

Review of Sediment Toxicity Identification Evaluation (TIE) Phases I, II, and III Guidance Document (Ho et. al.)

Overall Comments:

1. This document is a much-needed guidance that clearly took a tremendous amount of work. It will provide useful and much needed guidance to support the inclusion of TIEs in monitoring and regulatory programs. This document differs in style from other EPA guidance documents in that the authors have attempted to convey the thought process used in evaluating the data and planning the tests, in addition to the describing the methods. This style is appropriate, as TIEs must be adaptable to the specific situation, but it also adds complexity to the writing. Careful editing of the document is needed in order to distinguish specific method descriptions from more general discussion of potential confounding factors and alternatives.
2. The document is in need of thorough editing before release. There are inconsistencies in formatting (e.g., use of subheading numbers), misspellings, and variable writing styles that detract from the value of the information presented. Several smaller sections do not convey a clear message or purpose; the authors provide a lot of discussion of pros and cons without making a clear recommendation. It is difficult to distinguish the breaks between multiple paragraphs within a section; an alternate layout that emphasizes these breaks will make it easier to use the document.
3. The numbering structure leaves the information regarding individual manipulations buried at a low level of organization. This will make it difficult to use the document as a reference. An index might be a very valuable tool for the reader. Especially since some manipulations are mentioned in multiple sections.
4. There are many places where information from labs other than those of the authors would fill in what appear to be knowledge gaps. The document is intended to have national applicability and more information is needed on species and techniques used in other parts of the country.
5. The reference section needs a lot of work. In many cases where there are multiple publications by the same author, in the same year, the lettering sequence is not correct. There are a few citations in the text missing from the reference list. The in text format for listing multiple references is not consistent throughout the document.

Response to Questions:

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.

In a few cases, the concepts are not adequately developed and explained. A couple of examples are the Interlaboratory Communication (3.4) section and the Phase II Approaches When No Phase I Manipulations Affect Toxicity (9.7). There are other cases as well. There are many places in the document that need to be more clearly articulated. There are many overly complex sentences that are difficult to follow. There is a certain “chatty” style to some of the sections that include the use of contractions, which may diminish the reader’s perception of the technical foundation of the recommendations.

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

The science behind the manipulations is very sound and valid.

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

See question #1.

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?

For the most part these sections serve their purpose. I think that better references could be used to cite the documentation of sediment contamination in the U.S. in the introduction. In the variability section, more should be done than listing caveats of things that may affect results from long sediment storage. What are the effects and how can they be identified as a problem? As stated earlier, section 3.4 is problematic. This section is disjointed and does not clearly state a problem or a solution. Last sentences in section 3.6 are unclear. Are reference toxicant chemicals to be changed from what is normally used if the toxicants of the sample are known? Section 3.7 needs some background as to what types of interferences are of concern and how to address them.

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?

This section does a good job of explaining the differences. The table of species (Table 6-2) could benefit from contacting other agencies who conduct TIEs; there are additional species/test combinations that can be filled in. For example, *E. estuarius* has been used for interstitial water and whole sediment TIEs and *S. purpuratus* has been used for interstitial water TIEs. It is unclear what the numbers in the Cited Method column in Table 6-2 refer to.

Is this section internally consistent with the other sections?

Yes.

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

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

There is a lack of clarity in some of the subsections. The first sentence of the last paragraph on page 22 is an example of an overly complex sentence structure that occurs throughout the document. Using two concise sentences instead of one convoluted one would be much more effective.

Section 7.1.1 needs some introductory sentences explaining the methodology is only for the mysid/amphipod combination. There are plenty of other marine tests available, as evidenced by the previous section. In section 7.1.2 a lot of words are expended on the Benoit exposure method, but it is difficult to visualize the set-up; maybe a diagram would help. The Zumwalt method is only mentioned with no description, yet an analysis of the pros and cons of the two methods is presented. After reading the pros and cons, I think I would choose Zumwalt, but have no information on how to proceed. There is a lot of discussion of pH and effects on ammonia, however adjusting pH is dismissed as a viable method for whole sediment. Therefore, the pH issue does not need much discussion here. It would be better suited in IW section.

Is this section internally consistent with the other sections?

There are sub-sub sections in Section 7.2 that do not have section numbers.

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

There are two other methods that should be mentioned. PBO has been successfully added to overlying water to reduce toxicity associated with organophosphorus pesticides. Carboxylesterase has been successfully added to overlying water to reduce toxicity associated with pyrethroid pesticides.

There is another method that should be modified. There is a lot time spent on Ambersorb, however none of these products are still commercially available. Alternate sorbants should be investigated.

Section 8: *Phase I Overview Methods Interstitial Waters*

Does this section clearly explain the Phase I methods we have developed for interstitial waters?

This section is particularly light on information regarding West Coast species. This information (e.g. sample volume requirements and relative sensitivities to manipulations) is available from West Coast sources. If this document is to be for the use of the entire country, West and Gulf Coast experts should be consulted to fill in information gaps. For example, 60 mg/L EDTA is not well tolerated by *Mytilus galloprovincialis*.

Is this section internally consistent with the other sections?

This section is particularly lax in grammar and usage. There are contractions used in several locations.

Figure 8-1 should be modified to remove the filtration test to be consistent with the recommendations in the text.

Add information to Table 8-1 regarding volume requirements for Pacific Coast species. Add information to Table 8-2 for Pacific Coast species.

8.3.5.2. Method section should caution that use of laboratory film may remove organic toxicants from the sample and thus confound the results.

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

There are two other methods that should be mentioned. PBO has been successfully added to IW to reduce toxicity associated with organophosphorus pesticides. Carboxylesterase has been successfully added to water to reduce toxicity associated with pyrethroid pesticides; not sure if it has been tried specifically in pore water.

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?

This section reads well for the most part. The next to last paragraph in section 9.2.6 (starts “In a series of experiments...”) is very difficult to follow. It would be good to add flow rates to the column elution sections.

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

The only section that does not do this well is 9.7. A very clear connection needs to be made between the suggested methods the questions they are to answer.

Is this section internally consistent with the other sections?

Section 9.7 is not internally consistent in style with the rest of section 9. It has a very “chatty” style with again the appearance of contractions.

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

This section seems to cover the available methods well.

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?

The early parts of this section contain some very complex, hard to follow sentences (e.g. last sentence, next to last paragraph section 10.1), but otherwise does a good job.

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

Yes. This section does a good job of explaining that standardized confirmation procedures cannot be state explicitly and that the application of good professional judgment is essential.

Is this section internally consistent with the other sections?

Yes.

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

No.