Charge to the Peer Reviewers of "Sediment Toxicity Identification (TIE) Phases I, II and III Guidance Document"

This document was developed by EPA's Atlantic Ecology Division and Mid-Continent Ecology Division. Its objective is to provide guidance on the performance of sediment TIE for both interstitial water and whole sediments in marine and freshwater environments.

Background:

Sediment contamination in the United States has been amply documented and, in order to comply with the 1972 Clean Water Act, the U.S. Environmental Protection Agency must address the issue of toxic sediments. Contaminated sediments from a number of freshwater and marine sites have demonstrated acute and/or chronic toxicity to a variety of test species, as well as adverse ecological effects such as population declines and changes in community structure. However, simply knowing that a sediment is toxic has limited use. This document provides guidance on the performance of sediment Toxicity Identification and Evaluation (TIE). TIE methods allow for the identification of toxic chemicals or chemical classes causing observed toxicity. The identification of pollutants responsible for toxicity of contaminated sediments has a broad application in a number of EPA programs as the methods can be used within a total maximum daily load (TMDL) framework, to link sediment toxicity to specific dischargers, to design cost-effective remediation programs, and to identify environmentally protective options for dredged material disposal. In addition, the identification of specific problem contaminants in sediments could prove to be very useful to EPA programs involved in the development of water or sediment guidelines, and the registration of new products such as pesticides. Finally, knowledge of the causes of toxicity that influence ecological changes such as community structure would be useful in performing ecological risk assessments not only for the Agency but also for the scientific community as a whole.

Charge:

In your review, please provide written responses to the following questions. Additional comments and recommendations for improving the document are welcome.

Overall I thought the document was extremely well written. Having been involved in being involved in the development and publication of EPA technical manuals I know it is not easy to strike the right balance between "readability" and accurately outlining the technical approach needed to run the tests. This document does an excellent job in this respect. I do have some specific comments that I have provided in a marked up version. I did not review for spelling, etc. as I assume a technical editor will pick these things up prior to publication.

Overall questions:

1) Are the concepts and assumptions laid out in the document sufficiently developed and clearly articulated? If you identify deficiencies, please recommend ways to remedy them.

Response: I believe the concepts and assumptions described in the manual have been sufficiently developed and clearly articulated. It is clearly stated that this document does not provide a roadmap that can and should be used in all cases. It provides well articulated procedures while allowing for reasoning and creativity of the investigator.

2) Are the scientific bases for the manipulations conceptually sound/valid?

Response: I believe that they are. Although the manipulation of sediment is a very tricky and difficult process the approaches outlined have been tested and shown to be effective and valid.

3) Are the methods and logic clearly explained and scientifically justified? Please indicate any modifications that would improve upon the methodology.

Response: The methods are clearly explained and based on sound scientific principles. It does allow for creativity of the investigator, which could in turn make reproducibility a concern. Maybe the document could recommend the users document deviations in the procedures and if those prove useful they could be used in future revisions to the manual.

Sections 1-5: *Introduction; Health and Safety; Quality Assurance; Equipment, Supplies and Facilities; Statistical Methods*

Do these series of brief sections provide an acceptable opening to the document and provide the reader with sufficient preliminary information for understanding the material that follows? What specific additions or deletions to this section would you suggest?

Response: I do believe the series of brief sections provide an acceptable opening to the document and provide the reader with sufficient preliminary information for understanding the material that follows. However, I do recommend some changes.

Section 1: Delete section 1.4. Most of this information could be moved to the introduction, while a couple of sentences could be deleted. Please see the marked up copy for further clarification.

Section 2: I would recommend adding text from the freshwater toxicity manual (EPA/600/R-99/064). Specifically, sections: 5.1.3, 5.1.4, 5.2, 5.3, 5.4, and 5.5.

Section 3: I believe more needs to be added to section 3.7 with regard to "a more detailed quality control program is required."

Section 4: I would delete this section entirely and add an equipment list as an appendix. Then, some of the text in this section could be moved there to set up the list.

Section 5: One thought in this section is to add an example. Use some actual data and run it through the appropriate statistics.

Section 6: *Designing the TIE approach*

Does this section describe the differences between interstitial and whole sediment TIEs and contain logic for which approach to use, and how the approaches can be combined to help the researcher identify the cause of toxicity?
Response: This section does describe the differences between interstitial and whole sediment TIEs. I also believe this section does contain the logic for choosing the best approach. I do believe that "how the approaches can be combined to help the researcher identify the cause of toxicity" can be enhanced. It gets lost in section 6.2.2 and could be its own subsection (6.2.2.1). Not sure how the rest of the section would flow, but highlighting this and adding additional text on why this can be beneficial would be useful.

Is this section internally consistent with the other sections?
Response: I thin this section is internally consistent with the other sections.

Some additional comments on section 6: Section 6.1, defining the question, is very well written. Studies often lose site of the question you are trying to answer as well as the data quality objectives. I believe that in Table 6-1 you should just focus on one species and not two. The purpose of the table is to show that IW tests and sediment tests do not always match up. But, by showing it for two species you also show the variability due to species sensitivity. In the IW tests it shows a 93% survival in one species and a 0% with the other. I think this detracts from the message you are trying to get across.

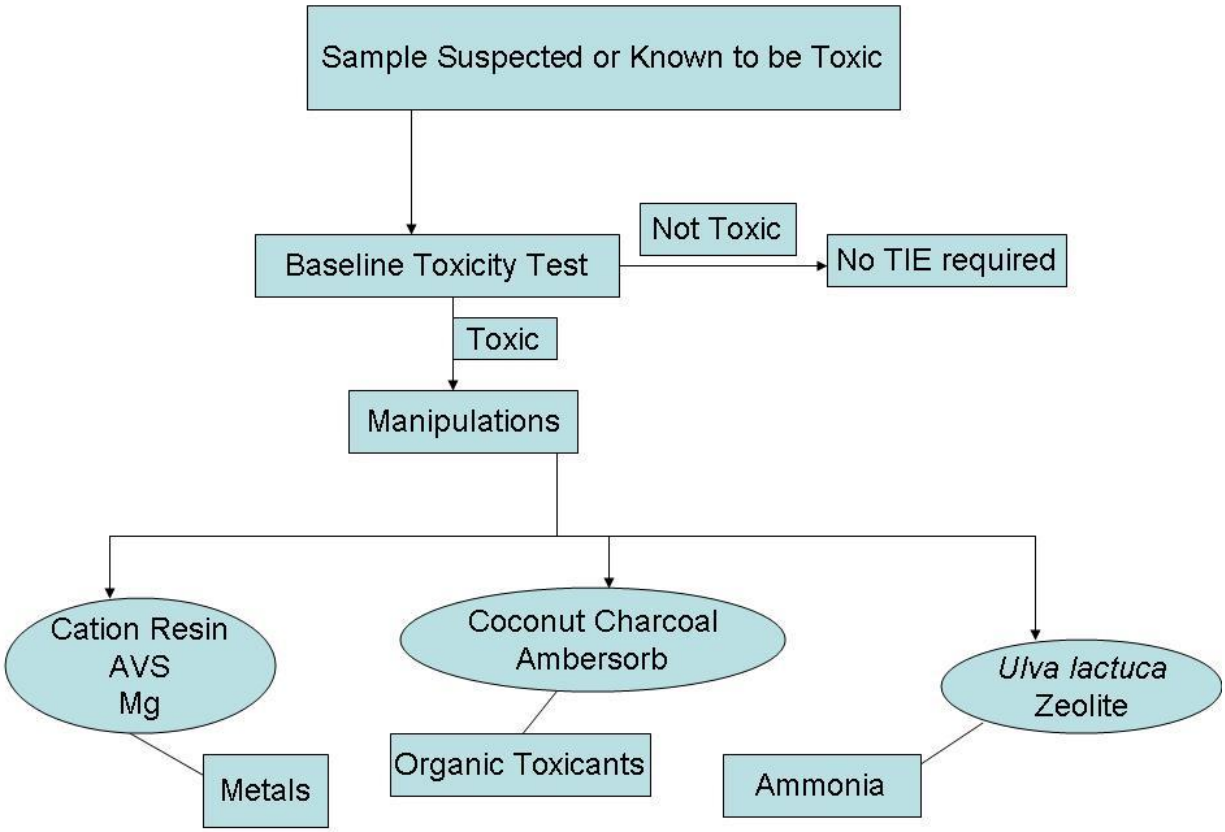
Section 7: *Phase I Overview and Methods: Whole Sediments*

Does this section clearly explain the Phase I methods we have developed for whole sediments?

Is this section internally consistent with the other sections?

Are there other methods that should be referenced in this section?

Some additional comments on Section 7: At the beginning of this section there is a flow diagram that is inconsistent with the approach outlined in the text. In this diagram it suggests running the baseline toxicity test *concurrently* with the manipulations. It is recommended to establish toxicity prior to any manipulations as it is possible the sample may not be toxic. I would recommend modifying the diagrams like this:



Section 8: *Phase I Overview Methods Interstitial Waters*

Does this section clearly explain the Phase I methods we have developed for interstitial waters?
Response: I believe this section does clearly explain the Phase I methods we have developed for interstitial waters.

Is this section internally consistent with the other sections?
Response: I believe this section is internally consistent with the other sections.

Are there other methods that should be referenced in this section?
Response: I can think of no other methods that should be referenced in this section.

Section 9: *Phase II Sediment TIE Methods*

Does this section clearly explain the Phase II methods we have developed for whole sediments and interstitial waters?

Does the section explain how procedures performed in the different manipulations can be supportive of the identification of the toxicant?

Is this section internally consistent with the other sections?

Are there other methods that should be referenced in this section?

Section 10: *Phase III Sediment TIE Methods*

Does this section clearly explain the Phase III methods we have developed for whole sediments and interstitial waters?

Does the section explain how procedures performed in the different manipulations can be supportive of the final identification of the toxicant?

Is this section internally consistent with the other sections?

Are there other methods that should be referenced in this section?

Please provide your written comments to me no later than **September 25, 2006.** Comments may be sent by regular mail to the address below, by Fax, or by e-mail to houk.virginia@epa.gov.

If you have any questions concerning the draft document or the charge, please contact me at 919.541.2815 or houk.virginia@epa.gov. We sincerely thank you for your input to our peer review process.

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