies on an interpolation of the till structure from adjacent areas. From what we can tell it does not result from cores in the SMA. It also doesn't correspond with, for example 3-28b, where the highest chlorobenzene concentrations are in the till and at the local height maximum of the till. In SMA 4, (Fig 3-32b), the one core shown penetrating into the till has the highest CB concentration at its lowest point. How do these results

indicate this is the vertical extent of contamination? An alternative interpretation is that the highest concentrations of contaminants were just at the base of the core. Without further justification, both interpretations are equally plausible.

Response: ***The Response Proposal has been revised to clarify the top of till interpretation. The top of till evaluation also relies on an interpolation of the till structure from adjacent areas and includes the results from cores in the SMAs.***

For the core noted in Figure 3-28b, the highest concentration is shown in the sample interval above the till (denoted by purple color), not the sample intersecting the till (denoted by orange color). For the core noted on Figure 3-32b, the highest sample interval intersects the till/sand boundary and includes analysis primarily from the sand unit with some material coming from the top of the till unit.

45. Section 3.3.4. Groundwater Flux Potential. General. The vertical gradients in groundwater may need to be determined at each of the areas determined to need remediation. The effect of the RGIS gradient, if any, may be stronger for SMAs that are directly adjacent to the RGIS. SMAs located near the mid channel (e.g., SMAs 4 and 5) may be less likely to be influenced by RGIS. Depending on the remedy selected, additional evaluation of localized hydraulic conditions and gradients may be required at the SMAs.

Response: ***Comment noted.***

46. Section 3.4.2 and Appendix B Direct Contact for Ecological Receptors. Please see General Comment 7 above. The Agencies have a number of questions and uncertainties related to this analysis. Please indicate in this section that additional work to evaluate direct contact effects on ecological receptors is underway, on a separate but concurrent track from finalization of the Response Proposal. Please note that detailed questions and comments will be provided separately. Please note that this analysis (including the proposed PLERs) cannot be considered approved, but that development of response alternatives for the identified SMAs may proceed despite the ongoing analyses.

Response: See response to Comment 7. Dow and the Agencies will discuss a process to resolve these stated issues on a separate but concurrent track from finalization of the Response Proposal/Remedial Design for Segment 1.

47. page 37, section 3.4, second sentence: remove the word “potentially” and replace with “actual or potential.”

Response: ***Section 3.4 has been updated in response to comment.***

48. Section 3.4.2.2, Page 41, second paragraph – Please clarify whether the TOC testing was done concurrently, or later.

Response: ***The revised Response Proposal has been revised to clarify the TOC testing.***

49. Section 3.4.2.4, page 45, first paragraph and bullets – The numbers discussed here are inconsistent. The paragraph mentions 15 samples with GUs greater than 5 while the 3rd bullet mentions 11 samples.

    Response: The 3rd bullet was revised to indicate "Fifteen samples had GUs greater than 5".

50. Section 3.4.2.4 GUs – The Agencies will identify specific concerns related to the GU assessment as we work to resolve uncertainties related to the direct contact for ecological receptors.

    Response: Comment noted.

51. *p. 45: "As part of evaluations to inform this Segment 1 Response Proposal, three different bioaccumulation-related data collection activities and corresponding datasets (i.e., wild fish, caged fish, and SPMDs) were reviewed…."*

    Comment: Were sediment-dwelling organisms considered in the bioaccumulation-related data collection activities? Were only the six SCOI categories considered? Please note that non-benthic toxicity by bioaccumulative compounds will be considered, as necessary, in the Task 10 risk assessment.

    Response: Bioaccumulative SCOIs were not measured in sediment-dwelling organisms.

    Measured SCOIs in wild fish, caged fish, and SPMDs are described in detail in Appendix B4.

    The revised Response Proposal notes that preliminary consideration of bioaccumulative compounds is provided in Table B4.2 and additional consideration of non-benthic toxicity by bioaccumulative compounds will be considered, as necessary, in the Task 10 risk assessment.

52. Section 3.4.4, pages 46 – 47 – Refer again here to the soil screening evaluation. Briefly discuss relocation of the portage area.

    Response: Section 3.4.4 has been revised to reflect the soil screening and relocation of the portage area.

53. Section 3.5, page 47 – Clarify that the SMA boundaries are general and for the purposes of assessing and comparing response options, and that they will be refined during design.

    Response: The following statement was included in Section 3.5.2 and in the Executive Summary of the draft Response Proposal: "The SMA boundaries delineated for this

Segment 1 Response Proposal are subject to further refinement during the remedial design phase, including additional sampling as necessary."

54. Section 3.5.1. Page 47. Last paragraph. This section needs to be updated to reflect the identification of recoverable product in the SMAs.

<u>Response</u>: Consistent with the response to Comment 1, the Response Proposal has been revised to include a summary of the fall 2010 product recovery investigation.

55. 3.5.2. Lateral and Vertical Delineation of SMAs

    a. The SMAs will need additional delineation laterally, and perhaps vertically, during design.

    <u>Response</u>: The Executive Summary and Section 3 of the Response Proposal state "The SMA boundaries delineated for this Segment 1 Response Proposal are subject to further refinement during the remedial design phase, including additional sampling as necessary."

    b. This figures associated with this Section should show the labeled sampling locations that are the basis for the proposed SMA.

    <u>Response</u>: Figures 3-27 through 3-38 from this section show the SMA boundaries and the sample locations that served as a basis for delineating the SMAs.

    c. Tables showing all the chemical data from all the sampling locations in Segment 1 should be provided.

    <u>Response</u>: Tables showing all the chemical data from all the soil and sediment sampling locations in Segment 1 have been included on a compact disc in Appendix G. All the chemical data from all the sampling locations in Segment 1 have been included in the geodatabase.

56. Section 3.6, Other Areas – Pending resolution of the uncertainties identified above regarding active bed depth and the direct contact for ecological receptors, the Agencies are reserving our rights to determine that the areas discussed in this section (or other areas) may require response activities.

<u>Response</u>: Comment noted.

57. *p. 54: "Surface sediment samples were collected from three locations in Lingle Drain.…Target SCOI concentrations from these surface samples were compared to the PLER values. The three surface samples from Lingle Drain contain concentrations below the PLER values for five of the six target SCOIs.…At two Lingle Drain locations (Lingle Drain DEQ and RH-161+50-T-NE265), the total PAH concentrations were greater than the PLER*

value of 15.1 mg/kg; the total PAH concentration at Lingle Drain DEQ was 16.7 mg/kg and the total PAH concentration at RH-161+50-T-NE265 was 49.2 mg/kg."

Comment: These quotations appear in Section 3.6, titled "Other areas in segment 1." However, Table B1.1B states that SCOIs from sites RH-161+50-T-NE265 and Lingle Drain DEQ were excluded from further evaluation because they were located outside the Segment 1 SMA boundary. Please clarify.

***Response:** The Table B1.1B footnote has been revised to correctly indicate that SCOIs from sites RH-161+50-T-NE265 and Lingle Drain DEQ were included in the evaluations.*

58. Section 4.1. Segment 1 Conceptual Site Model and Basis for Action.

    a. Section 4.1 and Figure 4.1. There is some confusion about the text and the figure related to the CSM. For example, there is a "known" pathway from sediments to the water column and from the water column to the fish. This has been demonstrated by the SPMD studies for dioxins and furans and chlorobenzenes and caged fish studies in Segment 1. In addition the pathways from sediment to fish and from fish to consumer could be identified as "known" pathways because people and animals eat fish from the Tittabawassee River and the Michigan Department of Community Health has issued a consumption advisory for Tittabawassee River fish. We need to provide more explanation in the text to clarify that these interactions exist and to explain that the focus is a CSM for the basis for action in Segment 1 (and not a complete description of the chemical interactions among the media, nor a risk assessment CSM). Because the public may be confused by the terminology, we should consider adding footnotes to figure 4-1 explaining "known," "potential," and "historical." The text should reflect that "sediments" includes the pore water component.

       ***Response:** The CSM narrative in the Response Proposal has been revised to reflect the changes in this comment.*

    b. p. 57: "The CSM depicts two pathways of potential concern associated with sediment-bound chemicals: 1) a known pathway to benthic organisms; and 2) a potential pathway to fish and consumers of fish. These pathways are discussed below. A third pathway, direct contact with soils or sediment, was considered and eliminated from further consideration as discussed in Section 3.4.4 and in Appendix B2."

       Comment: Please clarify that this CSM is broadly the basis for action for the identified SMAs. Other receptors (i.e., birds and mammals), other possible exposure pathways [e.g., direct ingestion, ingestion of benthic invertebrates, fish], and other species with advisories (e.g., duck, squirrel, turkey) may need to be evaluated as part of the Task 10 assessment.

       ***Response:** Section 4 of the CSM has been modified to indicate that the CSM may*

be revised and updated during Task 10, in accordance with the AOC SOW. The title for Figure 4-1 also has been changed to indicate that it is the basis for action CSM.

c. Section 4.1.2, page 58 – At this point, the Agencies are neither disagreeing nor agreeing with the screening. This will be resolved through the Task 10 assessment.

Response: Comment noted.

d. *p. 58: "Although some bioaccumulative SCOI compounds such as chlorobenzenes have been detected in wild fish collected from Segment 1, their levels are generally at or below regulatory screening levels established for the protection of human health and wildlife (Appendix B4)."*

Comment: Most of the fish tissue data described in Appendix B4 are for fillets. Although these data may be applicable to human health effects, the whole body results are important and applicable to wildlife.

Response: Comment noted. Also, see the response to 58.b. which recognizes that the CSM will be updated to meet the requirement of the risk assessments under Task 10.

59. Section 4.2, Segment 1 Remedial Action Objectives

a. 4.2.1 Performance Objective – The uncertainties discussed in comment relate (among others) to the PLER values. Perhaps this objective should be re-stated as ". . . Segment 1 SMAs to below site-specific PLER sediment criteria (that will be further evaluated before design is complete)."

Response: The performance objective of Remedial Action Objective 1 has been modified in the Response Proposal.

b. 4.2.2 Measurable Metrics – The long-term component of RAO 2 may need to include chemistry measurements, as well as stability. As noted, this will be developed in design, depending on the remedy selected.

Response: Comment noted.

c. *p. 60, Description of RAO3: "Performance Objective: As necessary, reduce the potential for sediment erosion that would lead to unacceptable surface sediment exposures to SCOIs above PLERs and/or bioaccumulation of subsurface Segment 1 contaminated sediments (including SCOI deposits)."*

Comment: The focus of this Performance Objective is on exposure of subsurface sediments to become surface sediments. The potential for erosion and downstream transport and deposition (in-stream or in floodplains) should also be considered. Perhaps

re-state the objective as ". . . reduce the potential for sediment erosion and/or downstream transport that would . . ." Also, see comment on section 4.2.1above on the PLERs. Finally, the Performance Objective is worded awkwardly – can it be clarified?

Response: ***We believe that RAOs 1 and 3 should be viewed together. RAO 1 addresses current risks or future risks to benthic receptors associated with contaminated surface sediments; controlling surface sediment concentrations in Segment 1 also will work to prevent downgradient releases. RAO 3 addresses the potential for contaminated subsurface sediments to become exposed.***

d. 4.2.3 Measurable Metrics – Please note that post-construction monitoring may include some event-driven monitoring after specified episodic, high-energy events. The long-term component of RAO 3 may need to include chemistry measurements, as well as stability. Please delete ". . . potentially resulting in increased fish PCOI concentrations exceeding EPA screening criteria" from the end of bullet 2. As noted, these details will be developed during design, depending on the remedy selected.

Response: ***The Response Proposal has been revised to recognize that post-construction monitoring may include chemistry measurements depending on the results of the sediment stability measurements.***

60. ARARS, page 61, sections 4.3.1, 4.3.2 and 4.3.3: We suggest the following changes:

4.3.1 Potential Chemical-Specific Requirements or TBCs[1]

Chemical-specific ARARs are either the numerical values or the methods for developing such values. These ARARs are used to establish the acceptable amount or concentration of a chemical that may remain in or be discharge to the environment. Identified in Section 3.2.1, above, are seventeen (17) PCOIs, all of which are furan and dioxin congeners. Also identified in Section 3.2.2 are 35 SCOIs, which can be grouped as follows: total chlorobenzenes, total chlorophenols, Polycyclic aromatic hydrocarbons (PAHs), arsenic, ortho-phenylphenol (oPP) and ethyl parathion.

Response: ***The Response Proposal has been revised to incorporate the text above, including text at the end of the paragraph to clarify that the medium being addressed in the Segment 1 Response Proposal is sediment for which there are no chemical-specific requirements. Although there are standards or requirements for water, such as the Clean Water Act and the State of Michigan water quality standards, these are only triggered by certain actions, such as when water is being discharged to surface***

[1] It should be noted that any standard, requirement, criterion, or limitation under any Federal environmental law, or any promulgated standard, requirement, criterion, or limitation under a State environmental law, which contains a cleanup criterion/number for sediment is not considered a chemical-specific ARAR for this response action since this response action is performance-based and is not driven by a cleanup criterion/number. In addition, this response proposal does not address soil, so soil cleanup criterion/numbers are also not chemical-specific ARARs.

water from dewatering or treatment areas. They are not generally applicable. Thus, both the Clean Water Act and the State of Michigan water quality standards are not included in Section 4.3.1 Potential Chemical-Specific Requirements. Rather, they are appropriately included in Section 4.3.2 Potential Action-Specific Requirements, which is where they were included in the original submittal and are included in the revised submittal.

Clean Water Act – Federal Surface Water Quality Standards
Federal Water Quality Standards are the foundation of the water quality-based pollution control program mandated by Section 303 of the Clean Water Act. Water standards are provisions of state, tribal, or federal law that define the water quality goals of a water body, or segment thereof, by designating the use or uses to be made of the water body; establishing criteria based on sound science that are protective of applicable uses; and protecting water quality through antidegradation requirements. See 40 CFR part 131. States and tribes adopt water quality standards to protect public health or welfare, enhance the quality of water, and serve the purposes of the Act. These standards may be ARARs for the Site (point source discharges to the River). If a state has not adopted water quality standards, federal water quality standards are used. The State of Michigan has developed standards for the protection of water quality, which are discussed below.

<u>Response</u>: The Response Proposal has been revised to incorporate the text above into Section 4.3.2 – Potential Action-Specific Requirements or TBCs.

Clean Water Act – Federal Ambient Water Quality Criteria
Section 304 of the Clean Water Act requires EPA to develop criteria for water quality that accurately reflects the latest scientific knowledge. These criteria are based solely on data and scientific judgments on pollutant concentrations and environmental or human health effects. These criteria are published pursuant to Section 304(a) of the Clean Water Act and provide guidance for states and tribes to use in adopting water quality standards. EPA has national recommended water quality criteria for the protection of aquatic life and human health in surface water for approximately 150 pollutants. These pollutants include dioxin, chlorobenzene, and chlorophenol. These federal standards may be TBCs for OU1 Segment 1 (e.g. when water is being discharged to surface water from dewatering or treatment areas, when there is turbidity during river bottom work, or as effluent from confined disposal areas).

<u>Response</u>: The Response Proposal has been revised to incorporate the text above into Section 4.3.2 – Potential Action-Specific Requirements or TBCs.

Michigan Water Quality Standards
The State of Michigan has developed standards for the protection of water quality. These water quality standards can be found in Part 4 of the Michigan Administrative Rules. For protection of aquatic life in surface waters, the standards include arsenic and parathion. For protection of human health the standards include chlorobenzene and 2,3,7,8-TCDD (dioxin). These standards may be ARARs for OU1 Segment 1 (e.g. when water is being

discharged to surface water from dewatering or treatment areas, when there is turbidity during river bottom work, or as effluent from confined disposal areas).

Response: The Response Proposal has been revised to incorporate the text above into Section 4.3.2 – Potential Action-Specific Requirements or TBCs.

4.3.2 Potential Action-Specific Requirements or TBCs

Action-specific ARARs are performance, design, or other requirement that may place controls or restrictions on a particular response action. Action-specific ARARs are typically technology- or activity-based requirements or limitations on actions, and these requirements my include chemical-specific standards or criteria that must be met as the result of an action. For response actions in segment 1, these requirements are not necessarily triggered by the presence of specific contaminant in sediments, but rather by specific activities related to managing contaminated sediment. Action-specific ARARs that may influence the Segment 1 Response Proposal are summarized in Table 4-2

Please add a brief paragraph for each one in table 4-2 paragraph here. Also, add the following:

Response: The Response Proposal has been revised to incorporate the text above, also adding brief paragraphs describing potential action-specific requirements or TBCs listed in Table 4-2.

Endangered Species Act
The Endangered Species Act (ESA), 16 U.S.C. Section 1531 et seq., provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The U.S. Fish and Wildlife Service (FWS) maintains a worldwide list of endangered species. Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. The law requires federal agencies, in consultation with the U.S. Fish and Wildlife Service and/or the U.S. National Oceanic and Atmospheric Administration (NOAA) Fisheries Service to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. If threatened or endangered species exist in certain areas of the Tittabawassee River, this law may constitute an action-specific ARAR for OU1 Segment 1.

Response: The Response Proposal has been revised to incorporate the text above.

4.3.3 Potential Location-Specific Requirements or TBCs

Location-specific ARARs are restriction placed on an action based solely on the action's location. Location-specific ARARs may restrict or preclude certain response actions or may apply only to certain portions of Segment 1. This group of ARARs includes

consideration of floodplains, wetlands, and navigation features. Location-specific ARARs that may influence the Segment 1 Response Proposal are summarized in Table 4-3.

Please add a brief paragraph for each one in table 4-3 paragraph here. Also, add the following:

Response: ***The Response Proposal has been revised to incorporate the text above, also adding brief paragraphs describing each potential location-specific requirement or TBC listed in Table 4-3.***

Floodplain and Wetland Regulations and Executive Orders 11988 and 11990
The requirements of 40 CFR § 264.18(b) (regulating hazardous waste facilities located in floodplains) and Executive Orders 11988 (Protection of Flood Plains) and 11990 (Protection of Wetlands), may be relevant and appropriate at OU1 Segment 1, which includes floodplains and may include wetlands.

Response: ***The Response Proposal has been revised to incorporate the text above.***

Clean Water Act
Under Section 303(d) of the Clean Water Act, states are required, on a periodic basis, to submit lists of "impaired waterways" to EPA. In 2010, the State of Michigan submitted its most recent list. The Tittabawassee River ("From the Saginaw River confluence upstream to Dow Midland") is included on the list. A total maximum daily load ("TMDL") for dioxin is scheduled for 2014. Clean Water Act Section 303(d) may be a TBC for OU1 Segment 1.

Response: ***The Response Proposal has been revised to incorporate the first two sentences in the text above. Currently, there is no TMDL for dioxin, and one is not scheduled for completion until 2014. The Segment 1 Response Proposal contemplates completing in-water construction in 2013, which is before the TMDL is anticipated. The potential TMDL, therefore, is not included in the Segment 1 Response Proposal. If the TMDL is finalized, Dow and EPA will evaluate whether it is applicable to or relevant and appropriate for Segment 1 response activities.***

Great Lakes Water Quality Initiative
The Great Lakes Water Quality Initiative, 40 CFR Part 132, Appendix E, sets forth guidance to the states bordering the Great Lakes regarding their wastewater discharge programs. For response actions, the guidance states that any remedial action involving discharges would, in general, minimize any lowering of water quality to the extent practicable. Although the Great Lakes Water Quality Initiative explicitly exempts response actions taken pursuant to CERCLA which are undertaken to alleviate a release into the environment of hazardous substances, pollutants or contaminants which may pose an imminent and substantial danger to public health or welfare, the Initiative may be

a TBC at OU1 Segment 1, which is located at river that ultimately discharges into a Great Lake.

Response: ***The Great Lakes Water Quality Initiative is not included in the Segment 1 Response Proposal. As noted in the February 16, 2010 comment letter from EPA, the Great Lakes Water Quality Initiative explicitly exempts response actions taken pursuant to CERCLA. Note, however, that water quality concerns will be considered (see Table 4-2 Potential Action-Specific ARARs for Segment 1 of the Tittabawassee River listing the Clean Water Act and State of Michigan water quality standards). Moreover, any actions taken will likely result in long-term benefits to water quality. Thus, water quality concerns are addressed in the Segment 1 Response Proposal.***

National Historic Preservation Act

The National Historic Preservation Act (NHPA), 16 U.S.C. Section 470 et seq., preserves historical and archaeological sites in the United States. In particular, it provides protection for properties on or eligible for inclusion on the Nations Historic Register of Historic Places (see 40 CFR Part 800). In selecting a response action, adverse effects to such properties are to be avoided. NHPA may be an ARAR for this Site to the extent there is a property at OU1 Segment 1 which is on or eligible for the National Historical Register.

Response: ***The Response Proposal has been revised to incorporate the text above.***

61. Section 5. Segment 1 Response Action and Remedial Technology Screening. This section requires revision based on the product recovery testing.

Response: ***The Response Proposal has been revised to reflect the results of the product recovery testing.***

62. Section 5, page 65, 2nd bullet – In the final parenthetical clarify that only on-site actions are exempt from procedural requirements.

Response: ***The Response Proposal has been edited to clarify that only on-site actions as defined under CERCLA are exempt from procedural requirements.***

63. Section 5.1.1, page 66, 1st paragraph of section – In addition to the concerns discussed here, please add a site-specific discussion about potential concerns relative to RGIS from excavation.

Response: ***Section 5.1.1 has been updated to include a discussion of potential concerns relative to RGIS associated with the excavation alternatives.***

64. *p. 70: "A pilot study also provides an opportunity to determine whether the target deposit is extractable; if not, the residual material may be defined as sufficiently weathered and immobile."*

Comment: Care should be exercised not to directly equate or imply failure of contaminant extraction with "weathered and immobile" contaminants. Preparations for pilot-scale studies to examine free-phase product removal should focus on accurately delineating the extent of the free-phase product within the aquifer to increase the likelihood of correct extraction well placement. Furthermore, detailed site characterization lessens the likelihood that other factors (e.g., undiscovered low-permeability geologic lenses separating product from the screened interval of the extraction well) could contribute to failed extraction tests by limiting the efficiency of the extraction wells.

Response: ***Comment noted: Dow conducted a product recovery investigation at SMAs 2 through 6 in November and December of 2010. The results of the product recovery investigation have been included in the revised Response Proposal and various sections of the proposal have been revised to reflect the new product recovery information. Dow also recognizes that additional product removal testing and delineation will be required during the remedial design phase.***

65. *p. 72: "The vertical barrier would be driven down from the top of sediment and embedded into the underlying low-permeability till, preventing lateral movement of contaminants outside of the contained area."*

Comment: A low-permeability till will exhibit some advective flow and hydraulic connectivity with the surrounding aquifer and will allow for limited lateral contaminant migration, albeit at a reduced velocity when compared to higher-permeability materials. The phrase "preventing lateral movement" implies full and total lateral contaminant containment, which is unlikely to be achieved. It is more accurate to use the terms "reducing" or "limiting," as total prevention of lateral contaminant migration would have to be displayed by long-term monitoring following construction activities. "Preventing lateral movement of contaminants outside of the contained area" would be dependent upon the vertical barriers being driven into a non-permeable layer in which the site geology had been characterized to preclude the existence of any flow pathways.

Response: ***The Response Proposal has been edited to address this comment.***

66. pages 75 – 76, section 6.1:

a. first bullet: Change the 1st sentence to read "Control efforts for known sources have been . . ."

Response: ***The Response Proposal has been edited as requested.***

b. third bullet: change the last line to read "…design and the issuance of an agreed or unilateral order directing implementation."

<u>Response</u>: The last line of the third bullet of Section 6.1 has been revised as requested.

c. Fourth bullet – The last part states that disposal of materials would be conducted in accordance with the off-site rule. However, disposal of product under some alternatives is proposed for on-site management. Perhaps material disposal is not a "common element" and is addressed in the specific response alternatives.

<u>Response</u>: The text of the Response Proposal has been clarified to distinguish between on-site and off-site disposal. Given that disposal of sediment and/or product is a component of numerous alternatives, this discussion remains within the "common elements" discussion.

d. Fifth bullet (1st on page 76) – Remove this bullet, this is more appropriately an ARARs discussion, not a common remedy element. Alternatively, add language here stating that only off-site response activities need to comply with both substantive and administrative permitting requirements – on-site activities only need to comply with substantive permitting requirements.

<u>Response</u>: The 5th bullet has been deleted as requested and an additional discussion is provided in the ARARs sections of the Response Proposal.

e. Please consider the following additional common elements:

i. O & M of B and D caps and D MNR area. Right now, this is implied in bullet 6, but it would be clearer to call this out separately.
ii. O & M, as detailed in a future O & M Plan for selected new remedies. The O & M Plan may distinguish different requirements for nearer-term monitoring vs. longer-term.
iii. Assessments to support remedial design.
iv. Please clarify that there will be construction monitoring for any response action, to be determined during design.

<u>Response</u>: The Response Proposal has been edited as requested.

67. *p. 83: "With time, the excavation area would backfill naturally as upstream clean sediment migrates into the area."*

Comment: The risks and benefits of backfilling excavation areas to different grades will need additional site-specific analysis, depending on the selected remedy.

<u>Response</u>: Comment noted.

68. Section 6.5.1, Page 85 – Please revise the MNR discussion based on the product recovery data.

<u>Response</u>: The Response Proposal has been revised to incorporate the results of the fall 2010 product recovery investigation.

69. Chapter 7, Cost Sections – The report refers to the +50, -30 percent estimate range as being an NCP requirement. This range is not from the NCP, but from EPA cost estimation guidance.

<u>Response</u>: The Response Proposal has been edited as suggested.

70. page 88, 7.1, second bullet: should also mention chemical-specific ARARs.

<u>Response</u>: The revised Response Proposal includes a reference to potential chemical-specific requirements or TBCs discussed in Section 4.3.1. See response to Comment 60.

71. Section 7.2.1.1, Page 90 – The conclusions about rate of recovery seem to be overly optimistic. Are there historically higher levels that support the model calculations? The complexity of this area is evidence by current conditions which do not fit into the CSM (e.g., why are arsenic-contaminated sediments on the surface of a depositional area where sources have been controlled?) Could this be related to recent upstream scouring and re-deposition in the SMA?

<u>Response</u>: The Response Proposal has been revised to clarify that if an MNR alterative is selected for SMA 1, additional analyses may be needed during remedial design to refine the projected recovery rates and develop a detailed long-term monitoring plan.

72. page 90, last paragraph, second sentence: change end to read "…design and the issuance of an agreed or unilateral order directing implementation)."

<u>Response</u>: The last paragraph of page 90 has been revised as requested.

73. 7.2.1.1. SMA 1 is about 300 feet below a dam. Such an area warrants strong consideration of potential sediment transport and the reality that these areas are hard to appropriately model. The area appears to be on a depositional wedge below the dam. But, as evidenced by the repeat bathymetry (fig A2.1C and A2.2C), it is adjacent to active scour areas. The dynamics introduced by the dam, particularly at high flows, will create high uncertainty regarding sediment transport modeling results (the basis of MNR predictions) and scour determinations (the basis of cap stability predictions). It's unclear whether repeat bathymetry measurements have encompassed the upper end of the flow regimes, so the potential location and size of the scour areas after events of various sizes has not been evaluated. In short, this is an active area of the river that may not model well, so sediment transport and hydrodynamic results will be uncertain.

<u>Response</u>: Additional discussion has been added to the text of Appendix C to further describe hydrodynamic and sediment transport characteristics in the vicinity of SMA 1,

based on differential bathymetry results in conjunction with model predictions.

74. page 91, section 7.2.1.2: this section needs to be reworked consistent with the new ARARs analysis (see above).

    Response: The Response Proposal has been revised to reflect the updated ARARs analysis. See response to Comment 60.

75. Section 7.2.1.3, page 92 – See comment 71 above on recovery timeframe.

    Response: See response to Comment 71.

76. *p. 93: "Additionally, the removal of sediments would form a depression within the sediment bed that would act as a sedimentation basin for subsequent accumulation of clean sediments."*

    Comment: Please provide the projected rate of accumulation of sediments within the removal area. Such a clarification would aid in the evaluation of the alternative and an approximation of time before the removal area returns to pre-dredge grade. Data from Reach D outside the sheet pile should be informative. Also, hydraulic analysis of flow as influenced by the depression may be required to understand local effects.

    Response: This section has been updated with a discussion to reflect the projected rate of sediment accumulation within the removal area.

77. Section 7.2.3, page 95, Cost – The assumptions about monitoring type and frequencies are sufficient for the purposes of an EE/CA, but the actual post-construction monitoring will be established in an approved O & M plan.

    Response: Comment noted.

78. Section 7.3.1.1

    a. page 96, last paragraph – It is not clear that connection to the RGIS without any modification will be sufficient to provide adequate hydraulic control.

       Response: Clarifying text has been added to the Response Proposal.

    b. Page 98, 3rd paragraph – Please discuss that the dredged are is expected to re-fill with sediment, which would further isolate residuals over time.

       Response: See response to Comments 67 and 76.

79. page 98, section 7.3.1.2: this section needs to be reworked consistent with the new ARARs analysis (see above).

<u>Response</u>: The Response Proposal has been revised to reflect the updated ARARs analysis. See response to Comment 60.

80. *p. 99: "The short-term effects of implementing SMA 2/3: Alternative 1 (In Situ Containment with Hydraulic Control) and Alternative 2 (Removal of Recoverable Product/Treatment and In Situ Containment with Hydraulic Control) could result in temporary, localized turbidity, particularly during installation of the barrier walls and from the capping materials."*

    Comment: Please expand upon the potential for dissolved and particulate releases of contaminants from the sediments during construction of the in situ containment features. Although releases would not be expected to be as large as those encountered during excavation/dredging, they should be considered.

    <u>Response</u>: The Response Proposal has been revised to expand on the potential for temporary, localized short-term impacts associated with implementation of alternatives that include the installation of in situ containment features (caps and/or vertical barrier walls).

81. 7.3.1.5. "The installation of an appropriately designed reactive cap to manage post-dredge residuals has been shown to permanently impede the migration and immobilize oily product, reducing the toxicity and mobility of residual sediments (EPA 2005)."

    The Guidance is a bit less conclusive than the one presented in the text of 7.3.1.5. The closest it comes is this:

    > "In situations where conventional cap designs are not likely to be effective, it may be possible to consider impervious materials (e.g., geomembranes, clay, concrete, steel, or plastic) or reactive materials for the cap design. Where this is done, however, care must be taken such that head increases along the edges of the impervious area do not lead to additional NAPL migration. Project managers are encouraged to draw on the experience of others who have conducted pilot or full scale caps in the presence of NAPL."

    <u>Response</u>: The Response Proposal has been revised to be consistent with the guidance and experience at other sites regarding the use of reactive caps in managing sediments containing oily product.

82. Section 7.5 – Update alternatives.

    <u>Response</u>: The description and evaluation of alternatives for SMA 6 has been revised in Sections 6.5 and 7.5, respectively.

83. 7.5.1.1. It would be helpful if the text provided the rationale for only considering removal of the sediments surrounding the parathion hit in surface sediments in SMA 6. Is it because the concentration is much higher than the PLER or that the area is not conducive to containment?

Response: ***Section 7.5.1.1 has been updated to provide this discussion.***

84. page 103, section 7.4.1.2: this section needs to be reworked consistent with the new ARARs analysis (see above).

Response: ***The Response Proposal text has been revised.***

85. page 108, section 7.5.1.2: this section needs to be reworked consistent with the new ARARs analysis (see above).

Response: ***The Response Proposal text has been revised.***

86. Section 8.1.1, page 113 – The timeframe estimates in the last paragraph may be overstated for MNR. See earlier comments.

Response: ***See response to Comment 71.***

87. 8.1.1. (SMA1, 4/5, and 6). It may just be unclear, but the alternatives for MNR and in-situ containment end their descriptions stating that a monitoring program will be implemented. No such program is mentioned for the removal alternative. However, performance needs to be verified post removal and an appropriate monitoring plan developed. It seems from p. 128 that all actions will be monitored, but that is not clear in section 8.

Response: ***As discussed in Section 8.2, "Monitoring during remediation activities and long-term monitoring are components of all alternatives, and will be detailed in SMA-specific monitoring plans or in the Site-Wide Monitoring Plan." Section 8.1.1 of the Response Proposal has been clarified regarding this point.***

88. page 117, section 8.1.2: this section needs to be reworked consistent with the new ARARs analysis (see above).

Response: ***The Response Proposal has been revised to reflect the updated ARARs analysis. See response to Comment 60.***

89. Section 8.1.4, page 121, SMAs 2 and 3 – Alternative 2 would be expected to have a higher overall effectiveness and permanence than Alternative 1 because of the removal and permanent treatment of product. See general comments above.

Response: ***The Response Proposal has been revised to acknowledge that Alternative 2 would be expected to have a higher overall effectiveness and permanence than Alternative 1 for SMAs 2 and 3.***

90. Section 8.1.5, page 123 – 124

a. 3rd bullet – The general description of reduction of TMV from capping should be modified to include a description of the low permeability or reactive cap's ability to affect this criteria.

Response: ***Consistent with the response to Comment 81, the Response Proposal has been revised to clarify the ability of reactive caps to reduce the mobility of oil product, based on the guidance and experience at other sites.***

b. SMAs 4 and 5 – There is not a lot of evidence to support biodegradation for the MNR discussion.

Response: ***The Response Proposal has been revised to address this comment.***

91. Section 8.1.6, page 125 – Discuss removal constraints relative to the RGIS system, and how that system may influence implementability.

Response: ***Section 8.1.6 has been revised to include a discussion of potential removal constraints to the RGIS.***

92. Figures 3-8A and 3-8B – Given the findings of the product recovery testing, it might be useful to modify these figures. Please consider identifying the TICs on Figure 3-8A. Please consider modifying 3-8B to show contaminant levels in the upper two feet of the core.

Response: ***Product recovery testing results have been added to Section 3.2.3 of the Response Proposal. Please refer to Comment 30d for a TIC discussion. These figures have been consolidated into a single figure.***

93. *Figure 3-16: This figure shows a long wavelength "step" in the bed with an amplitude of ~ 4 ft, superimposed on the smaller-scale bedforms with amplitudes closer to 2 ft.*

Comment: All three of the bed profiles in Figure 3-16 show bedforms with an amplitude of < 2 ft, superimposed on a much longer wavelength feature (0.2 mi) with an amplitude of ~ 4 ft. The bedforms also change markedly on either side of this feature. What is the origin of this step in the bed? Is the bed held up by glacial till above approximate mile 1.85? Has any effort been made to evaluate the long-term stability of this step? Is this reach likely to be particularly susceptible to erosion during a large-magnitude flood event due to the steepening of the bed?

Response: ***The longer wavelength feature in this reach of the river is a natural steepening of the river, as evidenced by the multibeam bathymetry measurements collected in 2007, 2008 and 2009, and is consistent with the change in elevation of the till in this region. The stability of this feature was examined through hydrodynamic and sediment transport modeling of both short-term and longer-term time scales (see Appendix C). Modeling of the September 1986 flood, which approximated a 1-in-50-year flood, indicates changes in***

bed elevation during this event of about +/- 6 inches (on a model grid scale). Modeling of the 10-year period between 1993 and 2002, which represents a period with average flow conditions that approximate the long-term average flow conditions for the river, indicates similar changes in bed elevation over this period.

94. Figure 3-18 – Because there is limited bed pin data in Segment 1, it would be useful to provide figures of the bed pin data from Segment 2.

Response: A discussion of the Segment 2 bed pin data has been included in the revised Response Proposal.

95. Figure 3-37 – The figure title indicates that these are samples greater than PLER values, but the figure shows channel sediments less than the PLER for PAHs. Please clarify – are the values shown for the channel cores the maximum PAH value in the top two feet?

Response: The title for Figure 3-39 (previously Figure 3-37) has been corrected.

96. Figure 4-1 – Please ensure that the title indicates that this is the basis for action CSM.

Response: The title for Figure 4-1 has been changed to indicate that it is the basis for action CSM.

97. *Appendix B1, p. 9,*

    a. *Footnote for 4-nitrophenol: "Neither of these chemicals were detected in the samples used for site-specific sediment toxicity testing so site-specific screening levels are not available for consideration."*

    Comment: It is not valid to exclude analytes detected in site samples on the basis that they were not detected in the 16 sediment toxicity samples.

    Response: The lack of detection in sediment toxicity testing was not the rationale for excluding these chemicals from further analysis; very low frequency of detection in the in-channel sediment samples was the rationale for excluding these chemicals from further consideration, as stated on page 9.

    b. *Footnote for phthalates: "Phthalates are ubiquitous in the environment and were not analyzed in the reference locations. Concentrations were within a factor of 3 for NSR levels and/or ESLBs and the detections were at least an order of magnitude lower than the EPA study on phthalates (Call et al. 2001)."*

    Comment: It is not valid to exclude primary constituents of interest (PCOI) from consideration on the basis that it was not analyzed in reference location sediments.

Response: ***Comment noted, however, the lack of analysis in reference locations was not the rationale for excluding these chemicals from further analysis; the rationale for exclusion are provided in the reviewers comment above.***

c. *Footnote for barium and copper: "Barium and copper were detected at concentrations well below the concentrations observed in site-specific sediment toxicity testing samples designated as PLER for target SCOIs."*

Comment: The 16 sediment toxicity samples are site samples themselves. It is illogical to exclude analytes that are of elevated concentration in these 16 site samples on the basis that they occur at lower concentrations in other site samples. Elevated concentrations in the 16 sediment toxicity samples should result in inclusion of analytes, not their exclusion. Please discuss whether this approach could result in contaminants of elevated concentration being incorrectly excluded from consideration. Furthermore, these 16 samples should have been included in the sediment dataset used to identify SMAs, and it is not clear if they were.

Response: ***No analytes were excluded based on the rational provided in this comment. No toxicity was observed from Barium and Copper at the concentrations in the site-specific sediment toxicity testing, thus concentrations observed at even lower concentrations were reported as non toxic.***

The 16 samples used for site-specific toxicity testing were included in the identification of the SMAs.

98. Appendix B2: Sediment Toxicity Testing and Designation of Site-Specific Sediment Screening Levels

a. 3.1 Risk Zone Terminology, Approach, and Application for Response Proposal

"The risk zone concept is derived from EPA's Contaminated Sediment Management Guidance for Hazardous Waste Sites (2005)."

It is unclear how the risk zone concept is derived from U.S. EPA (2005), which has no discussion of PER or PLER. The statement gives a misleading impression that the PER/PLER approach is in U.S. EPA guidance.

Response:
The concept applied for the Segment 1 Response Proposal is consistent with EPA (2005), as was the intent of the statement provided in Appendix B2. The use of risk zone terms (i.e., PER and PLER) for Segment 1 were similar to those cited in Exponent (2009). The Exponent (2009) document was provided to Dow and DNRE by EPA as an example of an approach used by EPA in Region 5.

The definitions of NSR, PLER, and PER in §3.1, based on consistency of toxicity, are inconsistent with the corresponding definitions in §3.2 and Table B2.3, based on magnitude of reference-normalized responses. Consistency and magnitude are not equivalent or even necessarily coupled.

Response:
These risk zones are provided to inform a process of risk management that is consistent with protecting the health of the benthic community, but we understand that further discussion will occur as part of the separate but concurrent track proposed in response to Comment 7.

b. Figure B2.2A Sediment Toxicity Testing Survival Results for Midge and Amphipod: Actual Values with Average of Split Samples Showing Variability

If the "actual values" are plotted, why is the y-axis labeled "Relative Survival"?

Response: The y-axis label was corrected to show "Survival (%)" values.

c. *Figure B2.2A-B.*

Comment: Based on this figure there was high mortality in some reference sediment toxicity tests, which means that (1) the tests may not be valid if reference mortality was high and (2) site test results should not be normalized to reference mortality. Also, the figure is labeled as showing "relative" mortality, but it is not explained what mortality is relative to.

Response: The Chironomid (midge) and Hyalella (amphipod) survival at the Chippewa reference shown in Figure B2.2A ranged from 80% to 94%. The Chippewa reference samples did not show statistically significant differences from laboratory controls, with only one exception where a Hyalella survival was 0%. For this sample, the laboratory control average survival of 94% was used instead of the Chippewa reference. A footnote was added to Figure B2.2A, B2.3B, and Table B2.1B.

The Chippewa reference location was selected from the sampling of three locations as described in the Sediment Toxicity Work Plan (Dow 2008). Two locations were sampled from the Tittabawassee River and a third sediment sample was collected in the Chippewa River. Of these three samples, the Chippewa sample performed the best and was therefore selected as a conservative reference for use in toxicity testing. The use of the Chippewa reference location is important to show variability among sample survival and growth outside the study area. Risk-management decision-making must take into account the variability known to exist in the system. The fact that Segment 1 survival may exceed some of the Chippewa reference is consistent with the fact that there was limited toxicity seen in the surface samples from Segment 1.

d. *Tables B2.2A and B2.2B in Appendix B2.*

Comment: Information in these tables is not clearly presented. For example the first column is labeled "Location Sample date test," but only lists numbers (1 through 8) or nothing at all. Similarly the table titles indicate that both actual and normalized values are included but there is no indication as to which values are what. These tables need an explanation as to how replicate test results within and between testing laboratories were handled. Additionally, most of the acronyms are not defined.

Response: ***A footnote was added to the footnote section to designate that the labels "Location," "Sample Date," and "Test" are row headers and one can see the locations (e.g., D1, D2, etc.), the sample dates (e.g., 11/2008), and tests (e.g., survival and growth), by following the table from left to right (and each of the corresponding designators are then column headers, wherein the data shown below header D1 is for testing that occurred at D1). The designations of numerals 1-8 are labeled as "Laboratory Replicate Samples," meaning that testing at D1 had 8 laboratory replicates, as shown numbered 1-8.***

There are additional row headers that indicate where the results are "Actual Values" and "Reference Normalized Values" showing both the ERM and GLEC laboratories individually and the datasets combined. Acronyms were provided on the last page of each table in the footnote section.

e. Figures B2.2A and B2.3A

What is the distinction between Chippewa Reference, Chippewa*, and Chippewa River?

Response: ***All Chippewa samples were collected from the same location, but since taken at different times, there was some variability in nomenclature. The Response Proposal was revised to use consistent designations.***

f. Figure B2.3B

Why are Chippewa Reference* and Chippewa River* shown with asterisks along with Chippewa* when only Chippewa* was so designated in previous graphs?

Response: ***See the response to Comment 98e (above).***

g. Figures B2.4A – B2.8 Concentration-Response Curve Graphics for Midge and Amphipod with Risk Zones

The Y-axes should be labeled "% Relative Survival and Growth".

Response: ***The axis label was changed to "% Relative Survival and Growth".***

h. ***Tables B2.4A through B2.8 in Appendix B2.***

Comment: These figures often show that survival and growth were greater than 100%, which seems implausible. If this is due to normalizing Segment 1 sediment testing results to the reference location, then this indicates potential problems with using reference locations that show more toxicity then Segment 1 sediment tests.

Response: See the response to Comment 98c.

99. Appendix B4: SCOI Bioaccumulation Evaluation

a. 2.2 SCOI Concentration in Segment 1 Wild Fish

The species showing PCB detections should be discussed – are the detections scattered among diverse species or are they clustered in one or a few species?

Response: Appendix B4 Figure B4.4D graphically presents the PCB 126 results for carp, catfish, freshwater drum, northern pike, smallmouth bass, and black crappie. Additional description of PCB 126 results in fish is provided in Appendix B4 indicating that detections are scattered among species and locations, including reference locations. Concentrations are not clustered in any one particular species.

b. Table B4.1B SCOIs Detected in Wild Fish from Segment 1: Fillet with Skin

The As tissue concentrations (30.8 – 2430 mg/kg ww) are not credible because they greatly exceed reported lethal adult fish tissue concentrations (Jarvinen and Ankley 1999; Eisler 1994).

Response: The Response Proposal was revised to reflect that arsenic in fish a range of 30.8 – 2,430 µg/kg wet weight.

Total PCBs (sum of Aroclors) should be reported.

Response: Total PCBs were reported along with individual Aroclors.

Eisler, R. 1994. A review of arsenic hazards to plants and animals with emphasis on fishery and wildlife resources. *In*: Arsenic in the Environment, Part II: Human Health and Ecosystem Effects. (ed.: J. Nriagu). John Wiley, New York. pp. 185-259.

Jarvinen, A. and G. Ankley. 1999. Linkage of Effects to Tissue Residues: Development of a Comprehensive Database for Aquatic Organisms Exposed to Inorganic and Organic Chemicals. SETAC Press, Pensacola. 358 p.

c. Table B4.1C SCOIs Detected in Wild Fish from Segment 1: Fillet without Skin

Similar to Table B4.1B, the fish tissue As data are not credible, but for a different reason. The reported maximum As concentration (0.00039 mg/kg ww) is an order of magnitude *less* than the reported minimum (0.00321 mg/kg ww), and the entire range is *less*, by 1 to 2 orders of magnitude, than the reported average As concentration (0.013 mg/kg ww).

Response: All data were revised and units were corrected. All units were reported as µg/kg wet weight.

Total PCBs (sum of Aroclors) should be reported.

Response: Total PCBs were reported along with individual Aroclors.

d. Table B4.2 Chlorobenzene Compounds in Wild Fish from Segment 1 Compared to Risk-Based Screening Values

The source of each of the Wildlife TRVs should be documented.

Response: The source of each of the Wildlife TRVs was documented in the revised Response Proposal.

C. Minor Comments

The following comments would not require revision, but may be worthwhile to address since other comments require document revision.

100. page 3, section 1.1 3rd sentence. Is it appropriate to say that that the proposal "includes" an EE/CA? Wouldn't it be more appropriate to say the proposal "is" an EE/CA?

Response: Comment noted, the text of the Response Proposal was revised to state that the Reponses Proposal is an EE/CA.

101. page 13, 2.2.5, last sentence. Outfall 031 is not clearly apparent on Figure 2-7.

Response: Outfall 031 is now clearly marked on Figure 2-7 in the revised Response Proposal.

102. page 21, 3.2.1, first sentence: Should read "Figures 3-1A and 3-1B show the locations…"

Response: This sentence has been revised to state "Figures 3-1A and 3-1B show the locations…".

103. page 26, 3rd paragraph, first sentence should state "…is presented in Figures 3-7A to 3-7E"

Response: ***This sentence has been revised to state "…is presented in Figures 3-8A to 3-8E" (previously Figures 3-7A to 3-7E).***

104. Page 37, second paragraph – The last sentence refers to the "2020 RCRA License."

Response: ***This sentence has been revised to state "… 2002 RCRA License".***

105. page 48, section 3.5.1, bullet points: refer to Figure 3-4 here.

Response: ***We believe that the figures currently referenced in Section 3.5.1 are more appropriate for showing how the Segment 1 SMAs were identified because Section 3.5.1 outlines the criteria used to identify Segment 1 SMAs, while Figures 3-4A to 3-4F show the vertical distribution of the target SCOI concentrations based on a logarithmic scale.***

106. page 75, section 6.1.1: refer to Figure 3-24 here.

Response: ***Text has been revised to reference Figure 3-26 (previously Figure 3-24), as suggested.***

D. Comments to be addressed during design

107. The footprint of the SMAs will need to be refined during design:

a. Section 3.2.3 SCOI Deposit Characterization, p. 26 – In the first paragraph, the FIELDS Group, using two very different interpolators found consistently larger areas with total chlorobenzene concentrations greater than 100ppm. These areas are larger still when the action level is 33.3ppm, the proposed PLER for total chlorobenzenes. (The FIELDS Group used a Natural Neighbor interpolator and a Minimum Tension Gridding interpolator. The former was via the FIELDS Tools for ArcGIS, the latter via the earth Vision software.)

Response: ***To facilitate a comparison between the FIELDS Group approach and the approach used by Dow, Table 3-9 of the Response Proposal now includes the input parameters Dow used in the 3-D interpolation of the total chlorobenzene sediment concentrations.***

b. 3.5.2. Lateral limits. The designation of several of the SMAs was based on chlorobenzene concentrations. For example, in SMA 2, chlorobenzene concentrations greater than the "conservative screening value of 100 mg/kg" were used for the delineation of SMAs. It's not clear how this value is "conservative". This number will be further evaluated during design.

Response: ***Comment noted. As discussed in Section 3.2.3, any Segment 1 location with a total chlorobenzene concentration of 100 mg/kg or greater corresponded to a***

potential NAPL location, as identified through core log descriptions. Furthermore, sediment concentrations of 1% or 10,000 mg/kg are generally considered to indicate the likely presence of free-phase NAPL. Thus, a concentration of 100 mg/kg or greater, 2 orders of magnitude less than the typical guidance, was used as an initial conservative screening value to delineate the potential extent of NAPL.

c. Section 3.5.2 Lateral and Vertical Delineation of SMAs, p. 48 – The authors propose that the potential SMA boundaries may be modified, e.g., larger or smaller, based on further sampling. This is supported by the Agencies.

Response: Comment noted.

108. Because the product recovery investigation was a very quick screening tool, additional confirmation that recoverable product is not present at SMAs 4 and 5 will necessary during design. Also, work may be necessary at SMAs 2, 3, and/or 6 to support optimal system design, should product recovery be an element of the selected response option.

Response: Dow recognizes that additional product removal testing and delineation will be required during the remedial design phase.

109. Cap Design – The report discusses thicknesses and composition for sub-aqueous caps. The design specifications are preliminary and for the purposes of comparing alternatives. If a cap is selected as a part of the response options, a more rigorous cap design analysis will be required, including design of appropriate cap layers.

Response: Comment noted. If capping is selected as part of a response action, detailed cap designs would be performed in accordance with EPA guidance during the remedial design phase.