U.S. Environmental Protection Agency
Science Advisory Board
Multimedia Multipathway Multireceptor Risk Assessment (3MRA)
Modeling System Panel
Minutes of Public Conference Call Meeting October 9, 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: October 9, 2003 from 1-5 p.m., 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 have structured discussions to assist them in their review of the 3MRA Model System and supporting documentation.

Materials Available: In addition to the materials distributed before the September 16 20003 conference call meeting, the Panel, the Agency and Public had received the original and revised agendas for this conference call, draft minutes for the September 16 conference call, draft Responses to Q 1,3, and 4, and a write-up on water balance provided by Bob Ambrose of EPA. (The draft response to Q2 was not provided until October 14, but for the sake of convenience will be included with these minutes.)

Panelists also received comments from individual panelists which were used by Drs. Theis, Murarka, DePinto, and Merrill to develop integrated responses to the four charge questions.

Attendees: Drs Thibodeaux and Eschenroeder were only able to attend the later parts of this call. All other panelists attended the full conference call. A list of participants, including the Agency and the Public, is attached to these minutes.

Summary

The actions resulting from this meeting were:

1. Some Panelists will hold a fact-finding call on sources and the soil column module October 9

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3. Some Panelists will hold a fact-finding call on sources and the soil column module October 9

4. Boissevain and Smith will identify criteria which might be used to classify the modules.

5. Because the PDF draft dropped some equations and distorted at least one graphic, the DFO will send out the original MSWord submissions from the question integrators.

6. Panelists will revise using track changes feature of MS Word

7. Panelists will let DePinto know, through the DFO, whether they want any changes in the structure of the response to Question 3. DePinto is not able to participate on the October 15 call.

8. Brown offered to develop an outline modeled after the Beck paper for the Panel.

9. The DFO was to obtain and distribute the Beck Paper

DFO should add information on the preparatory/fact-finding calls and the participating individuals

The following is a more chronological and detailed account of the meeting.

At 1 :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. This is the fifth meeting in a series of seven 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.

   Dr. Eschenroeder and Thibodeaux will be joining about 2:30. Dr. DeFur, who was present from the start of the call, will have to leave a little before 4:00. Dr. Foran was also present for the first part of the call.

   Since the last meeting, there have been three preparatory meetings of two or more panelists with Agency staff for fact-finding. These were a September 18 call on validation, a September 19 call on uncertainty, and an October 8 call on health and eco issues. The DFO was present on all these calls. Drs. Brown, Foran, Merrill, and Stubblefield will briefly summarize these calls for you in a few minutes and the DFO's notes will be appended to the minutes for this conference call.

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. All panelists have completed a course on government ethics prepared especially for Special Government Employees, like themselves. The panelists introduced themselves at the first conference call and their biosketches are available at the SAB website. In the interests of saving time, the introductions will not be repeated on today's call.

With the permission of those present the DFO skipped the following boiler-plate items which all had heard on the previous conference calls.

4. She referred those present to the SAB website (www.epa.gov/sab) for materials relating to the 3MRA review and about panel formation.

5. 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) who will add them to her list.

6. Public comment is accepted at SAB meetings. Written public comments are encouraged, but opportunities for brief oral comments are also scheduled. David Case of the Environmental Technology Council will provide brief oral comments this afternoon introducing a written public comment, prepared by AMEC Earth & Environmental, for ETC which is in the mail to the panelists.

7. All consensus drafts, and possibly earlier drafts, will be available to the public and the Agency.

8. 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.

9. 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.

At 1:08, Dr. Theis welcomed the panel and introduced the revised agenda. When he reviewed the integrated material for Questions 1,2 and 4 it seemed to him that there were remaining questions about how EPA had developed the 3MRA and that, after the summaries of the preparatory calls, the Panel should begin with its questions for EPA then discuss issues on which the Panel will need to develop consensus. He is not sure that the Panel will get through the available material by the end of the day. In any case, the Panel will receive material on Q2 from Dr Murarka and he would like to schedule another conference call of the Panel.

Foran asked Theis to give some idea of the time frame for working towards consensus in the context of the face-to-face meeting scheduled for the October 28-30 meeting. Theis responded that this is the Panel's decision and he just takes its pulse. Based on the information put together so far it is clear that many panelists are still in a fact-finding mode. This has to be completed so that the Panel understands how 3MRA is put together. It is complicated and it takes time. The second thing – and he asked the Panel to correct him if he has this wrong – is that the Panel would be uncomfortable finalizing the report without seeing the rest of the validation work (comparison with TRIM.FATE and the Maine chlor-alkali plant) which are unlikely to be available before the end of October. This information may be forthcoming by the end of October. It seems that the Panel is doing its work in parallel with the EPA effort. He has explored with SAB staff the probability that the report will not be final before the holidays. He thinks today's call and the next one will help.

Nevnertheless, it is very important for panelists to write down what they are thinking. That's why these drafts are important. They give the Panel a common set of information. He recognizes some panelists are uncomfortable writing and this point but encourages them. Because there are so many people on the panel, panelists have to exchange thoughts in writing and writing makes it a more exact process.

Foran thanked Theis. Foran and Stubblefield find it very difficult to make a substantive contribution in terms of questions. Once he has the answers, he thinks he can make the written contribution. He is comfortable with an extended schedule

There were technical difficulties on the call that impeded discussion. The conference call operator tried to resolve them.

1:10 **Summary of Fact-Finding Calls**

Validation	Dr. Linfield Brown
Uncertainty	Dr. David Merrill
Ecology & Health	Dr. Foran

At 1:20 Brown summarized the September 18 Validation Preparatory Call. Besides himself, panelists present included Carbone, Maddalena, Smith, Thibodeaux, and Travis. Others present included Ambrose, Babendreier and Laniak, Castleton, Daily from UGA (this name and affiliation were written as heard, but may, in fact be differently spelled). The call covered four major areas: mass balance, validation

1. Mass balance
    a. importance of demonstrating
    b. degree to which it can be demonstrated
    c. how the mass balance might be extended to determine whther mass is conserved as you got from source to receptor

    Panel was concerned that receptors might be infinite sinks.

EPA thought this is one reason TRIM FATE comparison is important because TRIM conserves mass. Castleton spoke on mass fluxes; there was discussion of wither these could be manipulated to see if mass was being conserved and asked EPA to do a simulation of seven chemicals. Smith suggested a graphic. The two action items were that Theis, Maddalena, and DePinto were to develop a list of chemicals, including one metal and several organics covering a wide range of partition coefficients and Henry's Law constants. The second is that EPA offered to do these simulations and also continue efforts to

2. Validation
    a. modeling system validation
    b. individual model validation, especially GCSM
    c. qualitative measures of validation
    d. sensitivity of model output to the 2 km

Brown offered to develop an outline modeled after the Beck paper for the Panel and DFO was to obtain and distribute the Beck Paper. GSCM is the newest and least tested module. There will be a follow-up conference call specifically on the GSCM. The Panel is not sure what the qualitative descriptors, such as "good", mean. EPA responded they had not tried to do a quantitative description. Some panelists favored

consistency, some didn't; they decided to raise it to the full Panel. Panelists were interested in whether the 2km radius captured all the risk. EPA does not have data beyond that radius. The Action item is that the panelists thought determining the sensitivity of the model to radius. Brown thinks all the items brought up in the fact-finding call found their way into the October 7 draft responses to the

EPA is considering using arsenic, mercury and nickel among the seven chemicals.

The technical difficulties continued so that the Panelists all hung up and called in again. The DFO did not call roll again, but it did seem that the same people were present.

At 1:40 Merrill summarized the September 19 Uncertainty Preparatory Call which included panelists Brown, Carlisle (DFO to check notes for others) and Babendreier and Laniak from EPA to get information on how 3MRA handles uncertainty and variability and how th MC analyses are performed.

The exit levels are intended to be set to protect a certain percentage of the population and to provide those levels at a certain percentage of the sites. Much of the time was spent discussing the 2D analysis. Uncertainty and variability are the two dimensions of the pseudo 2D analysis. He referenced a table he developed.
It addresses variability primarily from sampling its site-based distribution of waste management units. It uses the inherent, empirical variability represented by the 201 sites to characterize the range of variability around the country. It samples from the empirical data and says, at any given site, the presumption is that the data collected in the Subtitle D survey captures the site with certainty. It looks through its simulations by looping through site parameters (which can be found in detailed tables in Chapter 4)) such as area of the WMU. It picks a single waste management unit (say one of 56 landfills) then picks the next component (uncertainty) and picks from a large data base of distributions and runs an outer MC loop. The notion that this captures uncertainty is that the site-specific population that it attempts to model are not 100% captured with certainty by the national or regional distributions it is selecting for input distributions. It is a combination of variability and uncertainty.

In a nutshell, for the example, each national realization will develop 56 different outcomes which generates an empirical probability distribution for the 56 sites which is one outcome for the 56 sites. By doing this repeatedly, you get a family of distributions for the 56 sites,

By 1:45 the frustration with the technical difficulties, all Panelists hung up and called into a different conferencing service.

At 1:50 Foran summarized the October 9 Eco and Health Issues Preparatory Call. Boissevain, Carbone, Carlisle, and Stubblefield were also present along with Dave Cozzie and Steve Kroner of EPA and their contractor from RTI Steve Beaulieu.

1. Mis-match of Levels of Complexity or Sophistication and the related notion of a screening level model.

The Fate & Transport models seem more complex than the foodchain, eco and health modules. The former have also been used longer with the result that people are more comfortable with them. EPA pointed out there was some validation of the aquatic food chain models. This was not resolved.

2. Nine Year Exposure Period for Humans to Carcinogens

EPA picked a nine year period based on the average residence time near sites. However, for some children, exposed early in life, the exposure will result in increased rates of cancer. Barnes Johnson reminded the Panel the model is not intended for use by anyone other than EPA. DeFur asked for clarification about whether EPA could add subroutines that would relate to specific chemicals known to result in increased risk of cancer for those exposed in early life.

3. Ecorisk

Incorporating of water quality information (such as hardness) that may relate to an adjustment in toxicity. EPA is working with Stubblefield to sort this out.

A question was raised about the averaging period for eco risk. 3MRA seems to assume a one year exposure, but the Chronic Continuous Criterion averaging period is four days. This will be sorted out.

The issue of layering of protection levels was raised with regard to the selection of exit levels. The same issue is addressed in the water quality criterion, which are designed to protect X% of the population Z% of the time

Population level effects was another issue. Violation of water quality criteria does not necessarily mean a population level effect. This is a “so what?” question which did not get discussed on the October 8 call.

Carbone and Boissevain agreed Foran had presented the essence of the call.

Carbone had a question for Barnes Johnson, who had said the model is only intended for use by EPA. He sought some clarification. Decisions based on the model will result in regulatory effects. Therefore, EPA must envision that the regulatory community that will use the model. It’s part of transparency for them to do it. Johnson responded that he was trying to clarify the fact that the model’s bottom line output will be a table in a FR notice. Those are the numbers that will be used by people to seek relief from the hazardous waste regulations. EPA will run the model and use the results to place in the table. During the course of developing those models, other organizations – such as ACC and Carbone’s employer – will run the model. What Barnes wanted to emphasize that this is not a model where they are worried about the look and feel of the screens, infinite compatability, etc. that would be necessary for a program that would be widely used.

Carbone said the screens are already much better than the ones he is used to using. He understands that making the model user friendly is beyond what EPA can handle at this point.
Barnes said EPA is looking for advice, not just the identification of issues, but the proposed solution to the issue. So when an issue such as childhood exposure to vinyl

chloride is raised, if EPA gets good guidance on how to implement that change, it will make the change. But it can't worry about whether other users will be able to make the same changes. Carbone thinks EPA doesn't want people outside of EPA fooling around with the code – what he calls version control. Babendreier asked if EPA wanted to add anything at this time. A voice spoke to model usability and said they have designed the model so someone can run the model as EPA did and reproduce the results. As for more in-depth usage and code changing, if EPA wants to change the code, at least they are more familiar with it and so it is easier for them as for other users who are less familiar with it. Version 2.0, now in beta testing, makes this easier. Babendreier agrees with everything Barnes said, but also emphasized that EPA/ORD cares a lot about transparency. They want outsiders to make available to the public the opportunity to take the model and reproduce what EPA has done. The voice gets the feeling that external users feel that transparency should be immediate and with little effort. This is not the case here. It takes more than a day or two to get your head around 3MRA. Carbone agrees. The panelists who are expert in modeling know that you need to spend time playing with models, even more time with the more complex models.

At 2:15 the chair moved to questions for EPA. One of the reasons it is important to write is that the questions become apparent. A written response from EPA would be best, or direction to a specific part of the review materials. He will direct everyone to the page in the PDF version of the October 7 draft

1. Effective v actual mass in the waste management units (see page 15, page 5 of original draft material put together by DePinto)

It appears to Theis that the Panel is asking, "Is what is written here correct?" A problem was that the equations did not get captured in the PDF version.

Keith Little of RTI said they had looked at Merrill's equations and agreed that Cw is diluted in the units by 1. For the Fwmu for the land application unit where there is soil as well, it is diluted by the soil as well.

Bottom line: the Panel got it right.

Merrill asked if this is reflected in the documentation. Little said it is not in the four review volumes, but it is in the previous documents. The document on the website is the October 1999 Technical Background Document for the Land Based Force Module. Cozzie says they will forward a link to the DFO with the name of the document.

Brown asked if there was a visual or graphic that could bring this equation into better perspective in terms of streams entering and leaving. Cozzie doesn't think there is anything, but will check. Little said there is no graphic in the 1999 documentation.

DePinto asked whether Fwmu is a site characteristic that is constant for a given realization? If so, does it potentially factor into the 2-D Monte Carlo analysis. Babendreier said Fwmu is uniform for all five waste management unit types. It is a constant and uncertain distribution for application to a given site. It is treated as an aspect of uncertainty in the pseudo-2-D analysis. DePinto is thinking in terms of site-specific mass balance work; the selection of that coefficient could effect the outcome of the mass balance significantly. There was general agreement on this.

Theis sumarized that EPA agrees that the Panel has this correctly. A question for the Panel might be whether this should be transparent in the final documentation for 3MRA.

2. Why does think of 3MRA as a screening tool?
(pages14 and 20 in pdf file and pages 4 and 8 of question 3B write up)

Is there a concise statement of the meaning of screening? Johnson replied there was not. Different members of the team will have and will offer different views. He will start by saying they don't put a lot of stock in the term "screening level" in the sense that it would mean something in particular. Early in the project they had a design in mind such that they would have a screening level style module and then a more detailed scientific module. From a run time and manageability perspective they would use the screening level modules for production runs and the more scientific modules for diagnostics. However, as the years passed by and the money got thinner – and because the run times for what they thought of as screening modules – they never pursued the more elaborate modules.

Barnes said that EPA tends to use the word "screening" when it is not doing site-specific modeling. He doesn't think there's a lot of intent in their use of the word other than to denote 3MRA is not a complex tool that would be applied to a site-specific problem. What is "screening" depends on your view. The 3MRA modules are less sophisticated, say, than models being used at Yucca Mountain. The 3MRA modules are quantitative and to hold up in a regulatory environment. 3MRA is also not supposed to do ranking.

Theis thinks some people on the Panel view that one of the reasons for developing 3MRA is that, perhaps, in some instances hazardous wastes were being over-regulated for the risks involved. Therefore, 3MRA would be a tool for providing more realistic exit levels. It is hard to hold this concept and screening level in one's mind at once.

Theis and DePinto wondered if the term is being used to describe complex quantitative models that are not validated. Johnson doesn't see it that way. He spoke of an air module where there has been some simplified digestion of air input data to reduce run times – that's more of what he thinks about as "screening". Babendreier said that "screening" is often applied in a tiered sense in modeling where people are weighing the use of more or less complex models. Also, "screening" often suggested more conservative. Now they are doing multi-media modeling and need to seek new terms.

Beaulieu wanted to respond to this in the context of the eco models. He think the relative lack of complexity relates to the use of the Hazard Quotient. That decision suggests "screening" level, in contrast, for example, to the use of three month studies in mammals. Carbone favored this. Beaulieu said that, at this time, they weren't able to go forward with it. For Carbone "screening" implies conservative assumptions and has a concern about conservatism being piled on top of conservatism. He thinks either EPA will run a screening model or they will use more specific scientifically based information.

Foran disagrees with Carbone about conservatism, but addressed the concern over the mis-match in levels of sophistication between the transport & fate side and the health & eco side.

3. How the GCSM was put together and reviewed (pages 16 and 22 of the PDF document)

Given that there is a fact-finding call tomorrow on this subject, the Panel decided not to discuss this today.

4. There are two sets of questions in a series of bullets (18 & 19, 22 ;7 and 8, and 10 of 3B write up)

The first series seem to be mechanistic questions about how 3MRA operates. Theis wants to be sure the Panel correctly understands how 3MRA operates. The Panel took a break at 2:55

Bullet beginning “Section 4.6.3"

Kroner said this is the issue of layering protection criteria. EPA understands it is compounding protection levels. EPA takes exception to the phrase “may result in species level protection well below . . “ because they aren’t sure that the effect is well below that of the criteria; they would have to look at this more. EPA will check on “and only for those species in the WQC database). At this time, they believe that the water quality criteria are protective of all aquatic life. Stubblefield thinks this needs to be checked

Babendreier (referring to Volume 4, Section 4.6.3) said there are ways in the system, particularly exit level processors, to look at population aspects of the analysis. Individuals are aggregated into site population statistics.

Cozzie thinks there are two issues here. One was addressed yesterday - is it maximum year or averaged over a year. The answer is it is a nine-year concentration. There is another issue embedded in this question. As you select someone for this cohort, they may age during the nine-year period. Exposure factors vary by age cohort. Boissevain understands the choice of nine years is a policy decision based on a distribution in the Exposure Factors Handbook. Maddalena asked about the nine-year rolling average – is it exposure or risk? Kroner and Cozzie say it is exposures used to calculate risk.

Regarding “It is unclear” EPA agrees it does not currently account for this

This is not the same concentration used for aquatic risk. Stubblefield and DeFur discussed briefly the water quality criteria which allow you to have one exceedance of the value for the four-day averaging period every three years. The 7Q10 was addressed as it relates to the use of EXAMS. Ambrose thinks if you really need four-day rolling averages, the calculational burden would be immense and it could probably not be implemented even on the supercomputer. Stubblefield said that, if you stay below a criterion, you should not have an effect, but you cannot be sure that if you exceed a criterion, you will have an effect.

Ambrose addressed the bullet that begins with “Exposure and risk . . .” saying that the exposures done the two different ways should be good within a factor of 2-3.

Brown asked if that factor was random or whether there was a bias. Ambrose responded that the chemicals that flow and decay would affect the chemicals. A persistent chemical in a stream would be affected more than a chemical that rapidly decays in a pond. Another voice thought that volatility would make a difference because of the air-water partitioning. Ambrose agreed that, where there was non-linear variation in the environmental parameters, it would make a difference. Carbone thought it might also depend on loading timing in association with the temperature variations. He thought EPA is calculating an annual average concentration based on annual average temperatures, rainfall, etc. Ambrose said that EPA is not calculating a steady state, it is a dynamic simulation. Because EXAMS is a time hog, EPA went to the annual average concentrations

Ambrose addressed the bullet that begins with "In a similar vein . . ." saying 3MRA uses two sediment layers with an exchange between the water column and the sediment layers. EXAMS recognizes solids deposition and resuspension; some people have questioned the mathematics of that formulation. It seems OK because it addresses the exchange of hydrophobic substances between sediments and the water column. They have a simple solids balance on the drawing boards for this module of 3MRA for loss in stagnant waters which could be implemented if the program continues.

Theis said that sediments act as an accumulator in 3MRA (and exchanges with the water column) and a source of exposure to benthic organisms.

DePinto asked whether this means that, over a long period time if there is no chemical decay in the sediments, the chemical in the sediments could eventually all come out into the water column if the load went to zero. EPA said yes. DePinto and EPA agreed there was no loss due to deep burial. EPA was concerned that, over long periods of time, sediments get cut through. It could be considered a conservative assumption in some cases.

The second series deals with water balance and Babendreier is working on it.

4. Previous reviews and Agency's responses (pages 26-28)

Theis asked if there is any place where EPA's reaction to the reviews is collected? If so, can it be made available? Kroner responded that they are trying to update a table they have about the reviewer's comments and the Agency's decisions. In some cases, the recommendations are research oriented and would require time and money that EPA doesn't have. This is not a classic comment/response document, but a way of capturing in short hand, what the advice was and what EPA did about it. They plan to have this available at the end of next week.

Kroner said that in the last year they focused on the development of the Version 1 model, correcting errors in the model, making data base changes, etc.

Carbone wondered if it would be worthwhile for EPA to compile the consensus of whether the modules were "good" beyond individual comments. He would also like to know the Agency's overall conclusion about the veracity of the modules. He would like to think EPA thinks each module has a level of confidence such that EPA feels comfortable using them to make regulatory decisions. He thinks that, without a great

deal of confidence about the modules. it is hard for the Panel to conclude that 3MRA is ready for use.

Theis just wants to have all the material in the Panel's hands. The Panel understands the Agency probably does not have point-by-point responses, but if we can capture the Agency's reasoning for using these modules, it would help.

Ambrose said that the EXAMS legacy code has been in use for so long that they didn't send it for another peer review. They put together an innovative quick calculation that would fit in it; that's what EPA had reviewed.

At 4:00 Theis asked EPA when some other things might be available. Laniak responded on model comparison and mass balance issues. They are further ahead on model comparison. They have plots of both TRIM and 3MRA results now and are looking at it; they are encouraged by what they see because most comparisons are within an order of magnitude, but they need to understand why the differences exists. One source of difference is in the modeling process; the other is the data. He doesn't think it can be brought to complete closure in the timeframe for this review. He and Babendreier expect to present this at the October 28-30 meeting.

Karl Castleton developed a piece of software that would assist with water balance, but there are wrinkles to work out and Laniak cannot promise closure within two weeks.

Babendreier is hoping to have a write-up for the Panel in the next couple of weeks sumarizing EPA's understanding of the questions raised on the fact-finding calls.

Theis asked if the Panel had other fact-finding questions for the Agency.

Carlisle asked if there was general interest in an output table with a selection of parameters (Panel could identify those they would like to see – a sprinkling of cohorts, protection levels, protection radius) showing exit levels of a handful of the variables he just mentioned. Babendreier asked some questions relating to the uncertainty analysis he planned for seven chemicals – what he referred to as the ELP2 visual output which they can run, but is not available to the panelists. This could be provided on disk to the Panelists. In version 1.x, EPA has the ability extract inputs to a single model run. Many input vectors contribute to a single exit value. Carlisle responded that he was looking for something simpler. He is not talking about input vector mapping, but about an array of exit levels.

DePinto seconded Carlisle's request. He thinks what Babendreier plans to provide will help the Panelists address whether the risks make sense for a range of chemicals. In other words, does it pass the straight-face test? It adds to the corroborative information about the model. Smith says that even if they could just have two chemicals, that would help.

Maddalena asked about the idea of doing MC analysis at the site level and extrapolating to the national level. EPA thought this would have limited conceptual meaning. Merrill recalls this discussion from the fact-finding call. He took away the idea that risk calculations don't roll-up at the site level based on site population density. The simulations calculate hypothetical risk to the individual, but don't calculate the number of individuals in the local population that would come down with cancer. Babendreier said

that, at the core GRF level they do calculate on a receptor-group by receptor-group basis the number that are and are not protected within the site. This is how they determine whether, for this site, was a given percentage of the population protected. Maddalena asked, if you calculate at ten to the minus six risk at a site with 10 000 people, how do you calculate the protection? Babendreier's answer dealt with Bernouli trials and said it was always normalized to population density. Maddalena asked, "Can you make the statement that 95% of the receptors are protected based on a single realization at the site?" Babendreier said you could run a site a million times and come up with a statement about how many times that site was protected. Maddalena said that answered a different questions. Even though you get a percent of population protected for each realization for each site (See Section 4.6.3). One model run cannot generate percentage of times protected or percentage of sites protected. One run is either protected at that level, or not.

At 4:20 Theis asked if EPA had identified any factual errors in the October 7 write-up or opinions clearly based on factual errors.

Babendreier referred to the discussion of sensitivity analysis (pages 29-30of the October 7 write up), especially beginning page 30, line 17. EPA will perform this on a chemical and waste management unit basis, assessing for several outputs. He thinks EPA has more capacity than the Panel understands.

Beaulieu referred to MACTs (page 19 lines 29). MACTs were <u>not</u> used to develop water quality criteria. MACTs can translate into very large effects. They used a similar methodology for extrapolating between NOELS and LOELS. A Panelist had a question because EPA said they use water quality criteria; this means one of two approaches (EC20s) or the reliance on the older data. Often MACTS were used in developing the ACRS. Beaulieu said he misunderstood the comment; he thought the Panel meant that 3MRA had developed criteria. The 3MRA team did not, they just used what was there

Babendreier on sensitivity analysis (page 31, line 42). The statement is true if you didn't do anything else to manipulate the data base system. However, it is easy to change a constant to a uniform distribution. EPA can use this

Ambrose spoke to the phrase, "segmentation in the water body model application (EXAMS) unaccpetably large" on page 20, lines 12-14. Often the reaches of streams were very small – a 2 km stretch might have 20 reaches. He doesn't think they have many long reaches.

Eschenroeder asked if this had been testing using "squareways". Ambrose said that pulsed loadings had been tested in EXAMS.

Babendreier raised an issue on page 26 line 32. 3MRA already has this capability, described in Volume 4, Section 6.4.2 (Site Summary Tool)

When there were no further fact-finding questions the chair asked whether anyone from the public wants to say anything. No one did.

At 4:40 Theis then began a discussion of issues embedded in Q3 and Q4. He noted that several had already been addressed in earlier discussion today. The first

He began with the meaning of a screening level model (already discussed), especially as it relates to the level of accuracy, and 3MRA spatial and temporal scales, and the "level of science" captured in 3MRA (page 14, page 20, page 4 and 8 of the original 3B material).

Boissevain finds the use of the word “screening” contradictory and would like to suggest we refer to is as a “tiered” system. That tiered system could have both quantitative and qualitative descriptors associated with. Smith thinks this is excellent. He thinks the Panel is struggling with the fact that some modules were at Tier 1 level and others at Tier 2 and some even (arguably) at Tier 3. The exercise on page 14 would provide some internal criteria for qualifying something for one of these tiers. Murarka wondered if it was even necessary to tier the modules. Wouldn’t simply describing it be enough? Smith thinks the concept of tier levels helps the discussion of which modules are more (or less) sophisticated.

Smith described tiers as follows:

Tier 1 would be a model used for screening or of nascent development and simple form which has not progressed to the point of our knowing it is a good description.
Tier 2 would be more develoepd with some application and verification.
Tier 3 ICST might be considered as Tier 3, although some might consider it Tier 2.

Murarka described a set of tiers used by the state of Illinois

Tier 1 is to accept the state’s model
Tier 2 use certain established models
Tier 3 bring in your own model and prove it

Murarka likes having the information available for the model components, but thinks that the word Tier may be confusing. Smith seems open to other language.

Boissevain says the Panel should decide what it means, put it in a glossary, and stick with it.

Theis asked whether the Panel felt comfortable assigning tier classes to the modules. They felt comfortable and that it was important. Performance criteria such as validation and level of the science could be considered. Smith thinks it needs to be kept simple – three or four tiers. A matrix would help people identify the weak link. Sensitivity analysis could assign a range of conditions which were OK because the modeling system is not sensitive to it. Theis likes the use of multiple attributes to describe the tier because it allows the Panel to address several issues at once, such as validation and level of science.

Carbone and Thibodeaux wondered if the whole model came down to the accuracy of the weakest link. Apparently sensitivity analysis could help answer this question. Boissevain said it may be a valid comment to say that the linked models are limited by the weakest link, combined with the sensitivity of the model system to that link, which might be chemical specific.

Eschenroeder asked what the tiers would be used for – setting priorities for research? Smith thought of them providing better communication, but, in fact, once you have the documentation you could use it to set priorities for research. Carbone thought EPA could also base its decisions on its confidence in the models used on a chemical specific basis. Theis thinks that the Panel's tiers, coupled with EPA's sensitivity analysis would allow everyone to focus in right away on the weak links.

Carbone is concerned that the models at the end of the chain are the newest and the ones in which we have the least confidence. Maddalena says that the legacy models have a long history of use and study . . . but possibly not on a wide range of chemicals. He doesn't know if they have been tested for chemicals outside the range of what they were designed for. Ambrose responded that EXAMS was developed for pesticides, but the literature contains lots of examples where it was tested for other chemicals. Maddalena said that's the kind of thing he wanted to hear about the modules. Smith said ICST has been used for practically everything (metals and organics)

Theis asked Smith and Boissevain to take a stab at identifying criteria which might be used to classify the modules.

Brown asked a question about the diagram on page 25 which didn't come out very well in the PDF file. Maddelena's point was that was for an air emission and it could be quite different for soils.

Theis thinks there seems to be a general recommendation that EPA should add more chemicals and Maddalena's graphic provides some basis for this.

Brown (perhaps) suggested looking at chemicals and characterizing them. Smith thinks this could be a second task, but even doing seven chemicals were a lot of work. Theis is not sure how much information they could get their hands on. Even if they addressed metals, VOCs and SVOCs that would help. Boissevain thinks it would be helpful even for VOCs. Theis thinks these questions go to the level of science captured in the various modules. Part of the problem with the eco assessment is that different chemicals have different effects depending on various aspects of the environment.

At 5:10 Theis asked if there were other important items that Panelists would like to get out. Otherwise they will pick up at this point on the October 15 call. The Panel was willing to let the remaining issues wait until a Panel preparatory call on Wednesday. These are:

Q2 issues which will emerge after Murarka's draft is circulated
Q3 issues

Soil column module

The concept of mutliple site comparisons (not just the chlor-alkali plant) as part of 3MRA validation.

Representativeness of the site-based database.

Additional approaches to sensitivity analysis and validation.

Q4
#1 Reorganization of the 3MRA documentation/improvement of clarity.
#2 Uncertainty and Variability (again--may also be in Q2).
#3 The issue of probability-based risk assessment (perhaps belongs in Q2).

No public comment was offered.

At the end of Wednesday's call, the chair hopes to have enough input to develop the agenda for the face-to-face call. He would also like revised text from the panelists so that he can produce a revised draft before the face-to-face meeting.

After thanking those present for their efforts, Dr. Theis adjourned the meeting at 5 p.m..

Respectfully Submitted:

_____/signed/_____
Ms. Kathleen White
Designated Federal Official
Environmental Engineering Committee

Certified as True:

_____/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. Individual Comments
6. Integrated Responses to Questions 1,3, and 4 (aka draft #1)
7. Integrated Response to Question 2 received October 14
8. Materials relating to the preparatory calls
9. Write-up on water balance provided by Bob Ambrose of EPA