

**U.S. Environmental Protection Agency**  
**Science Advisory Board**  
**Multimedia Multipathway Multireceptor Risk Assessment (3MRA)**  
**Modeling System Panel**  
Final Minutes of Public Conference Call Meeting August 15, 2003

**Committee:** Multimedia Multipathway Multireceptor Risk Assessment (3MRA) Modeling System Panel of the U.S. Environmental Protection Agency's Science Advisory Board (SAB). (See attached Roster)

**Date and Time:** August 15, 2003 from 10-12 noon, Eastern Time (See attached Federal Register Notice )

**Location:** Science Advisory Board, Room 6450Z, Ariel Rios North, 1200 Pennsylvania Ave, Washington D.C.

**Purpose:** The purpose of the conference call was to allow the Panel to discuss the charge for the review and be introduced to the review document

**Materials Available:** In addition to the materials distributed before the July 21, 2003 Conference call, the Panel and Public had received the agenda and Federal Register notice for this conference call, a CD with four volumes of review materials and a user's guide for the model, a CD with the model on it, the website where the results of more than 45 previous peer reviews of parts of the modeling system are available, an e-mailed "Roadmap" from the Agency relating materials in the four volumes to the public comment received at the previous conference call, and an emailed public comment from the HWIR Consortium.

**Attendees:** Panelists deFur, DePinto and Merrill were unable to attend this call. All other panelists attended the conference call. A full list of participants, including the Agency and the Public, is attached to the minutes.

### **Summary**

The major elements decided at this meeting were:

1. All Panelists are welcome to respond to all questions.
2. In the interest of being sure that all charges were addressed, the chair assigned panelists to prepare preliminary assignments by charge questions. Those assigned will provide written input to the integrator with a copy to the Designated Federal Officer (DFO) before Saturday August 23. (After the conference call, the chair and DFO determined that these will be distributed to the Panel, Agency and Public at the meeting with the necessary caveats so that everyone understands this is just the beginning. Some comments will not make it into the final report; new ones might emerge and they will all probably be modified.) The team leader for each question will bring a preliminary summary to the face-to-face meeting on diskette or (better) email that summary to the DFO by mid-day on the 25<sup>th</sup>. This material can also be shared. The assignments are summarized on the table on the next page.

3. The Panel agreed that they did not want to see each piece of writing from each panelist. Because there would be discussion of the summaries prepared by the integrator, if anything was omitted, the panelist had ample time to present that thought to the full Panel at the face-to-face meeting.

<b>Preliminary Writing Assignments</b>		
Question	Individuals from whom Preliminary Responses are Expected	Team Leader
1	All	Theis
2A	Carbone, Carlisle, Eschenroeder, Maddalena, Thibodeaux	Murarka
2B	Boissevain, Brown, Foran, Stubblefield, Travis	Murarka
2C	Carlisle, deFur, Merrill, Murarka	Murarka
3A	Boissevain, Brown, DePinto, Smith, Thibodeaux	DePinto
3B	Carbone, DePinto, Eschenroeder, Foran Maddalena, Smith, Stubblefield,	DePinto
4	Boissevain, Carbone, deFur, Merrill, Murarka, Smith	Merrill

4. DFO White will remind panelists of assignments and send email addresses of coordinators
5. Theis will confirm DePinto and Merrill will integrate text for “their” questions.
6. Theis will develop, and forward to the DFO to distribute, a common case to test and discuss. A single site, single waste unit, single chemical won’t take too long to run and will improve the Panel’s understanding of the model and the Panel’s comfort level.
7. DFO White will speak with Carbone about emails he may not have received and with Russo about additional charge questions.
8. The Panel re-wrote Charge Question 2C to read, “Does the 3MRA model system generate sufficiently reliable science-based information for supporting national based regulations for specific waste management programs?”
9. White and Laniak will follow-up with the Corps about publicly available peer review comments on their FRAMES-based ARAMS model. If there are such comments, the 3MRA Panel may find them useful in responding to charge question 3A of their review.
10. The Panel separated Charge Question 3B into two sentences and edited the end, so that the full question now reads, “EPA has implemented thorough evaluations using the available data resources and technologies, while also recognizing the real world limitations that apply to validating the 3MRA modeling system. Have we reasonably demonstrated thorough methodology design, peer

review, quality control, sensitivity analyses, and model comparison, that the 3MRA modeling system will produce scientifically sound results of high utility for use in multi-media regulatory applications?”

11. The Panel re-wrote the first part of Charge Question 4 so that the could deal with the model as it is, rather than as it used to be. Dr. Murarka agreed to provide some limited reflection on changes since 1995 to benefit the SAB and the EPA in determining the utility of SAB advice. The charge question now reads, “Is the documentation for the 3MRA modeling system adequately designed and prepared? Does the SAB have additional suggestions for improving the presentation of the comprehensive set of materials related to this modeling system?”
12. Panelists are encouraged to bring laptops to the face-to-face meeting. There will be four power strips for use by the Panel.

The following is a more chronological and detailed account.

At 10:00, SAB DFO Kathleen White opened the meeting. She called the roll of the Panel, expected Agency staff, and the public. The list of attendees is attached. She made the following points:

1. Welcome to the conference call, which is the second in a series of face-to-face and conference call meetings at which a specially formed panel of the EPA Science Advisory Board will review the 3MRA Modeling System.
2. The activities of the Science Advisory Board are governed by the Federal Advisory Committee Act, other government regulations (such as those on conflict of interest) and SAB policies.
3. In accordance with those policies, this panel was formed using a widecast (FR dated April 11), a short list was posted June 20, and, after consideration of the comments received and the review of confidential financial disclosure statements, the current panel was formed.
4. She referred those present to the SAB website ([www.epa.gov/sab](http://www.epa.gov/sab)) for materials relating to the 3MRA review and about panel formation.
5. All panelists have completed a course on government ethics prepared especially for Special Government Employees, like themselves.
6. All materials available to the Panel will be available to the public. Individuals wishing to be on the DFO’s distribution list for materials relating to this review should send an email to that effect to the DFO ([white.kathleen@epa.gov](mailto:white.kathleen@epa.gov)) who will add them to her list.
7. The Panel’s first face-to-face meeting will be held August 26-27 at the Marriott DC at Metro Center, 775 12<sup>th</sup> Street NW. It will be followed by conference calls September 16 and October 9, a second face-to-face meeting October 28-30, and a final conference call November 24.
8. Public comment is accepted at SAB meetings. Written public comments are encouraged, but opportunities for brief oral comments are also scheduled.
9. Ted Steichen from API has requested time for public comment.
10. All consensus drafts, and possibly earlier drafts, will be available to the public and the Agency.
11. As part of the SAB’s routine process for insuring the quality of the reports it provides to the Agency, after the Panel is satisfied with its report, it will be sent to the Executive Committee for review before being transmitted to

- the Administrator.
12. Because this is a conference call, she asked that people use the mute button if they were not speaking and identify themselves before they do speak.
  13. The panelists introduced themselves at the previous conference call and their biosketches are available at the SAB website. In the interests of saving time, the introductions will not be repeated at today's call.
  14. There was a brief opportunity for procedural questions.

At 10:10, the panel chair, Dr. Thomas Theis said that the main purposes of the conference call was to engage the panel members in a discussion of the charge. By the end of the conference call, he would like to come as close as possible to the final charge. He will make preliminary assignments of individuals to particular charge questions so that when the Panel meets in eleven days they will have written materials to bring to the meeting to focus them on the charge questions. None of this is cast in stone and can all change at the meeting. However, writing assignments are needed to get the panel started and he asks their cooperation on this.

**Charge Question 1: While the EPA had the assessment methodology peer reviewed prior to the development of the 3MRA modeling system, does the SAB have any additional comments about the methodology as implemented?**

Panelist Foran asked whether the documents the Panel received on the CD had been revised as a result of the peer review comments received earlier. EPA's Barnes Johnson responded that there were a series of peer reviews done on this effort over eight years, beginning with the SAB prior peer review. It was certainly EPA's intent to be responsive to the peer reviews. The background documents identify peer reviews of various modules. One of the first was of the overall approach and plan. This was followed by module reviews. There was an attempt to address many of those comments to the extent possible. There were at least three letter peer reviews done on each module. Because not all peer reviewers agreed on everything, EPA could not implement all the advice given. Sometimes the best they could do was take the lessons learned and apply them. There are some comments that EPA received that they have not had the opportunity to address or they were not sure, when there was a conflict between peer reviewers, what path to take (for example, concerning complexity). In sum, EPA has incorporated many (but not all) advice.

Panelist Maddalena says Question 1 seems to separate the model from the assessment methodology. He is having trouble finding the assessment methodology separate from the model in the review documents. Is there a difference between looking at the methodology and the model? Panelist Murarka responded that he thought the model and the risk assessment methodology were the same thing. Similarly, Theis thought EPA worked out what they thought they should do, had it peer reviewed and then tried to implement it in the model. Barnes Johnson called on Gerry Laniak from EPA/ORD/Athens to speak to "assessment methodology" and direct the Panel to the materials that EPA calls the "assessment methodology." Laniak said EPA wanted to distinguish the conceptual approach from the software that implements it and both from the applications. There is an element of the original write-up of the methodology which was not implemented in the model – second stage Monte Carlo analysis for which there was not enough data, for example. EPA/ORD/Athens Justin Babendreier directed the Panel to Volume 4, Section 3 which provides a review of the methodology and a description of how it was implemented. This is mostly about the ideal implementation of the Monte Carlo simulation and what is really done. Some of

this is discussed in Volume 4 Appendix A. Panelist Brown asked if there were any other differences between the conceptual plan and the model that the Panel should be aware of. Laniak and OSW's Saleem said that second stage Monte Carlo analysis is the only difference they are aware of.

This thinks every Panelist may respond to Charge Question #1,

White asked the Panel's preference concerning whether each panelist would like to see everything written by each panelist, or would they be content to read the integration? The face-to-face meeting would provide panelists with the opportunity to bring out anything inadvertently omitted by the integrator. Several panelists favored that approach; the panelists were given the opportunity to speak up in case anyone wanted to see it all and none did. The DFO will send the Panel each other's email addresses. Panelists will copy the DFO on what they send the integrators.

**Charge Question 2a: Does the 3MRA modeling system provide a tool for performing national risk assessments that facilitates consistent use of the science and provides a mechanism for reproducing results?**

Murarka said the first part of the question, on consistent use of science is perfect, but he is confused by the second part. Reproducing results could mean, "if I put in the same input parameters, I would get the same answers by running the same model on different machines by different people." This is not exciting. Laniak agrees it is not exciting. The question is intended to get at whether someone who saw a table in the FR could reproduce it. The concern raised in this question results from criticism in the SAB's 1995 review. EPA wants someone to be able to reproduce the results from the first step. Panelist Carbone said it is important that independent modelers can take the same inputs and come up with at least qualitatively similar results. Ideally you would eliminate bias.

Murarka said the second way he interpreted this part of the question is, "Would different modelers use the model in the same way?" To answer that, however, would take an experiment by several panel members (perhaps 5) to address 1-2 problems. Carbone said he had the opportunity to run the model and found there were few opportunities for subjectivity. This suggests the model run consistently across computing platforms. Babendreier thinks the second part of the question is about precision.

This sees one other aspect. If you want to reproduce results, you also have to use the same initial parameters for the Monte Carlo. Maddalena cautioned that this question focuses on national risk assessments; that's what it is designed to do and where the Panel should keep its focus.

Panelist Brown returned to Murarka's earlier point. It would be interesting to see if some sort of risk assessment problem could be posed which panelists, if they wished, could see if they could reproduce. Maddalena thought that was a task for Athens. Murarka asked, if so, how does the Panel answer the question? This thinks the idea might have some merit. The model is not hard to run, although sometimes you can stumble into a long running time. He thought it might increase the Panel's level of comfort in answering charge question 2a if they could do something like Brown suggests. Smith asked if there was a test case embedded in the manual -- perhaps benzene which was used for the Monte Carlo demonstration -- which could be used as is or a slight modification agreed upon so it would be a new case, but the same case for everyone

Laniak isn't quite sure where the Panel is going. Smith thought the question was about familiarizing the Panel with the model by having them all run the same case. Laniak suggested one of the 201 sites, a chemical, and a waste management unit and

picking maximum as the output characteristic. This approach reduces run time over a national assessment and provides a lot of specific information they could examine using the site visualization tool. He suggests limiting it to a single Monte Carlo run. This approach helped the team at Athens understand the system and debug the system. A panelist is not sure if a run with the 1.0 version of the model includes a Monte Carlo piece; the SuperMUSE system may be the only opportunity to run model with MC.

Babendreier says it is all amenable to inspection and testing, its just a matter of how much run time the Panel wants to spend. Carlisle asked if the Monte Carlo could be examined on a small scale. Babendreier says the stand alone model does the same thing as the parallel computing version; it is just slower.

This is not sure how deeply the Panel wants to get into precision testing. He thinks the panelists are all running the model and are all going to play with it. Therefore, it would be useful to have a common case to test and discuss. Single site, single waste unit, single chemical won't take too long to run and it would improve our understanding of the model and the Panel's comfort level. This will come up with a case and send it to the DFO for circulation to the Panel. Panelists liked this idea.

Laniak cautioned the Panel that if they combine maximum storage limits along with many runs, they could exceed the capacity of their hard drive.

For 2A: Maddalena, Carbone, Carlisle, Eschenroeder, Thibodeaux will contribute comments to Murarka who will integrate comments for Question #2.

**Charge Question 2b: Does the 3MRA modeling system provide decision-makers sufficient flexibility for understanding the impacts on potential chemical exemption levels by allowing varying measures of protection based on the number of receptors and/or number of sites protected, types of human and ecological receptors, and distance?**

(This discussion began at 10:50)

This believed to answer this questions panelists must both review the written material and run the model. Laniak said that if the Panel looked at the EL2 graphics they will see a number of views (or slices) through the national analysis. Babendreier referred the Panel to section 4.6.1 of Volume 4. The decision-maker sees these as decision variables. There is a richness in the ability of the decision-maker to look at different decision variables.

Murarka recalled a comment from the 1995 review that ecological risks should only be allowed when minimum data for ecorisk assessment are available. Cozzie from OSW said EPA developed a data confidence document on ecological benchmarks, which can be found at the OSWER website with other background documents, under the reports section. (This website location was given in the April 11, 2003 Federal Register Notice.) This document describes all the considerations that went into the variables based on the data so the decision-maker can decide whether it is good enough.

Panelist Carlisle says the model has a lot of flexibility. However, EPA is also talking about a regulatory scheme in which, he presumes, at some point these points will be chosen. Are we commenting only on the system that allows the decision-maker to make these choices? Or are we eventually commenting on the choices?

Murarka's understanding is that policy decisions are not the SAB's purview.

For 2B: Stubblefield, Travis, Foran, Brown, Boissevain will contribute comments to Murarka who will integrate comments for Question #2.

**Charge Question 2c: Does the 3MRA modeling system provide appropriate**

## **information for setting national risk-based regulations for the waste program?**

Murarka asks what is “appropriate” and what is the “waste program”? It is a very broad question. Someone said that the model should not say what this is. Panelist Travis said this is the old “Red Book” stuff – the difference between risk assessment and risk management.

Murarka suggested, “Does the 3MRA modeling system provide results that could be used for setting national risk based regulations for a more defined waste program”

Eschenroeder suggested sufficient instead of appropriate.

Barnes Johnson raised the point that the answer to the question as Murarka proposed it is, “No” because it doesn’t provide the myriad of other things used to set national risk-based regulations, such as economic analysis. “Sufficient” isn’t enough.

Boissevain suggested adding something about science or environmental based information. After some further discussion

After some discussion, the Panel agreed on, “Does the 3MRA model system generate sufficiently reliable science-based information for supporting national based regulations for specific waste management programs?”

For2C: Murarka, Merrill, deFur, and Carlisle will contribute comments to Murarka who will integrate comments for Question #2.

Murarka gave everyone to send him their comments by Saturday August 23 so he could integrated them before the meeting. This asked for the same consideration.

**Charge Question 3a: Is the software development and verification testing approach implemented for the 3MRA modeling system sufficient to ensure confidence that the modeling results reflect the modeling system design?**  
(This discussion began at 11:05)

Brown asked about the FRAMES network. Is 3MRA the only modeling system currently using the FRAMES concept which was developed jointly by EPA and other Agencies. 3MRA was the first to use FRAME, but it is not the only. The Army Corps of Engineers in Vicksburg has ARAMS, for example. Brown asked if the other applications are being reviewed. Athens is not sure. Brown wondered if those reviews would be of any use to this Panel. Athens will find out if there is, then Panel can decide it whether it is useful. Barnes Johnson said that this Panel’s review will certainly interest others. White cautioned that anything that comes to the Panel is publicly available and that the Corps needs to understand that before it provides the Panel with anything.

Murarka had questions about verification testing. This agreed it was a lot of work to answer this question. The question focuses on the verification testing approach used for 3MRA modeling system and how that connects to the level of confidence we have that the model produces what it says it will. The documentation spells out the verification procedures pretty well; it is a tedious but answerable question.

Saleem directed the Panel to Volume 3, Section 2 (overall approach) and Section 4 then write-ups by module. Volume 4, section 6.7 provides a perspective on the systems level testing.

3A: Thibodeaux, Brown, Smith and Boissevain will contribute comments to DePinto who will integrate comments for Question #3.

**Charge Question 3b: Given the thorough evaluations that EPA has implemented using the available data resources and technologies, while also recognizing the real world limitations that apply to validating the 3MRA modeling system, have we reasonably demonstrated through methodology design, peer review, quality**

**control, sensitivity analyses, and model comparison, that the 3MRA modeling system will produce scientifically sound results of high utility and acceptance with respect to multimedia regulatory applications?**

(This discussion began at 11:15)

Murarka observed that the inclusion of peer review requires the Panel to look at the nature and extent of prior peer review and the limitations introduced by the Agency's inability to incorporate all comments.

Smith asked if Murarka had prepared a checklist, which he had not.

Stubblefield has a concern with the last part of the question as stated. It comes down to whether 3MRA produces scientifically sound results and their acceptability. Acceptability is in the eye of the beholder. This said this is like the difficulty they had in 2C and should be interpreted within the bounds of what the model is intended to do. The charge can be modified as in 2C.

What is acceptable to regulators may not be acceptable to industry. Carbone suggested, "produce results based on scientifically sound basis and of high utility with multi-media regulatory. . . ." Murarka suggested that the question be rephrased to read, "Given . . . , that the 3MRA modeling system will produce scientifically sound results of high utility for use in multi-media regulatory applications" The Panel agreed to this.

A panelist was intrigued with "has EPA demonstrated" instead of "does the model produce" Is the Panel really supposed to address whether EPA has demonstrated something? The answers to those two questions could be very different. Murarka thinks this follows from consideration of questions 2A, 2B and 3A. After having addressed the concerns in those questions, question 3B asks whether the implementation results in consistent and repeatable outcomes which are sufficient and scientifically sound for decision-making.

A panelist (perhaps the same one) responded that if EPA did document it, then the Panel can answer the question.

Barnes Johnson said EPA wasn't trying to be cute with this question and referenced the last part which says, "system will produce scientifically sound results." EPA is just asking whether, through all this, have they produced scientifically sound results.

Murarka suggests 3B be separated into 2 sentences for clarity. The first is the premise that says what EPA has done and the second would state the question. This said the Panel has been asked whether, in their expert judgement, the science is sound. If they say it is, it is. Murarka says that, if the Panel finds something has not been tested or demonstrated, the Panel needs to point out what remains to be done. This thinks the answers to some of the other questions will feed into this one. For example, if verification testing was not done or not done well enough it will affect the answer to this question.

Babendreier spoke to a plan presented in Volume 4 which has not yet been completed.

Foran said there could be three answers, "Yes", "No", or "We Don't know because it hasn't been demonstrated."

Thibodeaux prefers due diligence to "demonstrate" but Murarka is uneasy about legal terms. Perhaps "reasonably demonstrated" will do. Another panelist objected to "due diligence" because it could mean "did EPA try hard enough" Smith is comfortable with reasonably demonstrated and that seemed to be the phrase most comfortable to most of the panelists. That is the existing language.

Foran observed that EPA had some reason to make that list and asked what those reasons were and whether the panel add to the list. Barnes Johnson responded that EPA knew there would be a lot of attention given to the quality of this effort, so they had lengthy discussions of what activities they could implement to make sure what they were doing was high quality. These are the generic categories within which the various

activities they undertook have fallen. Listing them here just identifies what it was that EPA did to provide quality.

Barnes Johnson said the whole verification/validation document will help answer this question and many sections of the sensitivity/uncertainty document as well. In preparing responses to questions 3A and 3B, panelists will find it helpful to focus on Vol 3 and 4. In Vol 4, particularly where they lay out the approach to model validation. Volume 1, Sections 2 and 3 give a good overview of the overall methodology.

3B: Maddalena, Foran, Carbone, Eschenroeder, Stubblefield, Smith will contribute comments to DePinto who will integrate comments for Question #3.

This will ask DePinto to integrate, but he's not on the conference call.

**Charge Question 4: Has the EPA made substantive progress, relative to 1995, in designing and preparing documentation for the 3MRA modeling system? Does the SAB have additional suggestions for improving the presentation of the comprehensive set of materials related to this modeling system?**

(This discussion began at 11:35)

This noted this presupposes familiarity with the 1995 document; he is not sure how familiar the current Panel is with that. He wonders how important it is to gauge the current document against 1995. Shouldn't it be enough to say whether or not it is adequate? Boissevain would be happy to look at it for what it is rather than what it used to be.

Murarka says the state of science is much advanced since 1995. He would prefer not to answer the first part except for a broad 1-2 statement and then move on to the second.

Panel agreed to change first part to, "Is the documentation for the 3MRA MS adequately designed and prepared?"

Barnes Johnson has no problem with the change and provided an institutional perspective on the position in which they find themselves with respect to the SAB. They developed a model, brought it to the SAB, which gave advice that the Agency followed up on. Historically, SAB has cared whether or not EPA takes its advice. In this phraseology EPA just wanted to remind SAB that they had concerns and EPA had responded to them as part of an on-going dialog.

This thought this was a good point. Murarka mentioned the background section of the charge which summarized 7 key points from the previous review. Many of those things can be answered in a one sentence manner and the Panel could prepare a paragraph which reflects the changes; he will craft. This will give what Johnson is seeking without taking a lot of the Panel's time.

4: Smith, DeFur, Boissevain, Murarka, and Carbone will contribute comments to Merrill who will integrate comments for Question #4.

At 11:45 This acknowledged they ran over and went directly to public comments. (After the meeting Murarka suggested that the remaining conference calls be scheduled for four hours instead of 2-3. This question will be explored.)

Nadine Weinberg of Arcadis which has expertise in risk assessment, groundwater modeling and statistical analysis, etc. They have been providing assistance to the HWIR Consortium. Her remarks summarized the letter transmitting her technical critique (attached). The Panel confirmed that the attachment of the public

comment is adequate for these minutes. Theis thanked her and asked if there were any other comments. There were none.

Theis observed that, while there was not time now to go into each volume, EPA staff would be present at the face-to-face meeting to address questions on the documents if necessary.

At 11:50, he summarized what the materials are for the review:

5 volumes on CD  
model on CD  
public comments from July 21 and August 15  
EPA roadmap with reference to background documents  
website for prior peer views

EPA/ORD/Athens Laboratory Director Russo raised the question of addendum questions. The DFO had been told by her manager that they had been withdrawn. Russo and White will clarify this with their respective managements.

Due to pressure of time the Panel did not address these items from the planned agenda:

Overview and Introduction to Review Documents (OSW and ORD Staff, TBA)

More detailed discussion of:

Volume I: Modeling System and Science  
Volume II: Site-based Regional and National Data  
Volume III: Ensuring Quality in the System Modules and Data  
Volume IV: Evaluating Uncertainty and Sensitivity  
Volume V: Technology Design and User's Guide  
Technology: Installation and Use of the Modeling System

After thanking the members for their efforts, Dr. Theis adjourned the meeting at noon.

Respectfully Submitted:

Certified as True:

                  /signed/                  

Ms. Kathleen White  
Designated Federal Official  
Environmental Engineering Committee

                  /signed/                  

Dr. Thomas Theis, Chair  
3MRA Panel

**Attachments** (hardcopy)

1. Agenda for the meeting
2. List of attendees
3. Committee roster
4. Federal Register Notice
5. CDs for review
6. "Roadmap"
7. Location of website with previous peer reviews
8. Chair's emailed approval of the final minutes