

**Summary Minutes of the USEPA
Science Advisory Board
Public Conference Call Meeting on the Draft Report
Review of EPA's Draft Framework for Inorganic Metals Risk Assessment
Monday, November 7, 2005
1:00 pm – 3:00 pm (Eastern Time)
Meeting Location: Via Telephone Only**

Purpose of the Meeting: The Meeting was held to allow for the Chartered SAB to review and approve the subject draft report. The Federal Register announcement for the meeting is in Attachment A (see physical file).

Members Participating in the Meeting:

Dr. M. Granger Morgan, Chair
Dr. James Bus
Dr. Trudy Ann Cameron
Dr. Deborah Cory-Slechta
Dr. Virginia Dale
Dr. Kenneth Dickson
Dr. A. Myrick Freeman
Dr. Rogene Henderson
Dr. James H. Johnson
Dr. Catherine Kling
Dr. Jill Lipoti
Dr. Genevieve Matanoski
Dr. Michael J. McFarland
Dr. Deborah Swackhamer
Dr. Thomas L. Theis
Dr. Lauren Zeise

Others Participating in the Meeting:

SAB Staff: Thomas Armitage, DFO; Tom Miller, DFO, Dr. Vanessa Vu, Director, Dr. Tony Maciorowski (Special Assistant to the Director)

EPA Staff and Contractors: Randy Wentsel, Anne Fairbrother, Erin Koch, David Bottimore and others not specified

Public Commenters: Ms. Debra Littleton, DOE; Dr. William Adams, NMC

Public: Jane Luxton, Margaret McDonnell, Jeremy Brewer, J. E. Arnett, Lindsay Ott, Ann Smith-Reiser, Richard Frankel (GAO)

MEETING SUMMARY

Monday, November 7, 2005

Mr. Thomas Miller, SAB Designated Federal Officer, convened the meeting and identified those on the call. He noted that: 1) the meeting was an official meeting of the Chartered Science Advisory Board, chaired by Dr. Granger Morgan; 2) the meeting complies with requirements of the FACA and EPA policy for expert advisory committees; and 3) the SAB members participating in this meeting had submitted updates to their confidential statements of financial interest and the Deputy Ethics Official for the SAB Staff Office had determined that Members do not have “conflict of interest” or “appearance of impartiality” issues within the meaning of the relevant ethics and conflict of interest requirements that apply to this advisory issue.

Mr. Miller stated that Member’s responsibilities during this meeting were to evaluate the draft SAB Panel report and decide whether the report:

- a) adequately addressed the Agency charge questions;
- b) is clear and logical; and
- c) any conclusions drawn or recommendations made are supported by the body of the Panel’s report.

Members were also asked to be sensitive to errors and omissions in the draft report but are not to repeat the expert evaluation work done by the expert panel that drafted the report under consideration.

Mr. Miller noted that SAB proceedings provide an opportunity for public observation and participation and that participation can be by providing written comments to the SAB or by making short oral statements during the public meeting. The SAB publication “*Advisory Committee Meetings and Report Development: Process for Public Involvement*,” available on the SAB Website at http://www.epa.gov/sab/pdf/sabso_04_001.pdf, provides detailed information on how this is accomplished. Mr. Miller noted that for today’s meeting, two members from the interested public had asked for and been granted time on the agenda to make a brief oral statements. Both have provided written comments to explain their views and that these comments, as well as those made in writing by EPA were on the SAB Website.

Mr. Miller then turned the meeting over to the SAB Chair, Dr. Granger Morgan to carry out the agenda.

Dr. Morgan summarized the items that were to be on the agenda for the meeting and the intent of the meeting (see Attachment B). He explained the enhancements made by the SAB to its report review process. He stated that the report to be reviewed was the *REVIEW OF EPA’S DRAFT FRAMEWORK FOR INORGANIC METALS RISK ASSESSMENT* and that the Board’s task was to decide if it is ready for approval.

Dr. Morgan introduced the first Public Commenter, Dr. William Adams of the National Metals Council. Dr. Adams highlighted four of the points that are made in his written comments

to the SAB on the Panel's draft report. These comments are included in Attachment C to these minutes.

Dr. Morgan introduced Ms. Debra Littleton, US Department of Energy to make her oral statement. Ms. Littleton highlighted several points from her written comments to the SAB on the Panel's draft report. These comments are also included in Attachment C to these minutes.

Dr. Morgan asked if others wished to make an oral statement. No other persons requested time to do so.

Dr. Morgan introduced Dr. Deborah Swackhamer, Chair of the SAB Metals Risk Assessment Framework Review Panel. Dr. Swackhamer discussed the steps taken by the review panel to evaluate and develop advice on the EPA framework. She noted that the document was developed by EPA in cooperation with many others, and over a substantial period of time. The document is unique in that it is based on three White Papers developed by EPA and that the Panel's review included an evaluation and detailed discussion of these White Papers as well as the Framework document.

Dr. Morgan asked the Lead Reviewers to summarize their main comments (see Attachment D for detailed comments from the Lead Reviewers and Board members). The draft SAB report is in Attachment E to these minutes. Main points made by the Lead Reviewers included:

- a) **Dr. James Bus** complimented the report's thorough and clear recommendations to the Agency for future revisions; its responsiveness to the charge; and the consistency of the letter to the Administrator with points raised in the body of the report. He noted that the way recommendations were divided into short and long term categories was a bit confusing given that the report noted that they were all important. The report is a bit confusing in the way it handles research recommendations.
- b) **Dr. Deborah Cory-Shlechta** also complimented the Panel on its job. She noted that the amount of redundancy in the text made the document overly long and it might be condensed. She noted that the comment on juxtaposition of Sections 3 and 4 of the framework did not make it clear whether the Panel was recommending the two be integrated or how it might be improved.
- c) **Dr. Ken Dickson** remarked on the very large task that was given (18 charge questions) to the Panel and the complexity of the questions that made the task very difficult. He complimented the Panel on how it had responded. He suggested that the larger message might be that charges need to be simplified in the future to make the task more reasonable for panels to answer within the time available. He also agreed that the letter to the Administrator was well done.
- d) **Dr. Lauren Zeise** agreed to the "Herculean" nature of the task given to the Panel and their response. She noted how complicated the task given to the Panel was and the significant detail in the report. She suggested that parts of the letter to the Administrator might be more negative than the contents of several portions of the body of the report.

She was concerned with the level of detail in the report and its numerous directive recommendations for changes to the framework document. She noted that many recommendations might be amenable to placing in an Appendix and being relabeled as suggested changes. She was concerned that some of the wording changes might actually constitute changes in conventions in use of terms, especially with respect to other reports. She noted that all the recommendations seem doable, but that they do imply much work for the agency and that the report should make it clear that some are appropriate for proceeding on after the framework itself is completed, while others need to be accomplished in the revision of the framework.

Dr. Swackhamer responded to the points made by the Lead Reviewers. Her responses included:

a) **Short-Term vs. Long-Term Recommendations:** The Panel struggled with this and divided it into short- vs. long-term tasks in response to EPA's desire to have the Panel suggest what items should have the highest priority. She noted that the time-linked recommendations reflect the Panel's opinion that all items were of a high priority and their lack of consensus on which might be more or less important. Thus, they divided them in this way. She agreed that explaining this in the Panel's report would help make the recommendations more clear.

b) **Research Recommendations:** The recommendation on this issue reflects that in the EPA document, their handling of research items was incomplete. The Panel favored a separate document that would deal with research needs across all issues and not just some.

c) **Redundancy:** The Panel struggled with that issue. They first tried to summarize the main points in the Executive Summary; however, that led to an Executive Summary of some 25 pages in length. As a result they rewrote the summary with the highlights only and then added the recommendations to the end of each chapter of the report as appropriate so that the Agency could be clear on where they fit. This causes the redundancy. In this, they also recognized the separate audiences for the various parts of the report (letter is for the Administrator; Executive Summary is for managers; and the body of the report with the details is for Agency staff involved in the framework).

d) **Section 3 vs Section 4 of the Framework:** The Panel chose not to recommend integrating Sections 3 and 4 of the framework because of their expectation of the astonishing difficulty that doing so would present to EPA. Instead, the Panel thought it would be adequate to cross reference the points in Section 3 with the information in Section 4 and also to ensure that discussion of each topic was in the same order in both sections.

e) **Non-linear Dose-Response:** The Panel recognized the issue and it is discussed in the report. She will try to highlight it better.

f) **Human Health Section Problems:** The Panel thought that the White Paper that the framework's human health section was based upon was unbelievably inadequate. The

Panel recognized that the agency was not going to rewrite the White Paper so they wanted to ask for extensive rewrites by adding significant detail to the framework's health section.

g) **Panel Comments are Too Directive:** The Panel was concerned with the vague definitions in the document. The Panel thinks that clear terminology is important to understanding and using the framework. The Panel discussed the terms extensively and for many they suggested specific language to define some of the terms (bioaccumulation, accumulation).

Lead Reviewers were satisfied with the responses from Dr. Swackhamer in relation to the questions they raised (with some limited reservation on Dr. Zeise's part on human health.

Other members of the Board provided written comments, and several highlighted parts of their comments that they felt needed to be addressed in the meeting.

a) **Dr. Thomas Theis** felt very strongly that the draft panel report was too long, too prescriptive and too confusing. The Panel overused the word "Recommend" and that he believed that the length of the document reflected the inclusion of too many recommendations. Dr. Theis strongly suggested a rewrite especially in the areas where the Panel's advice essentially "rewrote" parts of the framework document. He recommended that the task of rewriting and clarification should be left to the Agency.

b) **Dr. Rogene Henderson** noted her agreement with health section comments made by Dr. Zeise. She also believes that the draft report is too prescriptive.

c) **Dr. James Johnson** noted the document's lack of certainty on discussing organo-metals. First it stated that it would not, but in the document organo-metals were discussed. He agreed to send in several points in writing after the meeting.

Dr. Morgan asked EPA representatives if they had any comments. Dr. Randy Wentsel and Dr. Anne Fairbrother thanked the SAB for its work in reviewing the framework. He discussed the history of EPA's development of the framework which began in 2002. The approach was broad and had many participants. In response to Dr. Morgan's question of the difficulty that might be presented to EPA if the final framework is delayed, Dr. Wentsel stated that there are some science policy issues in metals risk assessment that EPA needs to decide upon. Delay in finishing the framework would likely delay those risk assessments. Dr. Wentsel's comments summarized the points made in Dr. William Wood's memo to the Board (see Attachment F). Dr. Fairbrother noted that the Board's suggestion of creating an Appendix and labeling many of the items as suggestions would help EPA to determine where it should go with completing the framework in the short term.

Dr. Vu added background information on the framework noting that one of the issues in the framework's development was whether to do a separate framework document and a separate document giving practical guidance. The agency decided to do one document that would provide both a framework and practical guidance. This contributes to the "dual" nature of the document reviewed by the Panel. She stated that EPA is keen to move the framework forward. She confirmed that the Metals Framework Action Plan had been reviewed by the SAB earlier.

Dr. Morgan summarized the sense of the meeting noting that the Board's comments had not highlighted much in the way of technical difficulties with the draft SAB report. Most issues seem to be structural recommendations (e.g., create an Appendix; re-label many of the comments as suggestions instead of recommendations). He noted that an enormous amount of work had already been accomplished by the Panel and suggested that too much additional work might make the "perfect the enemy of the good."

Dr. Swackhamer stated that the idea of an Appendix and calling many of the recommendations suggestions could help to improve the draft document. She was not clear about the issue of being over or under-prescriptive as both positions had been advocated for in the meeting (by the Board and the Agency). She also believes that further work on the BAF/BCF ratio issue would be beyond the scope of the Panel's charge. Much additional work and material would be needed to do more here.

Dr. Theis questioned the statement that the Panel thought all the recommendations were equally important. Dr. Swackhamer clarified that the Panel may not believe all to be equal but that the choice of doing a time-dependent (i.e., short term vs long term breakout) in response to the request to prioritize the recommendations reflected the Panel's inability to come to consensus on a prioritization based on importance.

Drs. Zeise and Matanoski asked for clarification on the health sections deficiencies. Was it a case of outdated literature used by EPA or a case of not reflecting the latest knowledge. Dr. Swackhamer noted that the Panel's comments reflected the Health experts opinion that the underlying White Paper was absolutely unacceptable because it did not reflect an up to date understanding of the field. The draft report can be clarified to say that the problem is missing knowledge not just missing literature.

A motion was made and seconded in regard to the draft report. The motion was that:

The draft report is approved conditional on edits discussed here, and in the written comments, be used to guide edits to the draft SAB report. It will be up to the Panel Chair, Dr. Swackhamer, to determine if any of the edits require that the Panel be involved in the editing process. The edits will be reviewed by the Lead Reviewers (Drs. Bus, Cory-Shlecht, Dickson, and Zeise), as well as Drs. Henderson and Theis) and the report will be delivered to the Agency when they agree that the draft has met the conditions of the Board's approval.

Dr. Morgan called the motion to a vote and it passed unanimously with no dissent being recorded.

In closing, Dr. Morgan reminded Members of the need to follow up on the Board's directions at its September meeting to prepare and submit project proposals on several Board-identified projects. These will be discussed at the SAB meeting on the afternoon of December 14, 2005.

The meeting was adjourned by the Designated Federal Officer.

Respectfully Submitted:

/ Signed /

Thomas O. Miller
Designated Federal Officer
US EPA Science Advisory Board

Certified as True:

/ Signed /

Dr. M. Granger Morgan
Chair, EPA Science Advisory Board

Attachments:

- A FR Announcement (in physical file only)
- B Meeting Agenda (in physical file only)
- C Public Comments on the Draft SAB Metals RA Framework Report
- D Board Member Comments on the Draft Metals Report
- E *Review of EPA's Draft Framework for Inorganic Metals Risk Assessment* (in physical file only)
- F Draft Metals Assessment Framework Panel Review Letter, Dr. Woods, 11/3/2005

ATTACHMENT C

Public Comments on the Draft SAB Metals RA Framework Report

1. Comments of the National Metals Council -- Dr. William Adams

October 31, 2005

VIA E-Mail: Miller.tom@epa.gov

Mr. Tom Miller

Designated Federal Officer

EPA Science Advisory Board

1200 Pennsylvania Avenue, NW

Washington, DC 20460

Re: Comments on SAB Draft Report (9/15/05) on EPA's Draft Framework for Inorganic Metals Risk Assessment

Dear Mr. Miller:

The North American Metals Council ("NAMC") appreciates the opportunity to provide comments on the September 15, 2005, Draft Report prepared by the Science Advisory Board ("SAB") on EPA's Draft Framework for Inorganic Metals Risk Assessment. The SAB's Draft Report will be considered at the SAB teleconference on November 7, 2005, see 70 Fed. Reg. 60338 (October 17, 2005). NAMC is an unincorporated group of 30 metals-producing and-using associations and companies that focuses on science and policy-based issues that affect metals in a generic way. Its members include representatives of a broad cross-section of metals industries that have a strong interest in the scientific issues that are presented in the draft Framework.

NAMC has been actively involved in the issues that are the subject of the ongoing SAB review and submitted written and oral comments to the SAB panel during its deliberations. Our comments consist of the points made directly below in the text of this letter, briefly addressing specific points raised by the SAB Draft Report, as follows:

SAB Draft Report

Executive Summary: *Use of the term "Bioaccumulation" versus "Accumulation" to Describe Metals Concentrations.....* "The SAB believes it important to recognize that some metals do bioaccumulate in the tissues of humans and that this bioaccumulation is related to their toxicity."

NAMC Comment:

The statement above does not clearly distinguish bioaccumulation and toxicity as separate concepts for assessment; nor does it reflect the fact that bioaccumulation/accumulation can occur in some organs without concomitant effects. If this point is retained, the emphasis should be changed from "bioaccumulation is related to toxicity" to "*toxicity is related to bioaccumulation.*"

NAMC recommends the following clarifications:

- The above statement should be changed to read: "*The SAB believes it important to recognize that some metals do bioaccumulate in the tissues of humans and that toxicity may occur when effects thresholds at the site of action are exceeded.*"

NAMC further notes that the SAB Draft Report as well as the EPA Draft Framework do not point out the absence of scientifically reviewed approaches for measuring or assessing the significance of bioaccumulation in humans. In the absence of such approaches, the use of bioaccumulation in humans to prioritize the need for further assessment or regulation of metals and other substances in commerce is problematic.

NAMC recommends the following change in the same section of the report:

- To the new sentence above we recommend adding: “*Scientifically recognized approaches for measuring or assessing the significance of bioaccumulation in humans have not been developed to date.*” It would now read in its entirety, “The SAB believes it important to recognize that some metals do bioaccumulate in the tissues of humans and that toxicity may occur when effects thresholds at the site of action are exceeded. Scientifically recognized approaches for measuring or assessing the significance of bioaccumulation in humans have not been developed to date.”
- Similar changes to the discussion in section 5, page 8 should also be included.

SAB Draft Report

Executive Summary: Definition of the term “Bioaccumulation.” The Draft Report proposes to define this term (with the italicized portion as a proposed addition) as: “The net accumulation of a metal in a tissue of interest or the whole organism that results from exposure to all environmental sources, including air, water, solid phases (i.e., soil, sediment) and diet, *and that represents a net mass balance between uptake and elimination of the metal.*”

NAMC Comment:

The phrase “net mass balance between uptake and elimination of the metal” is potentially confusing. The intent of the proposed definition appears to be focused on an increase in the steady-state body burden of a metal as a result of uptake exceeding elimination of the metal. The phrase “net mass balance” conveys equilibrium rather than an increase. NAMC recommends that the SAB revise this definition to express more clearly what is intended -- or delete it.

SAB Draft Report

Section 5, page 5 now reads: “The discussion of simultaneously extracted metals – acid volatile sulfides (SEM-AVS) does not adequately address the limitations of the approach (e.g., bioavailability from oxidized sediments). Similarly, discussions of the biotic ligand model (BLM) do not adequately describe its limitations or the early stage of BLM development. Finally, other approaches such as the National Oceanic and Atmospheric Administration’s (NOAA) empirically-derived effects range median (ERM) and effects range low (ERL) approach (Long & Morgan, 1990; 1991) should be included in the discussions.”

NAMC Comment:

NAMC agrees that the Framework should address limitations of the SEM-AVS approach, especially its application to oxidized sediments. At the same time, it is important to note that extensive research has been supported by the metals industry on copper, zinc and nickel the past three years to address this issue with more than 200 chronic sediment toxicity tests being performed. This work is making its way into the peer reviewed literature. The intent has been to develop a basis for assessing bioavailability of metals in oxidized sediments as well as anaerobic sediments where sulfide chemistry dominates.

NAMC has serious reservations about recommending the approach of Long and Morgan as an overarching recommendation to EPA. The methodology of Long and Morgan is not metals-specific, does not consider bioavailability and cannot ascribe effects to a given substance. We believe the Agency should be encouraged to develop metal-specific methods for sediment assessment. Approaches such as that of Long and Morgan may have utility as an interim approach for national assessments, but their significant limitations should be noted.

NAMC recommends the following change to the above sentence:

- “The discussion of simultaneously extracted metals – acid volatile sulfides (SEM-AVS) does not adequately address the limitations of the approach (e.g., bioavailability from oxidized sediments). Similarly, discussions of the biotic ligand model (BLM) do not adequately describe its limitations or the early stage of BLM development. Finally, *other approaches based on empirically-derived effects thresholds, with their strengths and limitations, should be included* in the discussions.”

SAB Draft Report

Section 6.3.14.1, page 72, now reads: “The BLM is in the relatively early stages of development and also has inherent limits. For example, the BLM: 1) has no dietary component; 2) has no chronic component; and 3) has no cross-species comparisons among differing mechanisms for binding and effects-level metal concentrations.”

NAMC Comment:

To assist with the accuracy of the SAB review, NAMC points out that chronic BLMs have been developed and published for zinc and copper for algae (*Selenastrum* sp.), fathead minnows and *Daphnia magna*. The model is nearing completion for the same species for nickel and is under development for cadmium, silver, aluminum and cobalt. Since the development of this approach in the early 1990s the BLM has advanced significantly and characterizing it as in early development is not entirely accurate. It is true that a dietary component has not been built into the approach, but cross-species comparisons with differing mechanisms have been done and continue to be done. Further, chronic BLMs exist as noted above. (Literature citations for the above referenced chronic BLMs can be provided.) We recommend that the statement in section 6.3.14.1 be revised to reflect these points.

SAB Draft Report

Section 6.3.14.1, page 73 now reads: “For risk assessments of a broader nature, e.g., at the national level, clearly the only viable approach to be implemented may be through the assessment of bulk sediment numbers.”

NAMC Comment

It is recommended that the above recommendation be modified to reflect the developing state of the science. National risk assessments have recently been completed in Europe for zinc, copper and nickel. These are the most comprehensive assessments for metals to date and, to a large degree, they have not relied upon the use of bulk sediment numbers. Rather, specific approaches have been used for oxidized and non-oxidized sediments where bioavailability has been considered; bulk numbers are used only as a first tier screening level assessment. We point out that bulk sediment assessment is one way of performing national assessments.

Thank you for the opportunity to submit comments on the SAB Draft Report on EPA’s Draft Framework, which NAMC believes will place EPA’s assessment of metal-related hazards and risks on sound scientific footing.

Sincerely,

William J. Adams, Ph.D.
Chairman, NAMC

2. U.S. Department of Energy -- Ms. Debra Littleton

Staff Comments

**On the Environmental Protection Agency (EPA) Science Advisory Board (SAB)
Draft Report to Assist Meeting Deliberations (9/15/05)
Review of EPA’s Draft Framework for Inorganic Metals Risk Assessment**

DOE staff has been extensively involved with the EPA Metals Risk Assessment Framework during the last several years and believe the document is well done. DOE is very interested in continuing to work with the EPA regarding revisions that would be made prior to finalizing the Framework. In reviewing the draft SAB Review Panel report, DOE agrees with a number of comments but finds many others that could introduce confusion to the EPA Framework revision process. The following points include selected examples of where clarification would be helpful, with the aim of guiding an effective revision effort to limit potential misinterpretation by the risk practitioners who will ultimately apply this very useful Framework.

General Comments

1. Extensive revision requests

The draft SAB report represents a broad review effort and provides helpful information across many charge questions. However, DOE disagrees with the SAB Panel's statements that substantial revisions are needed to the Framework, which is a strong document that contains a great deal of sound scientific information and significantly advances the state of the practice for joint ecological and human assessment of inorganic metals. A number of SAB Panel comments and recommendations of particular interest/concern to DOE are discussed within specific comments below – including those related to bioconcentration factors/ bioaccumulation factors (BCFs/BAFs), bioavailability, bioaccumulation and toxicity.

2. Definitional inconsistencies

DOE notes a number of terminology issues that make suggested Framework revisions unclear. Wording preferences such as the use of principles vs. factors are not a key issue (see comments on *page 15, lines 13-14*, and later SAB use, e.g., *page 44, line 40*); rather, the concern is consistency in how technical terms are used in the Framework compared with other scientific documents. For example, the Panel seems to confuse distribution (pharmacokinetic processes) with toxicity (pharmacodynamic processes), bioaccessibility is referred to as bioavailability, and the reference dose or concentration (RfD/RfC) is incorrectly represented as an increment to a body burden. The DOE encourages the Panel to revisit its terminology and interpretation for consistency with scientific risk assessment practice, keeping in mind the Framework's target audience.

3. Scope inconsistencies

DOE understands the Framework's objective to be to outline scientific principles and consistent approaches for conducting metals risk assessments, focusing on inorganic metals. DOE believes the Agency has effectively identified basic concepts, principles, and methodologies with useful illustrations to highlight key points, as appropriate for a framework. In contrast, many Panel comments seem inconsistent with this scope, requesting less detail in useful areas and more detail on several topics that are beyond a framing scope. To illustrate, the requested evaluation of the benchmark dose (BMD) modeling and no observed adverse effect levels (NOAELs) (*page 41, bullet 5*) would be appropriate for other programs (e.g., the EPA Office of Research and Development's Integrated Risk Information System), not the Framework. A similar issue applies to what seems an overstatement (considering that diet is a major exposure route), "... nanoparticles are now of critical concern for the exposure and delivery of metals to humans" (*page 25, lines 20-21*). Many requested additions appear to address such emerging areas or developmental tools for which the state of the science and practice has not yet advanced to the level sufficient for useful discussions in a Framework that is designed to guide practical applications.

At the same time, the Panel asks EPA to remove good information. For example, regarding the section on Metals Research Needs, the Panel states, "There has not been a thorough review of all research areas and it is not appropriate in the given context to highlight and identify specific research needs for the future" (*e.g., page xv, last bullet, and end of page 12-top of page 13*). DOE considers this section valuable and strongly encourages that it be retained. It captures issues gleaned during the Agency's preparation of the Framework and provides

insights into next steps in this important area, as a research bridge for gaps identified in the Framework, the supporting issue papers, and further review inputs. As such, this section embodies the inclusive approach EPA took in developing the document. Furthermore, DOE notes that this section does not claim to be a comprehensive review of all possible areas, but rather offers useful content across integrated research needs from various contributors. Whether its non-inclusive nature is further emphasized in the introductory text or this is moved to an appendix, DOE endorses retaining the section for many interested users who would find it much more difficult to locate in a separate document, where the integrated context would be lost (and for which joint timing could be an issue).

As a note, the Panel seems to request various discussions without acknowledging material already provided in the Framework (from tools to concepts such as mimicry and organic-metal interactions). Also, in some cases references are requested that either do not reflect scientific consensus or have already been accounted for in the Framework. (For example, the NAS reference requested at the *top of page 21* is included in the Framework, and a more recent study on that topic is included as well. Regarding the 17-year old mixtures citation at the *top of page 29*, the Framework includes much more recent references such as EPA 2000 that improve on that early report.)

4. Recommendation inconsistencies

Certain comments regarding EPA recommendations appear inconsistent in terms of tiering or phrasing. On the first issue, the Panel asks EPA to tier its recommendations “with the most critical (those with the greatest impact) presented first” (*page 7, lines 6-7*), while elsewhere (*page x, line 7*) the direction appears to be to order the recommendations by specificity (not importance), from general overarching to more specific. It would be helpful if the SAB Panel would clarify what organization is being requested, and if it is to be based on importance it would be useful to identify how the greatest impact would be defined (considering human and ecological applications at multiple scales, likely involving multiple preferences).

With regard to phrasing, the Panel asks EPA to express its recommendations as such (*page x*) but then requests wording be changed from recommended to “considered” (*bottom of page 26 to top of page 27*) and advises against recommending a particular model or approach (*page 23, bullet 1*). Given that EPA’s Framework is to be a practical resource for risk assessors, and that current recommendations regarding available tools clearly contribute to that purpose, it would be helpful for the Panel to reconcile its recommendation comments.

Specific Comments

1. BCF/BAF

The SAB Panel states (*page xiii, 1st bullet*) “The SAB agrees ... that BCF/BAF methodologies are not good measures of hazard for metals. However, the SAB finds that a clearer more systematic discussion is needed in the document to justify this statement. ...include a discussion of what could replace BCF/BAF as a measure of bioaccumulative potential, and where BCF/BAF approaches are useful.” DOE agrees with the Panel that BCF/BAFs should not be used in hazard ranking or national-scale assessments, and agrees that a discussion on how to use them in site-specific situations would be useful. To be clear on this issue, the SAB Panel and EPA should directly state that BCFs/BAFs do not apply for humans.

2. Bioaccumulation

The definition proposed by the SAB Panel does not reflect distinctions between human and ecological risk assessment practice. As a scientific or academic principle, DOE agrees with harmonizing terms. However, this Framework is to guide practical risk assessments across disciplines so it is important to consider whether a lumped definition loses its practical benefit to the applications for which it was developed (ecological assessments) while confusing those to which it is being extended (human health assessments). DOE believes using the general term “accumulation” instead of bioaccumulation for the human health context could reduce confusion associated with changing established definitions in use across various programs.

DOE notes that using separate definitions is supported by substantial Agency precedent for ecological and health risk assessments, simply reflecting differences in the processes, data, and state of practice for each field. Although many (not all) underlying principles are common, the scientific community of risk assessors has relied on established distinctions in key definitions to guide appropriate analyses. For example, trophic transfer is a common element of bioaccumulation definitions, and terms like critical body residues are used because many ecological measurements are whole-body data. In contrast, health assessment guidance does not include this definition, referring instead to accumulated tissue concentrations (whole body data are not relevant) with an emphasis on the target organ/system or site of toxic action. Also, terms such as mode and mechanism of toxic action, target organ toxicity dose, point of departure, margin of exposure, and toxicologic interaction, have been defined specifically for health assessments (see the EPA 2000 Mixtures Guidance).

Furthermore, in ecological assessments, bioaccumulation typically represents steady-state (equilibrium) conditions, while for humans, distribution and intermediate redistribution within a metal's biological retention time can be very dynamic, with potential accumulation or sequestration affected by factors such as lifestyle and nutritional status. Thus, for human assessments, a given measure of accumulation reflects the recent exposure profile as a temporal snapshot, which is much different from how bioaccumulation is used for ecological assessments. Such important distinctions are inadequately addressed by the proposed combined definition of bioaccumulation, and that should either be revised or rephrased as the more general "accumulation" to account for the state of the practice for ecological and health risk assessments.

Also, in the discussion on *page xiv (4th bullet)*, the Panel indicates bioaccumulation is defined as a **persistent increase in steady-state levels**, which adds confusion to the wording proposed for the glossary, "net accumulation ... that represents a **net mass balance between uptake and elimination**" (*page xiv, lines 31-34*). In summary, DOE suggests reviewing established terminology for ecological and health assessment practice and either using distinct definitions (in keeping with the approach the Panel recommends for "human biological monitoring," *page 59, lines 13-15*) or defining the general term as accumulation. If EPA does use the Panel's new definition of bioaccumulation in the Glossary, DOE would encourage the Agency to use the body of the Framework to discuss actual, practical applications for risk assessors in order to avoid confusion among risk assessors. That would allow the utility of the term to be retained for site-specific ecological applications and clarify differences for health applications. Using the main Framework to better frame concepts and thus avoid confusion regarding the Panel's terminology preferences that may not consider integrated risk assessment practice also extends to Panel comments that seem to confuse bioaccumulation and toxicity (*e.g., pages 7-8*).

3. Speciation, cycling and transfer, and ambient levels

a. Nature and type of source (*e.g., page xii, lines 26-27 and page 7, second section*)

In several places in their report the Panel comments that the nature and type of metals sources have not been identified in the Framework, and that the source plays an important role in the toxicity of essential metals. The objective of this statement is unclear because key to the bioaccessibility, pharmacokinetics (PK, including bioavailability), and pharmacodynamics (PD) of a metal is its physicochemical form (and levels) to which exposures could or would occur. That is, whether it was released from a photographic plant or an electroplating facility is relatively unimportant compared with the characteristics of the metal in the exposure setting. Also note that it seems unusual to reflect atmospheric deposition as a source (parallel to an electroplating facility, *page 7, line 16*), for that is commonly represented as an environmental transport process. DOE notes that the Agency's cumulative risk framework (2003) specifically orients risk assessors forward to place-based assessments from the older source-based approach. This means all metals in a given exposure/risk setting would be evaluated in an integrated manner, regardless of origin. Thus, it would be useful if the Panel clarified the intent of its comments on the importance of the nature or type of source.

b. Speciation and direct measurement (*page xi, first bullet, and pages 8-9*)

DOE encourages the Panel to reconsider its definition of speciation in light of practical implementation for metals risk assessments, which is the focus of the Framework. (The proposed definition could be confusing to many environmental and analytical chemists who commonly refer to this as fractionation.) Also, the intent of the Panel's comment regarding insufficient discussion of the direct measurement of speciation is unclear (*page 9, lines 21-22*). Historically the vast majority of metals measurements have been made by atomic absorption or emission spectrometry, which converts all species to elemental atoms so information on speciation is lost. Speciation has thus been approached in two ways, with the much more common practice being through thermodynamic modeling as described in the Framework, using site-specific data on pH, eH, complexing species present, and other contributing factors. The second would be by measuring certain species using specialized or emerging analytical methods, which is more a future direction of the art. If the Panel aims to encourage that direction, it would be useful to not imply this is a routine approach, and to provide context regarding the limitations for direct measurement of metal species.

c. Biogeochemical cycles (*page 10, lines 17-28, repeated on p. 21*)

The point of the comment is not clear because overview discussions of this topic are provided at a useful level in the Framework (e.g., see Section 4.1.9), as biogeochemical cycles involve transformations between organic and inorganic forms with intermediate steps involving interconversions (note for *lines 24-25, page 10* that carbon would seem more commonly limiting than metals). It would be useful for the Panel to indicate the practical purpose served by extending discussions of this topic within a Framework the Agency has defined as focusing on inorganic metals.

d. Bulk sediment numbers (*page 73, first paragraph*)

DOE agrees with the usefulness of suggesting alternative guidance where AVS-SEM data are unavailable. But in suggesting other approaches such as bulk sediment data, it is important to state what metal information and criteria (SQC, TEL and PEL) must be available for them to be useful. The Panel should also clarify how bulk sediment concentrations would be applied at the national scale, considering differences in how data are collected (e.g., averaging over depth or total concentration irrespective of dissolved state or speciation used) and variations across regions that can limit the relevance of a lumped approach.

e. Background and ambient levels (*page 16, third bullet, page 58, and elsewhere*)

DOE agrees with the importance of clearly defining the terms ambient and background, but the Panel's recommendation is counterproductive. Both of these terms are in common use in ecological and human risk assessments because they allow important distinctions to be made. So to delete "background" and replace it with "ambient" (*page 58*) would increase confusion and the potential for misinterpretation. It would be more reasonable to retain both terms and simply clearly define the two, as is done in current practice (e.g., with background representing naturally occurring levels and ambient including anthropogenic contributions). This would retain consistency with terminology in other EPA documents, including the conceptually similar cumulative risk framework (2003). (Note this comment further supports the point regarding usefulness of distinct definitions as a practical matter, as discussed in Specific Comment 2a.) Thus, the Panel should consider the practical implementation emphasis of the Framework and delete the request to collapse these into one term. To illustrate the confusion associated with unclear terminology, consider the statement "The SAB notes that arsenic, for example, is naturally occurring but still needs to be regulated" (*page 16, lines 36-37, repeated later*). This seems to imply that sites are expected to bring naturally occurring levels into compliance with a particular regulatory level. (Note that this is a risk management issue, and therefore need not be part of a risk assessment framework.) The Panel's recommendation that the Framework "provide guidance to establish a background concentration" is also confusing (and somewhat contradictory with earlier statements) and also appears to be outside the scope of a framing document (see General Comment 3). The Panel should explain what is intended by this comment and should retain both terms in accordance with common risk assessment practice.

4. Bioaccessibility vs. bioavailability

The Panel (like the Framework document) seems to often use the terms bioavailable/ bioavailability when discussing bioaccessible/bioaccessibility (e.g., pages *xiii*, line 13 and elsewhere). From the definition provided in the Framework, DOE understands that bioaccessibility represents the environmentally available component, while bioavailability addresses absorption across the exchange boundary, upon uptake or intake. (Note that this definition of bioavailability is consistent with its use in medicine/pharmacology, consider oral bioavailability). The Panel should revisit its use of this term to be consistent with the Framework definition and scientific practice.

5. Body burden and biomonitoring

DOE disagrees with the Panel's statements that "Section 4 of the Framework does not adequately describe biomonitoring" (p. 59, lines 17-18) and "lack of discussion on this topic is a serious deficiency of both Sections 3 and 4 of the Framework" (page 59, lines 30-31). Noting that issues raised in the comment and limitations in the current science are acknowledged in Sections 4.2.2.1, 4.2.2.4.1, and 4.2.4.3 and elsewhere in the Framework, the DOE considers the discussion in that document to be at an appropriate level for a framework (see General Comment 3). Also, in the Panel's discussion of body burden ((page 59), measurements often do not represent steady state, and it is not clear how the indicated "baseline" is equivalent to background (rather that would seem to parallel "ambient" by analogy to the background issue for environmental levels). Thus, the changes suggested by the Panel could increase confusion in interpreting terms for metals risk assessments. The Panel should review its terminology to be more consistent with standard risk assessment practice and revise or delete the suggestion.

6. Toxicity and essentiality

a. Pharmacodynamics vs. pharmacokinetics

The Panel should re-evaluate statements throughout its report to avoid confusing distribution/accumulation with toxicity – or pharmacokinetics (which covers the basic processes of absorption, distribution, metabolism, and elimination, essentially reflecting the action of the body on the metal) with pharmacodynamics (which addresses the mode or mechanism of toxic action, to essentially reflect the action of the metal on the body). The distinction between these is very important, and the draft SAB report should be revised to be consistent with standard terminology and scientific knowledge.

Also, the Panel's statement "Pharmacokinetic models can be used to estimate the extent to which metals bioaccumulate in tissues" (page 8, lines 7-8) could be misinterpreted as implying that models exist for all metals (far from it, as explained in the Framework Section 4.2.4.1). In addition, the Panel does not acknowledge the importance of exposure duration, time, and timing, stating only that the rate depends on the "concentration of the exposure dose and the frequency of exposure" (page 8, lines 6-7). This wording ("concentration of the exposure dose") is very confusing, given that concentration and dose are distinct terms with different units and meanings. Thus, the Panel should review its discussions of PK and PD to more accurately reflect accepted scientific terminology for risk assessment.

b. Reference values and potency factors

Several statements made by the Panel regarding these toxicity values are confusing. It is not true that human health risk assessors start their analysis with a metal-specific reference value and/or cancer potency factor (pages *xiv-xv* and page 8). Note that many assessments do not involve these values at all, including those focusing on epidemiological analyses; even for those assessments that do consider these values, they are simply not available across exposure routes for many metals of interest (consider tungsten and tellurium, seemingly strange choices for the Panel to call out as metals that may be important, page 20, last bullet). Also consider the model used for lead, and note that even for Superfund applications the analyses start at a point much different from a toxicity value (consider data collection).

In addition, the wording "appropriately integrate" (page *xiv*, line 41) seems odd, as estimated doses are simply divided or multiplied by the indicated value to produce the index/indicator for noncancer effects or the cancer

risk estimate. Furthermore, statements regarding the role of the “human risk assessor” (*page 8, lines 18-19*) seem to imply that the individual assessor may modify these values for various situations, when in fact they reflect standard values developed through a peer review consensus process and are not subject to change by general risk practitioners. Thus, the Panel should clarify what this overall comment is intending to suggest for the Framework.

c. Essentiality

The SAB panel “... recommends that the discussion of essentiality in the Framework be limited to humans ...” (*page 61, 6.3.9.2, number 2*). This appears to contradict other parts of the report on essentiality (e.g., see *page 16, 2nd bullet, and page 68, #7*). DOE strongly disagrees that essentiality should be limited to humans, because essentiality is important in ecological assessments as well. This recommendation should be deleted.

Also relevant to Comment 6b above, the Panel’s statement that “RfD/RfC values are presented as increments to RDAs” (*top of page 28*) is not true. The RfD/RfC is for a total daily exposure (dose/concentration), not an increment to an essential level. This should be corrected.

d. Low-dose effects (*page 41, fourth bullet*)

DOE disagrees with the Panel’s comments regarding the omission of any discussion in Section 4 of toxic effects of metals at low doses, as the Framework includes considerable discussion relevant to this topic. The Panel states “... a number of metals exhibit a biphasic dose response curve with distinct adverse effects at low doses and a different type of toxic effect response at higher concentrations. The SAB recommends the inclusion of a section in the Framework that describes low dose toxic responses to metals and their compounds.” This is included in Section 4.3 of the Framework (including Figure 4-4). More importantly, DOE suggests the Panel revisit its subsequent statement (“For example, it is now apparent that the slope describing Pb toxicity versus blood Pb concentrations is greater at lower exposure levels.”) to better reflect scientific knowledge, notably in light of scientific evaluations by the Centers for Disease Control and others. (See http://www.cdc.gov/nceh/lead/ACCLPP/SupplementalOct04/Work%20Group%20Draft%20Final%20Report_Edited%20October%207,%202004%20-%20single%20spaced.pdf.)

e. Mixtures

Regarding the Panel’s comment to discuss metal-organic interactions (e.g., arsenic and PAHs, *page 18, line 4*), note that an illustrative discussion of metal-PAH mixtures is included in Section 4.3.6.3 of the Framework. Similarly, regarding the request for a discussion indicating that metals can react with organics to form organometallic compounds” (*page 18, lines 7-8*), DOE notes that the Framework includes such discussions (e.g., see Section 4.1.9.2). The Panel should identify what is new in the request and what objective it will address. A similar comment applies to the Panel’s request to cite the 1988 NAS reference (*e.g., pages 28-29*). That is, it would be helpful to be clear on what new information and objective is being addressed, because the EPA mixtures guidance (which is discussed in the Framework) covers these issues in fair detail, including statistical analysis, information quality, and quantitative uncertainties.

The 1988 NAS book focuses on testing strategies, not risk assessment, and much more recent references are more relevant to the purpose of the Framework. The EPA guidance on mixture risk assessment, which is much more complete and focuses on information useful to risk assessment, is already included in the Framework. (Note that EPA’s mixtures guidance from 2000 does cite the NAS 1988 text, including its limitations concerning interaction terminology, and goes beyond that early reference to address the magnitude of interaction, not simply the direction.) DOE agrees with the importance of good statistical analyses, and agrees that proper objective criteria and correct statistical tests are important. However, if statistical analyses are to be included then other characteristics should also be mentioned, such as toxicological evaluation of the relevance of experimental scenario to the assessed setting, including the extent of extrapolation. Those characteristics, like statistical analysis, are part of a good risk assessment.

Many published toxicologic interactions are not likely to occur under environmental exposure conditions, often

because of the lower doses. On this point, it would be useful if the Panel provided examples of dramatic effects observed, with an emphasis on environmental levels (*page 9, lines 36-37*). Also, most toxicologic interactions depend on the exposure route and duration (and sometimes sequence), and for metals, on nutritional status as well. Thus, a considerable amount of information is needed about the exposure scenario – at least the dose, duration, route, target organ, test species, timing, and other specific conditions as warranted – and about how specific the interaction is to that scenario, to be useful for a risk assessment. The Panel should clarify the objective of the additional information requested for mixtures.

ATTACHMENT D

Board Member Comments on the Draft Metals Report (November 3, 2005)

1. Dr. Ken Dickson (10/17/2005)

Tom, I read the letter, executive summary and report and have the following comments:

1. Did the draft report adequately address the original charge questions. Comment: I think the charge questions were more than adequately addressed. It is my opinion that the committee did an excellent job. However, there were far too many charge questions in the first place. The committee should be commended for "service above and beyond the call of duty: This is particularly true considering the inadequacy of the draft document they were asked to review.

2. Was the Draft Report Clear and Logical? I found the draft SAB report to be well organized, clear and logical. However, because of the sheer number of charge questions, complexity and diversity of technical issues addressed and thus redundancy, I got bored reading the report. I can only imagine how a lay reader would react. This may not be important considering that the primary audience for the SAB report in this case is agency folks preparing the document. I did like the simplicity of the cover letter in that it effectively outlined the overarching concerns and punchlines. The executive summary section in the draft report provided more detail concerning the Review Panel's concerns and recommendations. The full report provided more indepth commends and recommendations. I like this procession from simple and overarching to indepth details.

3. Were conclusions and rescommendations suported by information in the draft report. Yes they seemed to me to be adequately supported in the draft report.

I concur with the punchline recommendation of theMetals Risk Assesment Framework Review Panel - The document needs Major revisions and after these revisions are made needs to be reviewed again.

2. Dr. Deborah Cory-Shlechta (10/12/2005)

The SAB Panel Review of EPA's Draft Framework for Inorganic Metals Risk Assessment was clearly a significant endeavor, in terms of the scope of the document and the corresponding charge questions. In general, the charge questions have been thoroughly addressed and corresponding recommendations supported by the text.

There are some general issues to consider as well as points that could be further clarified and/or corrected as elaborated below:

General Issues:

1. The text is largely redundant which partly accounts for the length of the document. One of the reasons is that each section describes the basis of it recommendations and then goes on to repeat those recommendations again, with the only addition being whether they are short term or long term recommendations. It would seem that the document could be shortened significantly by inserting the "Short Term Recommendations" and the "Long Term Recommendations" before the longer text describing the recommendations and their basis and deleting the subsequent duplication of the recommendations.
2. The draft document itself in Section 3 describes Metals Risk Assessment Recommendations, while Section 4 is entitled Metals Specific Topics and Methods that includes much of the text that serves as the rationale for the recommendations made in Section 3. It is not clear whether the Panel considered whether the order of Sections 3 and 4 should be reversed, or alternatively integrated, such that the rationale for each recommendation explicitly followed the text stating the recommendation. This would

seem to eliminate the difficulty repeatedly mentioned in the Panel's review of the inconsistent links between the two sections.

Minor Points:

1. Page 1, line 12, change "permitting" to "permits".
2. Page 5, line 34 in referring to uncertainties of particular importance to metals. It indicates that "lack of dietary exposure is a good example". It is unclear what is meant by this example or how it relates to the toxicity testing section.
3. Page 8, Lines 32-43. In the section entitled "Background Versus Ambient Concentration", discusses issues related to this topic, but the point of the paragraph in relation to the document, is unclear, particularly for the executive summary.
4. Page 10, line 9, would be more correct to insert "appropriate parameters for" before "data collection".
5. Page 12, line 20, insert an 'o' into the word contradiction.
6. Page 20, line 14, delete 'it'.
7. Page 26, line 5, needs to indicate why the first recommendation should be deleted.
8. Page 28, lines 44 through Page 29, line 17, needs to have the format changed.
9. Page 30, lines 13-19, not clear what the point of this text is supposed to be.
10. Page 32, lines 26-29, the two sentences appear to be duplicates and one should be deleted.
11. Page 35, lines 4 vs. line 9 seem to be in reverse order, with section 3.3.2.2 presented before section 3.3.2.1
12. Page 38, lines 29-32 should be eliminated as they duplicate statements previously made.
13. Page 39, lines 24-25 states that EPA should start (in relation to metals mixtures) by looking at ratios of toxic to interacting essential metals. The rationale for this statement is not clear, nor is it made clear later in the text. It would seem to be a debatable point, and probably irrelevant to the recommendations.

Pages 60-61 Discussion of essentiality versus toxicity. It is not clear whether the issue of the non-linear (U-shaped) dose-effect curves for essential metals was considered by the Panel or in the risk assessment document (e.g., too little copper and too much copper both have pathologies).

3. Dr. James Bus, Lead Reviewer

Board Member Comments on the Draft Metals Report (October 23, 2005)

The SAB Panel Review of the EPA Draft Framework for Inorganic Metals Risk Assessment provides thorough and clearly constructed recommendations to the Agency on future revisions to the draft. The Panel report was very responsive to all of the charge questions posed, and provides a well described roadmap for improving the quality of the draft. The primary conclusions of the Panel are concisely and accurately captured in the proposed letter to the Administrator, and appropriately emphasize the need for significant revision to the Draft Framework before any future public release.

Specific Comments:

The Panel review divides its recommendations into "Short Term" and "Long Term" categories. Given the Panel's primary conclusion that the draft must be significantly revised, the separation of the recommendations into time-based categories provides a potentially confusing signal to Agency authors. The reading of the Panel recommendations clearly suggests that the Agency should address all recommendations, both short and long term, in a future revision, and does not seem to imply that a revision only addressing the short term recommendations would be acceptable. Thus, a clear expectation of how the Agency should respond to the long term recommendations should be provided.

The Panel specifically and strongly cautions the EPA to avoid inclusion of research needs into the Framework document (p. xv, ll.14-15). Although the recommendation is appropriate, at various places in the review (see below), the Panel appears to make research recommendations for inclusion in the report. Although this may be just an issue of clarity of wording, as written, it could provide confusing advice.

p.5, l.16: Consider deleting phrase beginning "...and should be a source of pride..." The purpose is not to create pride, but rather to provide a scientifically defensible and useful work product that will assist the EPA in evaluations

and decisions regarding metals.

p.26, l.5: The recommendation for deletion of a report recommendation should be accompanied by a rationale.

l. 37: Again, a brief rationale for the change should be noted.

p.27, l.6-7: The Review Panel specifically criticizes the draft for including research recommendations; yet, this Panel conclusion clearly infers inclusion of a research recommendation (“...similar models should be developed...”).

l.39-40: This Panel recommendation also appears to infer a research need, i.e., “...need to developed and validated.”

p.28, l.33-34: An explanation of what is not “true” would be useful.

l.41: Briefly explain why not a “good example”.

p.29, l.16-17: Again, Panel appears to provide a research recommendation (“...future research goals...”).

p.36, l.31-33: Suggest deleting “unique”; many non-metal compounds also suffer the same limitations in toxicity testing that are described in the subsequent sentence, e.g., diversity of responses, among species, etc.

p.41, l. 24-26: Not clear what is meant by “slope describing toxicity versus blood Pb...is greater at low exposure levels”. Does report mean biphasic, as stated in sentences above?

p.59, l.18: It is likely premature to describe biomonitoring as an “emerging area of risk assessment”. Rather, it could be more appropriately stated as an emerging area of public health evaluations.

p.70., l.2-5: Appears worded as a research need.

4. Dr. Lauren Zeise, Lead Reviewer

The review is clearly written and responsive to the charge questions. The Panel clearly spent a good deal of thought and time reviewing and providing comments on the EPA Framework. Numerous observations regarding the appropriateness of EPA positions are made, along with recommendations for change. On the general Framework and most important policy issues that the Agency has asked for comment on, the Panel appears to support Agency positions, and then goes on to offer a number of recommendations for technical change. There are numerous recommendations that direct the Agency to cover specific technical issues and details that may have been overlooked in putting together the draft Framework, and some that may have been left out because of the level of detail envisioned for the Framework differs from that found to be needed by the Panel. There are also a number of criticisms and recommendations that are more of an editorial nature –regarding rewordings, moving text around from one section to another, reframing tables, calls for clearer definition of concepts – changes generally needed for early drafts of technical documents. But again, the Panel comments support the basic structure and most policy calls in the Framework. This needs to be clear in the letter to the Administrator and in the Executive Summary, and some of the major points of agreement enumerated. The exceptions could then be called out. The last bullet in the letter to the Administrator picks at editorial issues. I’d suggest leaving it out.

The conclusions and recommendations of the Panel generally are supported by information in the body of the report, but this is not true throughout. One example that has made it into the letter to the Administrator is the conclusion that the human health section contains inaccuracies and important detail; in the body of the report it is noted that the human health part of the Framework is not complete and contains numerous errors (P40, L23). These appear to be conclusions based on the discussion in response to charge question 3.2 on human health effects on pages 40-41 in the SAB report. The only inaccuracy noted was on the “principle of metal accumulation in organisms that can be eaten by humans.” It was noted that the principle did not apply to hexavalent chromium which is converted to the less toxic trivalent form. Fair enough but this one does not seem a sufficient justification for a conclusion that the human

health section is inaccurate or has numerous errors. Regarding completeness, the SAB notes the importance of addressing nanoparticles (apparently not addressed by the Framework), and insufficiently detailed treatment of PM as a mixture, Hg speciation and in vivo measurement, and interactions between metals and organic chemicals. The one important omission noted is the lack of discussion of response at low doses. These don't appear to support the strong statements regarding lack of completeness. A different group of experts might find 5-10 more specific issues worthy of coverage. An exhaustive treatment is beyond what is desired for a framework document. This should probably be acknowledged.

The Panel recommends some restructuring and makes numerous recommendations for editorial changes and minor technical clarifications. These are not generally kept separate from important technical concerns and agreements and such points are therefore lost in the volume of relatively minor recommendations. For example, the important discussion and findings regarding bioaccumulation and bioavailability are lost. In various places revisions recommended are referred to as "major" or "important" but are at the level one would expect required of an early draft and do not speak to the need for any major restructuring of the document. A quick reader of the comments may not appreciate this and may be left with the impression that the document is technically deficient in areas that it is not.

In certain sections the level of technical commentary and recommendations seems about right (e.g., pages 50 on). But the review is far too directive for an SAB report in many other places - in recommending rather than suggesting exact wording and definitions, rewriting, reforming tables, and giving explicit instructions for moving text. I think it's unwise to be so specific and prescriptive in an SAB review. The vetting, peer review and rethinking that normally occurs as documents are developed and revised is by-passed. It also puts both the Agency and the SAB in an awkward position as ideas and the overall framework evolves. The Agency can be seen as ignoring specific recommendations of the SAB when the specific language may not longer be suitable. I feel explicit recommendations for precise language should be reserved for a few important cases where it is found to be necessary or is specifically requested by the Agency. In the current SAB report it would be better to state the problem that the recommended rewording is attempting to address and leave the rest to the Agency; in some cases suggested language or alternative approaches could be presented.

In several places the document seems overly concerned with presentation. For example, on page 22, in response to a question regarding how well EPA recommendations or guidance for conducting risk assessments are supported, the charge is answered by discussing how the information should be presented, and a restructuring that may not improve matters is proposed. The fault is found with the presentation when it is the scientific issues that are to be vetted. Again this is not found throughout but is too frequent in this SAB review.

Throughout the documents detailed, very specific and relatively minor recommendations for editorial change are represented as the opinion of the SAB. (e.g., "It is the opinion of the SAB that Recommendation 7 should not stand alone as a recommendation, but rather be included as supporting text" (P30, L29)). It would be better edit this out and to leave the noted opines of the SAB for the issues that matter much.

The distinction between long term and short term recommendations does not seem necessary. I could not find any real show stoppers where the long term recommendations would hold up the development of the Framework. They mostly seemed to be relatively small additions to the document or in the scheme of things minor changes to the document. All recommendations seemed manageable. If there are some recommendations that would prevent the Agency from proceeding apace they should be pointed out, perhaps as something to be addressed in future projects.

Imbalance – At several places in the report it is pointed out that the coverage of a particular pieces are not sufficiently balance (e.g., P15, L30). It is not clear there is actually an inadequacy in guidance or description that needs to be addressed. It is presented simply as a matter of quantity rather than what is being lost by some points getting less emphasis.

The Panel also raises semantic issues, and suggests changes in conventions. It recommends "inorganic" come out of the title (potentially leading to misunderstanding of the extent of coverage of the document). On P58-59 and in the Executive summary the report takes issue with the term background. The importance of considering "background" exposures in human health dose response assessment has been raised in various previous SAB documents. It speaks to the issue of whether in assessing dose response a linear or threshold model should be applied, for example in

national assessments of metals such as lead. The term “background” has been used as a term of art and convention in discussing this particular issue; various publications on dose response modeling over the past 25 years or more use the term “background” in this way. It refers to both the natural and anthropogenic sources to which a particular chemical under assessment is being added. I did not review the EPA document so I don’t know if that is how it is being used there, but in some cases it does seem in this sense (p65 SAB comments). Whole scale replacement of the term “background” with “ambient levels” is problematic for this reason. In some cases the term “body burden” is a reasonable substitution. But this would not work for all cases. In making recommendations regarding background in the SAB report, this should be kept in mind and acknowledged in making recommendations for changes in terminology.

P14, L4 and 5. The review needs to clarify what is meant by “site scale complex assessment” and “national scale complex assessment” and why these are not adequately covered by the site and national assessment categories. lines 18 and 27. The committee doesn’t make a finding that the guidance for assessments other than site assessments is inadequate. If the guidance is insufficient it then would be appropriate to call for more guidance for these other types of assessments.

P17, more justification is needed for the recommendation to treat toxicity rather than toxicity testing as a factor or principle. All of the other factors seem directed at getting at the overall toxicity or adverse environmental and health outcomes.

P23, L4 It is unclear what is intended in the recommendation that “the EPA provide ‘guidelines’ for formulating the recommendations.” Justification is needed.

P23, L5. The SAB comment that the EPA risk assessment recommendations should be tiered looks like a comment that the entire chapter needs to be restructured. But this is not what appears to be intended, judging from comments later on regarding the charge Q 3.1. It appears that it is just tiering within the relevant subsections. The point needs to be clarified.

These problems are repeated on page 39 in the first recommendation.

P26, L5. There is a statement that the EPA should delete a recommendation without providing justification for why this should be done.

P28, L26. The recommendation regarding animal use for toxicity testing is off point, since this is advice to the risk assessor not the designer of toxicity tests.

P40, L1. Is this lack of consistency really important? Are there good reasons for lack of it? It’s unclear whether this recommendation would improve the guidance.

P55, line 12. The tone of the statement “The SAB cannot recognize much evidence of critical thought in the recommendation...” is obviously problematic and undermines the points raised regarding charge question 3.6.

P60, L3, may also be good to refer them to the substantial work of the Institute of Medicine (IOM) in this area.

5. Dr. Terry Young (10/14/2005)

COMMENTS FROM TERRY YOUNG:

SAB DRAFT (9/15/05) REVIEW OF EPA’S DRAFT FRAMEWORK FOR INORGANIC METALS RISK ASSESSMENT

This review is extremely well-written, clear, and responsive to the charge questions. I would support Board approval of the draft without any changes. It is an impressive piece of work that reflects well on the Board, and it provides EPA with a clear and detailed roadmap to use while revising the framework.

I offer the following suggestions regarding changes that could be made at the option of the Chair:

1. I suggest that this framework review reference previous reviews provided by the Board, particularly those that contain recommendations that are nearly identical. EPEC conducted two of these as recently as 2000: Review of an

Integrated Approach to Metals Assessment in Surface Waters and Sediments (EPEC 00-005) and Review of the Biotic Ligand Model of the Acute Toxicity of Metals (EPEC-00-006). Here are some examples where the framework review and the EPEC reviews are essentially the same:

- Recommending use of a bioavailability model that incorporates routes of exposure other than pore water, such as dietary uptake.
- Noting that proper application of SEM-AVS in the field demands a method to account for the spatial and temporal variations of SEM-AVS. This is not a trivial issue.
- SEM-AVS is of little use in oxidized environments or those where sediments are periodically resuspended.
- BLM, while promising, does not account for dietary exposure, chronic exposure, and lacks broad taxonomic applicability.

These issues are raised in the framework review in several locations, including pp.5, 65, 68, and 72. There may well be more overlap than I have identified in this list. This repetition of the same shortcomings is frustrating. I can understand if the Agency has not yet been able to develop the tools necessary to deal with these shortcomings in the field, but it's troubling to me that the Agency's conceptual thinking (as reflected by the Draft Framework) has not incorporated our prior analysis.

2. Notwithstanding my first comment, I suggest that the cover letter add a sentence or two pointing out how important this effort is. Lines 24-27, page viii and lines 14-17, page5 could be lifted for this purpose.

3. The discussion of bioaccumulation and trophic transfer on pages 35 and 66 seem slightly incompatible, although this is more a matter of tone than substance. Page 35 sounds almost dismissive of bioaccumulation and trophic transfer, which is the opposite of the point being made on page 66. In any case, I suggest that page 35 contain explicit reference to the exceptions (mercury and selenium).

4. On page 46, I wonder why it is important to consider nanoparticles for human exposure but not for animal exposure? Does this reflect the committee's discussion?

5. Check this to be certain, but I think the discussion of metal speciation in the executive summary omits mention of the conclusion drawn on page 47 ("metal speciation determination is more applicable to site-specific investigations than the setting of national standards") and the associated text that discusses how metal speciation often changes once the metal enters nature. I suggest that this discussion be reflected in the executive summary.

6. Similarly, the discussion on page xiii of AVS-SEM struck me as a little vague. Perhaps it can be expanded to better reflect the issues presented on page 68, items 4 and 5; page 70, line 12; and page 72, lines 19-34.

7. On page 68, lines 5 and 6, don't you mean the reverse?

8. I suggest that the references contain hardcopy document identifiers and not just the web location where the reports can be found. Website change.

6. Dr. Virginia Dale

To: Tom Miller

From: Virginia Dale

Re: Comments on SAB Review of EPA' DRAFT Framework for Inorganic Metals Risk Assessment

Date: October 20, 2005

This report was clearly a challenge to prepare because there were eighteen detailed charge questions. In spite of that difficulty, the Review Committee has done a very good job and appears to have addressed all of the questions with some care. The difference in the detail and number of these charge questions compared to others that I have seen makes me wonder if there is a need for the Board to provide some guidance on the format of the charge.

I agree that with the general conclusion of the review that the revised framework should go out for another review. The Review Committee has provided a number of useful suggestions: e.g., clear definitions of the purpose and of

terms are necessary; a balanced evaluation of tools and methods would be useful; and more examples in the framework would be helpful.

I think that the cover letter does a good job of covering the key limitations in the framework while emphasizing the need for revision and another review. It might be useful to add a new third sentence that states the importance of this framework.

The report is mostly well written and clear, but some clarifications in the writing are needed. My few comments are mainly to improve the clarity of communication.

- There is some repetition in the document. For example, comments made under “overarching comments” are repeated under “response to charge questions.” Can these repetitions be removed?
- There are many cases where commas are inappropriately used (or not used). I will mail my corrections on the hard copy to Tom Miller.
- A few sentences have the subject quite removed from the verb. Suggested changes are made on the hard copy.
- In several places the word “ecosystems” is used where “ecological” is the more appropriate term (page viii line 46, page 12 line 32, page 13 line 26, etc.). I note that the cover letter does appropriately use the term “ecological.”

7. Dr. Cathy Kling

Tom, I've read the draft letter, the executive summary, but only skimmed the report. The panel has done a thorough and careful review; the charge questions have been thoroughly addressed and the letter and exec summary are internally consistent. Cathy Kling

8. Dr. Rogene Henderson

Comments on SAB Review of EPS's Draft Framework for Inorganic Metals Risk Assessment
By Rogene F. Henderson

I found the letter to be well written and clear. I have no suggestions for the letter.

I found the report of the review to be clearly written and responsive to the charge questions. My only general comment is that it is quite repetitive. Repetition is not such a bad flaw, but the report could be made more concise, if that is desirable.

I had a few specific comments:

I liked the discussion of essential metals and of bioaccumulation in humans.

I had a problem with the discussion of metals from natural versus anthropogenic sources. On page 16, line 36 and on page 18, line 40, the report states that metals from natural sources may pose “as much or more risk than anthropogenic metals.” On what basis did the authors conclude that natural metals may pose MORE risk than anthropogenic metals? That statement needs to be modified to leave our “or more” or some explanation given. I know of no basis for making such a statement.

Page39, line 4: Insert “a” before “factor”.

9. Dr. Michael McFarland

Review of EPA's Draft Framework for Inorganic Metals Risk Assessment – McFarland Comments

The SAB panel tasked with reviewing the EPA's Draft Framework for Inorganic Metals Risk Assessment report did an outstanding job in addressing all of the Agency charge questions. The panel provided clear and comprehensive responses to each of the charge questions while furnishing the Agency with a number of valuable recommendations that should be considered in refining a future redraft of the document. It was also apparent from reading the report

that the panel had strong misgivings about both the structure and content (and ultimately the value) of EPA's Draft Framework for Inorganic Metals Risk Assessment in its current form. The panel has requested substantial revision to the entire document (including a change in the document's title) as well as a second external review. Beyond these general observations, the following are my specific comments related to the panel's summary report.

Cover Letter

The cover letter is well written, concise and provides a valuable summary of the panel's findings. However, the general tone of the letter is overtly negative including the recommendation of a major redrafting of the document followed by a second external peer review. It appears that there were few, in any, laudable facets of the EPA's Draft Framework for Inorganic Metals Risk Assessment worthy to include within the cover letter. Although I have no doubt that the cover letter correctly reflects the consensus opinion of the panel, I did take note that the summary expertise of the panel did not seem to include individuals with extensive experience in conducting risk assessments (or at least that appears to be the case in my reading of the bottom of Page 4 – lines 40 through 44). Of course, having those expertise on the panel does not necessarily change any of the report's findings but, I believe, a larger representation of professional risk assessors within the panel membership may have resulted in identification of a greater number of meritorious aspects of the report (for possible inclusion in the cover letter as well as other places in the report).

Executive Summary

Like the cover letter, the Executive Summary is well written and comprehensive but it is unclear from this section of the report what the framework actually entails. In other words, the panel appears to support the framework's scope, risk assessment categories, conceptual model as well as other aspects of the document yet there is little description of the general structure of the framework. In my limited experience in reviewing risk assessment documents, the Agency typically adopts a progressive three tiered framework: 1) screening risk assessment (using conservative assumptions), 2) deterministic risk assessment (normally using site specific data, when available) and 3) probabilistic risk assessment (using site specific as well as literature data). There is no allusion to this type of risk assessment framework in the Executive Summary or in the body of the report, a fact that suggests to me that the Agency may have adopted another type of framework. In my opinion, the framework should be clearly described within the Executive Summary together with the panel's scientific and/or technical reasons for supporting or opposing it.

Main Body of Report

- Page 1 (lines 18-22) – Since the EPA's Draft Framework for Inorganic Metals Risk Assessment document was developed based on earlier Agency efforts (the Metals Action Plan, in particular), it is important to establish whether or not the recommendations from these activities were considered in drafting the new document. I inferred that, in the absence of any statements to the contrary, the panel believes that those earlier efforts were properly considered in drafting the new document.
- Page 6 (lines 29-32), Page 12 (lines 6 – 8) – The following is a panel recommendation that appears throughout the report “If the document is to serve as both a framework and practical guide for risk assessors, the recommendations and guidance in the document should be balanced and organized consistently with this dual purpose in mind”. Personally, I see no inconsistency in the document serving both purposes and, in fact, most Agency risk assessment guidance (that I am aware of) addresses both of these needs. My concern stems from what the panel means by the word “balance”. This panel recommendation implies that there is imbalance in the document and, if that is indeed the case, the nature and extent of that “imbalance” should be clearly stated.
- Page 12 (lines 44-45) – I take some exception to the following statement, “It is the opinion of the SAB that the identification of research needs should not be within the scope of the current framework”. Clearly, if the framework supports a multi-tiered risk assessment approach (that includes probabilistic risk assessment) for which there are universally accepted areas of uncertainty for metals fate and transport, identification of broad and overarching research needs that will assist in reducing that uncertainty for a range of applications is not necessarily inconsistent with a basic risk assessment framework. Of course, not having actually read the EPA's Draft Framework for Inorganic Metals Risk Assessment document, there may be other more compelling reasons to support exclusion of a research needs section.

- Page 15 (lines 8-9) – The panel believes that the detailed material in Section 2 of the report (and as suggested throughout the framework) is more relevant to site specific risk assessment (and not necessarily applicable to regional and national scale assessments). I believe that this is a very important point that may require additional clarification. In other words, should the reader infer from this statement that the panel supports (or at least doesn't oppose) the use of the screening level risk information for establishing regional and/or national scale assessments? In at least one report of which I am aware (EEC Surface Impoundment Study), the SAB has supported the Agency's use of screening risk assessment information (supplemented with regional data) to establish national scale risk assessment levels. It would be of value to know whether the panel believes there are more effective methodologies for establishing regional/national scale risk assessments than those espoused by the Agency.

10. Dr. James Galloway

I have no comments on the report.

11. Dr. Jill Lipoti

I reviewed the metals draft report over the weekend. My only comment is that the recommendation that the research needs section of the Framework should be removed should appear in the letter to the administrator.

Due to our recent discussions about process, I thought I would share some of the insights gained by reading the report. I note that the panel was large (21 people) and that they divided themselves into three working groups to develop responses to the 18 charge questions. Even so, they were careful to bound their recommendations to just the areas of their expertise.

It seems that almost every EPA document that the SAB comments on says that they need to address uncertainties and data quality, and that they need to provide illustrative examples. This review came to the same conclusion. Maybe we could just give EPA a checklist saying that they should address those two items before they send the document to the SAB?

The executive summary seemed very long, but with 18 charge questions, what can you do? Then I read the document and I kept coming up with things that I thought needed expansion in the executive summary. I thought that the biogeochemical cycle on page ix, line 33 needed more detail. I thought that the discussion of mimicry on page xiii, line 33 could be amplified. But I came to the realization that those were just my pet subjects and probably every SAB reviewer had something they would like to see expanded. Overall, the executive summary seems comprehensive, and the real meat of the review is in the report, as it should be.

For the report format, I liked the summary of recommendations (divided into short-term and long-term) at the end of every charge question. It left me to wonder if the EPA addressed the short-term recommendations and made the document into an iterative format (looseleaf) that could be updated on a periodic basis, would that be a possible solution? Kind of like a textbook that could be updated easily as new research came to light?

Lastly, on the recommendation to eliminate the section on research needs - I think it was great that the committee realized that the section was too narrow and that areas of research needs were left out. The solution they proposed is to get rid of that section. Another solution would have been to rewrite the section to include a broader look. I'm glad that the SAB did not rewrite because that is not our function. Good call on the part of the panel.

Jill

12. Dr. Granger Morgan:

Tom,

I've now read the report. It looks to me to be one of the most careful and complete reviews I've seen the SAB do.

Only comments are minor editorial things. For example is it necessary to say over and over again "The SAB recommends..." Couldn't we just say it once at the beginning of lists such as those on pg 18 and 22?

Slightly more substantive pg 26 line 26 says "quite complete" line 33 says "fairly complete" Does the latter reflect the fact that the figure they are talking about does not capture everything? Might clarify.

In short looks good. We are down in the nits.

Granger

13. Dr. Thomas Theis:

General Comments:

The good news is that the review seems to have answered the charge. The bad news is that it is far too long. There are two reasons for this. First the review is much too proscriptive; the Panel is trying to write the report for the Agency. Many recommendations consist of specific wordings (the goal should be to lay out a rationale for the Agency and let them write the report), are trivial, or are repetitive. This has the effect of diluting the recommendations that really matter, and raising the ones that don't to a higher status. If the Panel wishes to include all of these matters in the report then I suggest many be placed in an Appendix, and not be called "recommendations" ("suggestions", "possible rewordings", "nits" are possible classifications).

Second, and less important except it adds to the excess verbiage, is the habit of "summarizing" each section (in a few cases the summary is almost as long as the section being summarized). These summaries add little except identifying "short term" and "long term" recommendations, and it is not clear what these designations mean. If the Agency were to follow all the short term recommendations but leave the long term ones for later, would the revised report be acceptable? Probably not, thus why draw the distinction?

Specific Comments (I haven't been able to go through the entire report in detail, but here are a few specific comments on specifics)

1. page xiii, lines 31-37. This suggested change in the title of the document confuses me by making it seem as if metal complexation with organic ligands is purposely left out of the report. Is this so? Later (page 38) reference is made to organo-metal transformation, leading me to think that organic complexation is indeed included in the report (as I would expect). The title of any report is important, thus the need for clarification.
2. page 10-biogeochemistry; page 21 lines 28-33. There are grand cycles (e.g. C, N, Fe), and lesser cycles (U, Ni, etc.), and one can define cycles for organic compounds as well. The only difference is that for cycles defined in terms of the elements, inorganic forms can be converted to organic forms, while for organic cycles organic forms can be converted to inorganic. All biogeochemical cycles interact among one another, although for trace substances the impact on the grand cycles may well be negligible, while the converse is seldom true. The main distinguishing feature isn't "organic" vs. "inorganic" but rather "trace" vs "major".
3. page xiv lines 31-34. It is not obvious what the Panel is trying to say relative to the uptake and elimination of metals in organisms. It states that the accumulation should represent a "net mass balance" but this leaves considerable ambiguity. For instance mass balances change over time as the concentration of metal changes or, over longer terms, as the organism mass changes. Perhaps the Panel simply wishes to emphasize the importance of mass closure when conducting accumulation studies.

4. page 17 lines 12-14. The statement that metals behave more like organic compound when complexed with organics needs more clarification. Without doing an exhaustive survey of all the different metal-organic complexes the only thing I would feel safe in saying is that since most metals are cations and most organic ligands are anionic, the net charge on the complex will usually be different. This will certainly lead to different behavior, but not necessarily "organic" behavior. I think what the Panel means is that the behavior of metals, when in trace concentrations in soils or sediments, will behave as the organic matter in which they become enmeshed.

5. page 26. These are examples of being overly proscriptive. Line 5 says to eliminate the first recommendation without explanation. Lines 7-14 provides exact wording by the SAB to be incorporated into the report. The point of lines 18-28 is to warn of the complexities of metal uptake. This is good. To then go on to tell the Agency how to make this clear is not necessary. The overall impression is that we are afraid they won't "get it right" if we don't tell them exactly how. Pages 28, 54, and 62 provide more examples, indeed this approach can be found throughout the report.

6. I find great irony in the statement on page 35 (lines 41-42) admonishing the Agency to be more concise, given the swamp of verbosity that constitutes the SAB review.

7. Pages 44-45, lines 40ff. The fact that in vivo metal speciation changes (whether by redox, complexation, sorption, or uptake) is the major point here, not that an "exception" needs to be made for Cr(VI). A similar statement could be made for metal complexes that dissociate releasing the free metal ion, or metals taken up in the free form and then become complexed by biogenic ligands. To single out one metal is to open the door to singling out all metals because they all have some unique differences between ex vivo and in vivo.

In summary what we have heard is a review that recommends major revisions to the Agency report, while in need of major revisions itself.

14. Dr. Rick Freeman:

He read the report and has no comments on it.

15. Dr. Gene Matanoski:

The SAB panel has done an excellent job in reviewing the document. They have answered carefully and completely all of the charge questions. I would suggest that we accept the document with only one question to the total SAB

The Committee has been very detailed in their responses to some of the charge questions even to the point of making specific changes in the wording of the document. This seems unusual in view of our usual handling of EPA documents. This response in some sections is in contrast to those in others where all responses are general. I can see how that might happen if the latter sections are not complete enough or need major revisions so that it is difficult to go into detail. Perhaps we should explain that somewhere.

ATTACHMENT F

November 3, 2005

MEMORANDUM

SUBJECT: Draft Metals Assessment Framework Panel Review Letter

FROM: William P. Wood, Ph.D.
Executive Director
Risk Assessment Forum

TO: Thomas Armitage
DFO - Metals Assessment Framework Review
Science Advisory Board

- We appreciate the work and feedback of the SAB panel on the metals framework, and think this draft is an improvement from the March draft report. We continue to have a few comments.

Overarching Comment - Continued Lack of Prioritizing Recommendations

- While we appreciate the panel taking our suggestion from the April teleconference to delineate between short and long term recommendations, the vast majority of the recommendations fall into the short term category, with no explanation of relative priority. We had hoped that the panel would elucidate their priority for the multitudes of recommendations, as we suggested earlier this spring. The same can be said of the over-arching comments in the Executive Summary, where some elucidation of priority would be helpful.

Comment 1 - Framework Purpose

- In commenting that a major weakness of the framework is the lack of a consistent identify (i.e., concerns that framework oscillates between basic principles for metals risk assessment and a detailed methods manual), the SAB notes in several places (e.g., pages ix, 6, 12, 13) that there is a “sense of contradiction” associated with this dual purpose. While the Agency appreciates the recommendation that improvements to the organization and clarification of the purpose are warranted, it is unclear what is inherently “contradictory” about this particular condition. It will be important to understand what is contradictory so that we may better address the comment.

Comment 2 - Human Health Recommendations

- We appreciate many of the comments from the SAB concerning the human health discussions. For example, helpful feedback was provided concerning ambient background concentrations of metals, essentiality, and mixtures. The SAB notes also that the human health discussion is incomplete, lacks important details, and contains inaccuracies that need to be addressed in the final framework. So that we may better address the reviewers’ comments, we request that the SAB report clarify the specific topics or issues that are absent or incomplete, and likewise, identify the specific statements or discussions that are inaccurate. As it stands, it is difficult to identify these items in the current draft report.

Comment 3 - BCF/BAF Recommendations

- The next comment/request is in two parts and relates to the BCF/BAF recommendations described in the Executive Summary and in the body of the report (pages xiii and 69-71). The SAB recommends in the Executive Summary that EPA revise the framework to include a discussion of what could replace BCF/BAF ratios as a measure of bioaccumulative potential, and also describe where BCF/BAF approaches are useful. Later in the document, (pages 69-71), the SAB indicates that a “clearer discussion is needed of when to use BCFs, their deficiencies, and when they should not be used,” and that the justification for why to use them needs to be “more explicit and coherent”. They also indicate the availability of alternatives to the BCF/BAF approach that are much more flexible and less variable (e.g., biodynamic

models), and that a valuable, long term approach to understanding metals bioaccumulation would be to incorporate a “bioenergetics approach” into the framework.

- We request that the panel clarify and provide a fuller discussion of the first short term recommendation concerning the use of BAF/BAF values on page 70. Specifically, we request the SAB provide an explanation of what language or ideas specifically need to be inserted or amended in the justification concerning why or why not to use BAFs/BCFs to make it “more explicit and coherent”.
- Second, we request a fuller discussion concerning the recommendation in the Executive Summary and on page 69 that alternative methods to the BCF/BAF approach are available for hazard ranking and national scale assessments. We request that the SAB identify some of the specific approaches that are “more flexible and less variable”, as opposed to the passing reference to the literature. This will be particularly important for the purpose of hazard ranking. It will also be important for the SAB to provide its opinion on the state of the science of any models and approaches it recommends, and the extent to which they are applicable now or require further validation and study.

Again, we appreciate the effort of the peer review panel, and look forward to a final document that considers our comments so that we may effectively and efficiently respond to the recommendations and revise the framework accordingly. Dr. Anne Fairbrother and Dr. Randy Wentzel will be attending the teleconference on Nov. 7, 2005 and will be available to clarify any of the aforementioned comments.