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FIFRA SCIENTIFIC ADVISORY PANEL (SAP)

OPEN MEETING

SELECTED ISSUES ASSOCIATED WITH THE RISK
ASSESSMENT PROCESS FOR PESTICIDES WITH
PERSISTENT, BIOACCUMULATIVE
AND TOXIC CHARACTERISTICS

U.S. ENVIRONMENTAL PROTECTION AGENCY
CONFERENCE CENTER- LOBBY LEVEL
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2777 South Crystal Drive
Arlington, Virginia 22202

OCTOBER 31, 2008

8:32 A.M.

1 FIFRA SCIENTIFIC ADVISORY PANEL
2 MEETING
3 OCTOBER 31, 2008

4 **MS. CHRISTIAN:** Good Morning, again. By
5 now, you all know who I am, but just for the record, my
6 name is Myrta Christian, Designated Federal Official
7 for this FIFRA Scientific Advisory Panel. And without
8 any delay, I would like to introduce Dr. Heeringa,
9 chair for the FIFRA Scientific Advisory Panel.

10 **DR. HEERINGA:** Thank you very much,
11 Myrta, and welcome back everybody for the final morning
12 session of our four day meeting on the topic of
13 selected issues associated with risk assessment process
14 for pesticides with persistent, bioaccumulative, and
15 toxic characteristics.

16 We have made steady progress through the
17 presentations and charge questions this week. I think
18 we all agree, there's been a lot of exchange of
19 information, and we elected to save the final two
20 charge questions, which have some overarching aspects
21 to them, for this morning, so we'd all be fresh and
22 ready to go.

23 I appreciate the panel and the EPA staff
24 willingness to go to this fourth day. I think it's
25 going to be valuable to have done that in the end. At

1 this point, I'd like to turn to, either, to Steve
2 Bradbury, or to Don Brady, of the EPA for any opening
3 remarks or follow up on yesterday's session.

4 **DR. BRADY:** No, Dr. Heeringa, I think
5 we're ready to proceed to number nine.

6 **DR. HEERINGA:** Okay, then, again, since,
7 we've had introductions at the beginning of the week, I
8 won't have the panel introduce themselves. I think
9 we're all quite familiar with one another at this point
10 in the process. Why don't we launch right into
11 question number nine, and Dr. Brady, if you would
12 please read that into the record, please.

13 **DR. BRADY:** Okay, question number nine,
14 example pesticide assessments. In this White Paper,
15 the Agency provides examples of how it has assessed the
16 environmental persistence, bioaccumulation, toxicity,
17 and long-range transport of several, unidentified
18 pesticides, using refinements to its ecological risk
19 assessment methods.

20 Given the data available, as illustrated
21 in the pesticide examples provided in the White Paper,
22 please comment on whether the Agency has used these
23 data appropriately, to the fullest extent possible, in
24 assessing ecological risks of pesticides with PBT
25 characteristics; methods it has used to characterize

1 environmental persistence, bioaccumulation, toxicity,
2 and long-range transport potential of the example
3 pesticides.

4 **DR. HEERINGA:** Thank you very much, Dr.
5 Brady. And Peter Delorme is our lead discussant for
6 question nine.

7 **DR. DELORME:** Could I get that slide put
8 up of Table 8.1, please. I just want to thank, start
9 by acknowledging and thanking Steve for the extra time.
10 This question is, as it says in the document, a
11 cross-cutting question. It's, actually, a question
12 that is trying to integrate the responses from most of
13 the previous questions.

14 Again, I just want to emphasize that,
15 and I want to recognize that the proposed approaches
16 and methods used for the example pesticides do
17 represent a significant change from the current
18 approach to ecological risk assessment of pesticides.
19 Personally, I think that they, generally, appear to be
20 on the right path towards being able to better assess
21 pesticides with PBT characteristics.

22 I just want to point out that there
23 needs to be a dialogue between risk assessors and risk
24 managers to ensure the results of any risk assessment
25 are fulfilling the needs of the risk managers; and

1 interpretable and understandable by the risk managers,
2 so that they can understand things like the degree of
3 variability uncertainty associated with them.

4 And I just want to make sure, I'm sure
5 that Steve Bradbury is aware of the importance of doing
6 that, but that dialogue is important, and it usually
7 goes along, on behind the scenes.

8 With respect to the first charge
9 question, or the first part of this question, there are
10 a couple of panel members who, we did have some
11 deliberations. These are mostly my thoughts. We did
12 meet, uh, I did meet with the associate discussants
13 through the week, and discussed the new things, but
14 these, my, what I'm going to say here are, mostly, my
15 view on things.

16 There were a couple of panel members
17 that thought that the question was a little bit loaded,
18 'cause it was really given what the EPA had to work,
19 which we interpreted as, or more appropriate, what they
20 chose to share. We did not have access to the full
21 data, or the study, which sometimes make difficult
22 interpreting the context of how they developed the
23 numbers that they used in their risk assessment. They
24 did provide a good outline of the process in the
25 results of the analyses.



1 When you're looking at this question,
2 two aspects need to be considered. The first is how
3 they used the registrant submitted data. And second,
4 how they used other data, or information, which is
5 available, and which can be used to help characterize
6 the risk. For example, non-chemical specific model
7 input, six values, assumptions, and whatnot.

8 With respect to the registrant submitted
9 data, for the most part, it appears that the Agency
10 used the data provided. Without understanding or
11 having access to the context of the data used, it's
12 difficult to judge if it's been used to its full
13 potential. So, we get one value from the study, so,
14 we're not quite sure, you know, were there other stuff,
15 was it a range of things, but, you know, generally
16 speaking, we, it's difficult to comment on that.

17 There are a few cases when faced with a
18 range of values, rather choose a single conservative
19 input, they performed their analysis with values
20 bracketing the range to understand the impact on the
21 output, and I think, that's a good thing to do. It
22 provides additional information, with respect to
23 whatever your modeling.

24 However, I thought that there were more
25 cases with only one value was chosen, when multiple

1 values or ranges were available. So, for example, for
2 KOW pesticide four, you had a range of 7 to 8.1. He
3 used, for 7 to 9, he used 8.1. You know, maybe, it
4 would have been nice, I don't know if it makes a
5 difference, but, you know, it's nice to, sort of, give
6 that idea of what difference it makes in the value for
7 a model. You get that with sensitivity of the model.

8 Going back, in a tiered approach, the
9 use of conservative value is appropriate for initial
10 tiers, though. I will say that. But, again,
11 understanding the variability of response, the methods
12 of the model should be part of the risk
13 characterization.

14 Oh, you know what, I have the long
15 version here, just a second. Oh, I can't find the
16 right on. Anyways, with respect to the other types of
17 data that were used to characterize approach, sort of,
18 the input for the model, where there is data, there are
19 some cases where you provided supporting data, but
20 there wasn't in the analysis.

21 For example, in the suspended sediments,
22 you provided data on ranges of suspended sediments. I
23 didn't see where there was a real strong case for how
24 you picked the one you did, at least, not in the white
25 paper. It may be in another, other background papers.

1 So, there are areas where, you know, we
2 need to explore whether or not how you're using the
3 additionally available data from the literature can be
4 used more fully. Okay, and that's a hard thing to do.
5 I understand that. And I recognize that when you're
6 doing these things, the science tell you the
7 information. The policy may drive how you pick a
8 value, or how you use particular data, and it's working
9 at that science policy with it, okay. But,
10 unfortunately, I'll have to look back. I may be able
11 to find it later, and we'll address that later.

12 Now, with respect to the method that
13 you've used to characterize the various issues here,
14 what we discussed, and how I've approached it is, we've
15 taken Table 8.1 here, and it also appears other where,
16 looked at the issue, examines what you've presented,
17 okay, and the methods that you've been proposed.

18 And what I did is, when you were talking
19 about all these various issues, I was listening to see,
20 was anybody jumping up and down and saying what we've
21 done is really inappropriate. Or, are there serious
22 concerns, are there minor concerns about things, okay,
23 'cause the question is asking, you know, what do we
24 think about the methods, are they sound. That's,
25 basically, the way that I've interpreted it.

1 I just want to start off by saying that,
2 when you step and examine this whole package, there are
3 several common themes that seemed to emerge over the
4 week when we were discussing things across all the
5 issues, or the majority of the issues. And it may
6 effect to the varying degree how things are
7 interpreted, or they're the ultimate acceptability of
8 the proposed approaches from a scientific perspective.
9 Again, it's from a science perspective. And these
10 include things like, characterizing the uncertainty in
11 the variability of the model and the model results.
12 There's very little on that directly done.

13 Identification of assumptions was
14 brought up several times. You know, we need to be
15 clear about what the assumptions are, and, you know,
16 it's, in a general sense, probably a good idea that, at
17 some point, you have an idea of what the impact of
18 those assumptions might be on the output.

19 Assessment of model performance, okay,
20 always an issue that gets brought up. You have to
21 understand how well your model represents what's going
22 on out there, how, you know. And one of the ways, I
23 think, that you can achieve this, in this case, for PBT
24 pesticides is, there is data, both empirical, well,
25 mostly empirical, on older historically used pesticides

1 with these kinds of properties.

2 So, I strongly urge you to take those
3 and use them to a full extent by running them through
4 your processes, your models, your methods to see what
5 the results are. I mean, a lot of these things are
6 already gone. And if we can't learn from the mistakes
7 we've made in the past, we're on a treadmill to I don't
8 know where.

9 Maybe to where that guy that was handing
10 out candy was in the front this morning. And I think
11 it was brought up yesterday by Dr. Oris, you know. We
12 accrue the benefits now, and then pay the price later.
13 We're probably not doing our jobs properly.

14 Understanding model sensitivity to keep
15 parameters, you've done a little bit of that, okay, but
16 it needs to, you need to do that to better help you use
17 your model.

18 Feasibility of existing studies or
19 protocols for use in the assessment of PBT. This came
20 up, you know, a few times where study protocols that
21 exist now are more aimed at those things that are
22 soluble, or you know, help lower KOWs, lower Kocs, and
23 whatnot. And that hampers the interpretation of the
24 data.

25 We need to make sure that, if those



1 things need to be tweaked, if you need to put a
2 criteria in there that says, when you're KOW, KOA or
3 whatever parameter it is exceeds, or is less than a
4 certain value, you need to do this. That's a good
5 idea. That's also going to help the registrant to make
6 sure that they come in with data that's usable right
7 out of the get-go, which is, then, going to make it
8 easier for you guys to get stuff done, efficiently, and
9 us.

10 Suitability of the data requirements
11 themselves. You know, our, I like to say that our data
12 requirements read like a history book. They reflect
13 the problems that we've seen in the past.
14 Unfortunately, in the past, we weren't seeing
15 environments or risk assessments of some of the
16 chemicals that we've gotten rid of. So, they don't,
17 necessarily, reflect well, you know, these kinds of
18 chemicals.

19 So, there may be a need to, actually,
20 have new or different kinds of data produced for these
21 kinds of chemicals. And that was going to have to be
22 put, then, in your data requirements, and in ours in
23 Canada, and, possibly, in Europe.

24 Incorporation of scenarios or models
25 that go beyond field scale assessments, okay. Current



1 paradigm is, field scale, things don't move, you've got
2 to move beyond that, consideration of appropriate
3 temporal scales. So, maybe we don't need to model just
4 for a year. Maybe we need to do it five, six, seven.
5 Maybe we need to do that model, project it out into the
6 future.

7 And another emerging, another theme is
8 definition of tiered approaches where applicable.
9 Obviously, the general approach is to start
10 conservative, you know. If you pass something, or if
11 there's no problems identified, then there's no use, no
12 need to waste time and resources in, you know, building
13 a Cadillac if a Fiat will do.

14 There are logical links between the
15 models and methods proposed for consideration. For
16 example, you know, ATMOS-EAC feeds into PRZM feeds
17 into EXAM feeds into QWASI feeds or into AGRO. You
18 need to be cautious about building a house of cards
19 through changing a component in variability and
20 uncertainty.

21 At some point, the uncertainty may
22 render the results less than ideal for making the
23 decision, okay. You don't want to do a QSAR that, you
24 know, you're not really sure of, and have that as the
25 basis of a number of different steps or a number of



1 different models, only to find out in the end, that
2 it's not right, and your whole assessment falls apart.
3 So, you need to be aware of that.

4 I'm not quite sure how to address that,
5 but. And I know, in other areas, they do use these
6 kinds of things. I think we have the advantage with
7 pesticides in that, we can go back and ask for data,
8 and we can modify our data requirements. If we're
9 putting them out in the open environment, we need to be
10 careful. We need to have good data in order to do our
11 assessments.

12 So, now, what I'm going to do is, I'm
13 just going to go through the topic areas, and
14 basically, touch on the issues. Again, as I said
15 before, the approach that I take is, I listen to the
16 discussions. I tried to see whether or not people in
17 the panel were, sort of, saying, yeah, generally, we're
18 okay with what you're doing. You need to tweak it here
19 or there and other places.

20 Or, the general, my general comment to
21 the comment to the panel is, this is my perception of
22 what I've heard. If you don't agree with it, we'll be
23 discussing it. And if I've missed something, I
24 apologize, and let me know, and we can make sure we get
25 it in the record and reflect it.



1 So, for combined exposure, we used a
2 progressively more refined approach, depending on data
3 availability is logical, you know, whether you use
4 Total Residue, Residue Summation, or FD. Obviously, FD
5 was, generally, agreed to be the best way to do it.
6 There didn't seem to be much consternation or concern
7 that there is anything wrong with the approach that you
8 had proposed.

9 The only point that was made is, again,
10 understanding, in those cases, where you're using Total
11 Residue is to understand what the difference might be
12 from an FD situation. So, using the existing data,
13 again, to go back and characterize that a little bit.

14 Aqueous solubility, there were proposed
15 changes to incorporate precipitate compartment. You
16 know, their people seem to, generally, be okay with
17 that. Another method, a hockey stick method, I
18 believe, Louie suggested yesterday. You might want to
19 consider looking at that. I think, I don't know if
20 that will be in question three, the response. And
21 again, you should be able to go back to the specific
22 questions and get an idea.

23 All these things should appear there.
24 The issue needs additional work to better understand
25 differences between lab and field solubility to assess

1 the potential impact on the interpretation of tox data
2 and the results of modeling. Again, you can maybe do
3 some data mining. There are information out there
4 which, probably, compare those two things. See how
5 your models react.

6 I did have a question about the
7 assumption of freely dissolve, only the freely dissolve
8 being bioavailable. But I am a little uncomfortable
9 with that assumption, although, I know in scientific
10 circles, it's, generally, held as true.

11 With respect to degradation half-life,
12 generally, agreed that the whole system half-life is
13 good for characterization of the overall persistence in
14 aquatic ecosystems. It gives us a good understanding
15 of, you know, how pesticides are going to react out in
16 the environment. The problem it presents is just the
17 modeling when you're trying to do that.

18 Generally, I think, we just said that it
19 was, probably, an artifact of the study design. From a
20 risk assessment perspective, it could be, generally,
21 regarded as a conservative approach when distribution
22 of a chemical would be dominated by absorption to
23 descended matter or the sediment.

24 For example, high Koc, KOW is greater
25 than five. It might be useful, it might be appropriate



1 for an initial tier assessment just to see. And,
2 again, tier one assessments go back to the, if your
3 tier one assessment tells you that there's not a lot of
4 problem there, then, fine. Don't spend the effort to
5 do anything else. Consideration should be given to, we
6 talked about modifying data requirements to include a
7 water only biotransformation study in a spike sediment
8 to maybe help get some initial data that could be
9 useful for the modeling.

10 With respect to persistence in soil and
11 sediment, use of PRZM exam to examine your carryover in
12 field soil is a, you know, good, science-based, logical
13 first step. You can do that right now. It's just a
14 matter of implementing it. You might want to think
15 about how you might further refine this in other tiers,
16 you know, in terms of how, I understand how you input
17 your data, and stuff like that, but mimicking the
18 actual application pattern a little bit better, if it's
19 not every year, if it's every second year, and stuff
20 like that.

21 You can also look at field dissipation
22 studies there. You know, if you get a field, we get
23 field dissipation studies that cut across different
24 areas. So, if, at the end of the year, you're still
25 seeing thirty, forty percent, there's a flag right



1 there. And your model should be, you know, in line, at
2 least, if they're working properly. So, you know, that
3 gives you an idea right there.

4 For sediment, this issue needs to be
5 integrated with the sediment dynamics issue of burial
6 bioavailability, bioturbation. I think the key issue
7 is burial. You know, you need to better define, and
8 then adjust the model in the receiving waters scenarios
9 appropriately. You may need to develop additional
10 receiving waters scenarios to adequately characterize
11 the impact on different sediments dynamics in different
12 types of receiving water volumes. I think that both
13 myself and Dr. Thibodeaux indicated that.

14 Now, we weren't, specifically, asked to
15 address sediment dynamics in the question, but I'm
16 going to do it anyways, 'cause I think it's important.
17 I think that there was a lot of discussion. It was,
18 you know, I, actually, had trouble, at times, following
19 all the details of the science and whatnot, not being
20 from the area.

21 But, I think, it was, generally, agreed
22 that incorporating sediment dynamics into modeling is
23 necessary for assessment of PBT pesticides. It was
24 noted that this is scientifically a complex issue. I
25 have to get together with the people from question

1 three to get an understanding of how they're going to
2 answer that question. In the end, there was, I was
3 unclear on certain parts of it. So, I apologize for
4 that.

5 Based on, you know, the discussions and
6 what you guys presented, I think there is general
7 agreement that burial, at least, is an important
8 process to consider. But there were questions about
9 the appropriateness of the rate of permanent burial
10 that you used in your modeling. You guys picked a high
11 erosion scenario, and there were questions, at least,
12 in my mind, whether or not that's appropriate.

13 There's concern that what is buried is
14 not disappeared. It's only temporarily out of
15 circulation. Again, going back to historical
16 knowledge, experience with PBT chemicals shows it can,
17 and will, come back. And as elegantly noted by one of
18 our panel members, shit moves downhill.

19 For PBT chemicals, redistribution among
20 and between environmental compartments is the key
21 factor that needs to be considered in problem
22 formulation of risk assessment. And it should inform
23 both the temporal and aerial scale used in the
24 assessment. And that's not only for sediment. That's
25 for everything.



1 There were a couple of us, as I said,
2 that said that for PBT chemicals, you need to give
3 serious consideration to developing additional
4 receiving water scenarios, including those for flowing
5 water, so we can adequately characterize what's going
6 on out there.

7 Under bioaccumulation, your use of
8 multiple lines of evidence, I think, does have merit.
9 You know, it's in, sort of, a weight of evidence to the
10 approach. So, if you have field data, you have
11 mesocosm data, if you have the modeling all together,
12 you know you're going to get a pretty good idea of the
13 importance of this.

14 Use of food web bioaccumulation models
15 is consistent with what's been done elsewhere within
16 the EPA, such as the Office of Water, and you know,
17 they appear to be scientifically reasonable. Again,
18 there was a lot of discussion about specific points
19 within the models, and whatnot, that are going to have
20 to be sorted out.

21 But, you know, I think, there's general
22 agreement that, you know, food web modeling of
23 bioaccumulation is a reasonable thing to do. Dynamic
24 models are, probably, appropriate for field scale.
25 But, you know, for field assessment in a longer term,



1 you may want to consider studies, and that could be a
2 simplifying assumption for doing, say, an arctic or a
3 mountain peak scenario.

4 For chemicals which are PB, you know,
5 again, back to the data and modification or additional
6 data that might be needed of existing protocols.
7 Things like, given that you might not reach equilibrium
8 or steady state in the BCS study, you need to have
9 rates. You might have to refine the sampling protocol
10 for those studies to make sure that you can calculate
11 those rates with confidence. And for larger animals,
12 you might want to look at, necessary to measure
13 residues in compartments, specific compartments, again,
14 tiered approach.

15 For the terrestrial bioaccumulation, at
16 this point, there's some proposed screening methods.
17 There's some potential models for risk assessment, so
18 they don't really bear on the cases that you talked
19 about. You need to look and see what their suitability
20 is, and stronger link in the future between aquatic and
21 threshold models.

22 Toxicity, most of this discussion
23 focused on critical body residues or TRVs, and, again,
24 this is consistent with approaches that are being taken
25 elsewhere within EPA. The science is understood and



1 well characterized in the supporting documentation that
2 was provided. So, again, that's one of those,
3 probably, a no-brainer type thing.

4 There was some challenge identified with
5 work on chronic issues and the use of PRA. And that's
6 especially important to know. If you have your
7 assessment endpoint at a population level, and you're
8 feeding into things like growth, repro, survival, you
9 know, how that was used in that, you know, it's going
10 to be a little bit trickier.

11 Let me see here. You did have some
12 mention of the TU and TEF approach, but in the White
13 Paper, it wasn't really discussed in the question. You
14 talked about the assumption of additivity. There needs
15 to be some support when considering this approach.
16 It's especially important if there's co-applications of
17 different pesticides, or you're getting into those
18 kinds of situations in, sort of, some cri-, and you
19 provided a little bit of information on when it might
20 be appropriate to use additivity and when not, but
21 needs some guidance, I think, on that to better
22 understand that, probably, more for the evaluators than
23 for people, other people who may not understand all the
24 issues.

25 Again, going back to one of the



1 cross-cutting themes is, you know, looking at
2 protocols, and the data requirements as to whether or
3 not they need to be changed, you know, specifically,
4 requiring or asking for tissue residues in some of the
5 studies, rather than just the media.

6 For the long-range transport, several
7 models were identified and available for quantification
8 screening. All appear to be well rooted in science.
9 You have the OECD models, global POPs, that's the
10 information Dr. Bidleman presented to them, Money, et
11 al, 2006. And it appears that a lot of these are used
12 in other jurisdictions already. So, there's some
13 confidence there, you know, that they are reasonable
14 approaches.

15 You know, there's general consensus that
16 these models are suitable, and a tiered approach has,
17 actually, proposed by the panel, so, they've done a
18 little work for you there. And it was suggested that,
19 if you read the OECD models, look at, potentially,
20 using the Monte Carlo, or doing specific values on any
21 of the ranges to see whether or not that impacts the
22 conclusions about long-range transport.

23 Also, suggested that you develop a
24 comparison set of pesticides based on the start to use
25 pesticides in the past, the PBT stuff, but I would,

1 also, add to that. It's also useful sometimes to add
2 in other pesticides that aren't subject to LRT, so you
3 know both ends of the spectrum. Okay, so pick a few
4 that are appropriate. Here's ones that we know don't,
5 aren't subject to long-range transport.

6 How do they come into it. My only
7 caution here is, scale of use may be important in this
8 one. We know that we see in Canada pesticides in air,
9 in rain, absorbed the particles that, when you look at
10 their properties with confidence, they would say, no,
11 they're not LRT, but because millions of tons a year
12 are being put on, or hundreds of thousands of tons are
13 being put on, just the scale of use was enough that,
14 even if it's a fraction of a percent, that's volatile.
15 It's getting up and it's moving around.

16 Those aren't, maybe, as much of a
17 problem, because they're not persistent, and they may
18 not be as bioaccumulative, but it's something to
19 consider. Especially, I think, the issue of, sort of,
20 medium range transport was brought up. I'm not quite
21 clear on what long range is any more. I thought I knew
22 before I came here. Terry changed my mind.

23 Consideration should be given, you
24 didn't discuss it explicitly under question number
25 eight. I did have a discussion with Keith on this one,



1 whether or not KOA and KAW should be added as data
2 requirements. You know, I had that in my notes and
3 forgot to mention it, but I think you might consider
4 adding them as data requirements as they, they are key
5 components getting into the OCD model.

6 Mind you, if you have lab data or,
7 actual, empirical data both, better to have that than
8 something from a QSAR. And that's going to trigger, if
9 you do that, then you're going to have to look at
10 whether or not there's existing protocols out there for
11 developing those data, if there's ASTM protocol. I'm
12 not sure.

13 With respect to far afield
14 concentrations, there were suggestions made on how to
15 develop models and links to the near fields. There are
16 datasets out there that could be mined, and empirical
17 models developed to help you in that assessment. There
18 is going to be considerable uncertainty in those. It's
19 going to take a little bit of work, but I think there's
20 probably enough information out there, that it can be
21 done, to give you, at least, a screening level
22 assessment of what might go on, again, far afield, and,
23 also, temporally displaced from the time of
24 application.

25 There were a number of points that were



1 given to me by various panel members that I included
2 under additional considerations. Things like, what Dr.
3 Abbott had brought up yesterday about scenarios, making
4 sure scenarios are representative of, sort of, the, not
5 necessarily the AGRO ecosystems that we deal with all
6 the time, whether it's a wetland or a stream or an
7 estuary, stuff like that.

8 As well, one point that was brought up,
9 that's, sort of, general is, and this is where I think
10 dialogue with the risk manager is important is,
11 understanding the implication of dealing with some of
12 these international conventions and laws. There are
13 conventions on trans-boundary pollutants. There are
14 things with respect to POPs, like UNECE in Stockholm,
15 and how is that going to impact what you need to do for
16 your risk assessment and how you must do it.

17 So, that's about what I have to say,
18 now. Again, I think, in general, there was, nobody
19 stood up and down and said, yeah, you shouldn't be
20 doing what you've done. Definitely, there were
21 tweakings. Two areas, the one area that seemed to be
22 the most contentious, I would say, was, sort of, the
23 sediment dynamics, and how to incorporate that in.
24 And, that one, I think, there is a bit of angst there,
25 with respect to the burial.



1 **DR. HEERINGA:** Thank you very much,
2 Peter. Our next discussant is Dr. Maddalena.

3 **DR. MADDALENA:** Yeah, I think Dr. Delorme
4 covered it quite well. I mean, I would simplify
5 things, somewhat, to a degree of, I'm not sure how
6 much, t he OECD tool, for example, in long range
7 transport, when you see results like you see in the
8 table in the White Paper for some of these case
9 studies, it's hard to understand why you would go on.

10 And so, I'm not sure, what other
11 information you would need. I don't think, there's
12 some ways to improve the long range transport model,
13 and get a little better feel for it, but I think, some
14 of those numbers are like, okay, this is not good, so
15 let's look at some of these other properties. If it's
16 as inert as water.

17 And it has a long range transport like
18 that, then, well, okay, we'll go on with it, but. So,
19 then, you can be done with the long range transport,
20 and focus your attention on, maybe, bioaccumulation and
21 toxicity. And then, if you have something that has a,
22 clearly, the KOW KOA range that's going to lead to
23 bioaccumulation, or has a pretty good potential, you
24 could focus there, too.

25 So, certainly, I don't understand all of

1 the dynamics that go into the regulatory process and
2 the data generation, but it seems like you could focus
3 your attention. And I don't see a need, really, to
4 develop very sophisticated models for these particular
5 class of chemicals. So, I'll participate in the
6 discussion, but that's, really, other than what Dr.
7 Delorme said, that's pretty much where I would go.
8 Thanks.

9 **DR. HEERINGA:** Thank you very much. Dr.
10 Abbott.

11 **DR. ABBOTT:** I have very little to add to
12 Delorme's excellent comprehensive presentation. In
13 fact, I, really, have nothing to add to it, but I do
14 want to re-emphasize that I think it's very important
15 for the Agency to use some of the data that you've
16 already collected, possibly, on older chemicals that
17 may not even be on the market anymore to perform case
18 studies, and see whether or not the modeling techniques
19 that you're using, or propose to use, are going to
20 point out the problematic nature of some of those
21 chemistries. And, I, also, strongly recommend that you
22 expand the aquatic scenarios that you are considering.
23 Thank you.

24 **DR. HEERINGA:** Thank you, Dr. Abbott.
25 Dr. Oris.



1 **DR. ORIS:** I have nothing to add.

2 **DR. HEERINGA:** Well, Peter, you must have
3 nailed it, I guess. I want to open it up, at this
4 point in time, to, is there another discussant? In any
5 case, if I've missed you, please speak up at this
6 point, but any member of the panel who would like to
7 contribute on this particular question, yes, Dr.
8 Bidleman.

9 **DR. BIDLEMAN:** Let me get the mike over
10 here. I have a couple of points to bring up that Peter
11 touched on. Early on, Peter, you said something about
12 physical chemical properties, and the variation in
13 them. This is a subject, a topic that cuts across
14 every single issue with PBT compounds, the toxicity,
15 bioaccumulation, LRT.

16 We need good physical chemical
17 properties. As anyone who has looked into this subject
18 knows, by just scanning through the Mackay, et al,
19 handbooks on p-chem properties, there's a bewildering
20 number of these. For the same chemical, you can find
21 orders of magnitude variation in different measurements
22 of them.

23 One way to assess the differences, as
24 Peter suggested, is to plug the ranges into the models,
25 and see what the outputs are. The other way is to try

1 to bring some order into all the various measurements
2 of these chemicals. And this has done quite
3 successfully for PCBs and the organochlorine
4 pesticides, by recognizing that these p-chem properties
5 are thermodynamically related.

6 So, if you have vapor pressure water
7 solubility and the three partition coefficients KOW,
8 KOA, and KAW, you can take the various laboratory
9 measurements of these properties and combine them, and
10 then, do an adjustment procedure, such that you
11 minimize the errors in the predicted property, based
12 upon the other properties. I didn't explain that very
13 well, but it's an iterative method. And, as I say,
14 it's been used quite successfully to derive what Frank
15 Byner's group would call final adjusted values, which
16 take into account all the thermodynamic data.

17 So, if you're after KOW, for example,
18 you would not just look at the measurements of KOW.
19 You would look at all the other measurements of things
20 that could be combined to give KOW, and you'd do
21 adjustments to minimize the errors in the predicted
22 KOW. And that allows you to arrive at a consistent set
23 of physical chemical properties, which are
24 statistically better than the simple average of the
25 properties just obtained from the tables of the Mackay,



1 et al, handbook.

2 And I'm suggesting that this approach be
3 looked into more thoroughly for currently used
4 pesticides, for which a number of data also exists, to
5 see if we can get a better set of p-chem properties for
6 these rather diverse chemicals.

7 The second point involves the long range
8 transport. The models that we discussed were really
9 long range transport models. They were designed to
10 predict the transport across wide ranges of latitude.

11 So, for example, from the middle United
12 States up to the Arctic, or across continental scale
13 regions of Europe. They weren't designed to take a
14 pesticide from Southern Illinois to Lake Michigan. For
15 that, you need a set of models that operates on a final
16 scale, and these were not really discussed here.

17 But, I can see that there's a need for
18 this. And so, I think we need to consider modeling
19 approaches, not only that takes things a long distance,
20 but to take things medium, and even short distances,
21 also.

22 **DR. HEERINGA:** Thank you very much, Dr.
23 Bidleman. Yes, Dr. Norstrom.

24 **DR. NORSTROM:** Sticking to the topic, and
25 as a person who has tried to use some of those

1 published values for things like KOW, my question is,
2 what is the reason for the variation in these values?
3 Is it because of older methods that just weren't very
4 good? Or the laboratories that were doing them that
5 weren't very good, or what?

6 Because, it's perhaps moot for new
7 chemicals if the methods have been sorted out, and we
8 know, now, that we can, actually, get a really good KOW
9 or KOA, then we shouldn't be importing the problems of
10 the past into the present. What's your view on that,
11 anybody?

12 **DR. DELORME:** Yeah, I would have to agree
13 with you, Ross, there, that, you know, for the newer
14 chemicals where you've got. I think that's one of the
15 reasons why other regulatory agencies, PMRA and EPA
16 like the protocol for these studies, because, you know,
17 they're controlled, and you know, there should be
18 consistency in results. And that's, actually, a big
19 part of our job, is reviewing those studies and
20 ensuring that the studies are scientifically sound when
21 they were conducted. So, and, or you probably see more
22 variability in some of the older information,
23 definitely 'cause of changes methodologies and whatnot.

24 **DR. HEERINGA:** Dr. Bidleman.

25 **DR. BIDLEMAN:** Well, Ross, I have a



1 rather cynical reply to your comment. And that was,
2 when was the last time you tried to get funding to
3 measure p-chem properties? You know, I've talked to
4 other people who have been in this business, and it's,
5 virtually, impossible to, actually, get stable funding
6 to do this type of work over the long term.

7 You, usually, end up measuring a Henry's
8 law constant, because you need it for a particular
9 study on the Great Lakes. So, you do a quick job of
10 it. You don't investigate all the nuances which may be
11 necessary. And for some of these things, there are
12 definitely technique differences which cause real
13 differences in the measured properties.

14 For example, the Henry's law constant is
15 a biased by the most common method used, and that's the
16 bubble stripping method. And it's biased for
17 hydrophobic chemicals because of adsorption of the
18 bubble water interface, which was suspected, but never
19 really tested, until a couple years ago, and there some
20 nice experimental papers that show that this is a real
21 effect.

22 So, when you go back and you look at the
23 Henry's law constants for PCBs, you might be tempted to
24 say, well, they're okay for the lower molecular PCBs,
25 but when you get to the heavy ones, there's likely to



1 be a bias in that particular experimental method. But
2 to investigate these biases and differences requires
3 some stable funding to do it. And it's very difficult
4 to get that support.

5 **DR. NORSTROM:** It seems to me, Norstrom,
6 considering the importance of these things in so many
7 models, that we really need to, somehow or another,
8 have a better feel for the real variation in these
9 things. Perhaps, relative consistency is more
10 important than absolutes, and so we can always make
11 some kind of correction for bias across correlations
12 with properties and that kind of things, but at least,
13 the numbers should be internally self consistent.

14 **DR. HEERINGA:** Dr. Meador.

15 **DR. MEADOR:** It was my understanding that
16 the slow stir method was about the best for estimating
17 KOW. The people that run the spark model have found
18 extremely high correlations between what slow stir and
19 the spark model puts out. And they are, actually,
20 quite pleased with the results.

21 Once I did a review of KOWs for
22 polycyclic aromatic hydrocarbons, and I had about a
23 dozen values for, oh, I think I did thirty, thirty or
24 so PHs, and course, they're all over the map, because
25 of the different methods. But the mean value for those



1 in the spark model was just about right on. So, that's
2 a fairly good estimate, of course, there's always
3 variants that you have to deal with, I mean, their log
4 values, and you have to consider that. It's never
5 going to be a precise number, so, you have to live with
6 it.

7 **DR. HEERINGA:** Okay, Dr. Lick and then
8 Dr. Gan. If you can turn on your mike, Dr. Lick.

9 **DR. LICK:** I would like to comment on
10 this whole system half-life. I did that before, but
11 I'll do it again. The present procedure, I think, is
12 very misleading, because, somehow, it gives you some
13 sort of average between what happens in the overlying
14 water, and what happens in the sediments. And we talk
15 about very hydrophobic chemicals.

16 The half-life in the sediments is
17 extremely long. And I've never measured them, but the
18 reason I say that is that, when you look at buried
19 sediments, you'll find highly chlorinated PCBs and
20 dioxin, and things like that, that have been there for
21 fifty years, or as long as they've been produced. And
22 at intervals, they don't seem to have changed their
23 concentration that much.

24 So, the half-lives are extremely long.
25 What really determines the life of these chemicals is

1 whether the sediments are buried, or whether they're
2 exposed. And if they're exposed, then the half-life in
3 the overlying is much more relevant than what's in the
4 sediments. But if they're in the sediments, they're
5 extremely long.

6 **DR. HEERINGA:** Thank you for thinking
7 that issue out again. Dr. Gan.

8 **DR. GAN:** What, while there's a few
9 chemists here, I just want to see something, maybe,
10 that's very obvious to some of you, most of you. I
11 spent about two days to go over the White Paper, and I
12 think it's very informational.

13 But reading the case studies, one
14 impression I did not get is the emphasis that's on
15 sediment toxicity. Because, for these chemicals, we
16 know maybe eighty or ninety percent of it will be in
17 the sediment phase. To me, I think the sediment
18 toxicity would be the number one issue here.

19 Maybe, you guys will address this in a
20 different protocol, I guess, but I, you know, that's
21 the impression I did not get after reading this 200
22 page document. It's mentioned here and there, even
23 sediment cold water is mentioned here and there, but I
24 would think sediment toxicity probably is the key. And
25 looks like, my impression from reading this is, we're

1 looking from the water into the sediment, not in the
2 sediment. That's my impression.

3 **DR. HEERINGA:** Thank you, Dr. Gan. Dr.
4 Simonich.

5 **DR. SIMONICH:** Staci Simonich, yes, I
6 would totally agree with that. In fact, I should have
7 called it out sooner. I had sidebar discussions with
8 my colleagues, but I definitely agree with that
9 assessment.

10 **DR. HEERINGA:** Okay, Dr. Hickie.

11 **DR. HICKIE:** I would just like to comment
12 on Dr. Delorme's commenting in his talk about using
13 steady state models for bioaccumulation, in regards to
14 long range transport.

15 And if you think about a system of long
16 range transport, it's kind of like a chromatography
17 column, in that your pulses will gradually get dampened
18 the farther you move along. You'll also get dilution
19 of the concentrations. And at some point, you do
20 approach the point where a steady state bioaccumulation
21 model is fine. I don't, can't quite comment on how far
22 depends on the chemical.

23 But the other thing is, if you're using
24 a generic pond system and food web, you're going to get
25 the same bioaccumulation factors, no matter where you

1 are along that track. And if you want to go beyond
2 that, then you need some idea of the loadings to get
3 actual concentrations, so you can do a toxicity
4 evaluation.

5 **DR. HEERINGA:** Okay, Keith Sappington.

6 **MR. SAPPINGTON:** Thank you, I just want
7 to address the comment, a couple of comments on the
8 panel regarding sediment toxicity, and I agree with
9 that. We chose, in the case of pesticide four, we
10 chose to focus on the higher level organisms, in the
11 White Paper, the actual risk assessment that was
12 conducted for that included sediment organisms and
13 sediment toxicity.

14 And in fact, those were the drivers in
15 that particular risk assessment. Likewise, for
16 pesticide one, we had quite a bit of sediment tox
17 information for the parent and the degraded compounds,
18 and we chose not to include that in the White Paper.
19 But those, in fact, were part of the risk assessment.
20 So, we probably should have made that more clear.
21 Thank you.

22 **DR. HEERINGA:** Thank you for that
23 clarification. At this point, I guess, unless there
24 are additional comments on nine, we have a chance for
25 closing comments and general comments later on, why



1 don't we move on to question number ten. Dr. Brady, if
2 you would read that question into the record for us.

3 **DR. BRADY:** Question number ten: Future
4 PBT-related refinements. The Agency is considering
5 refinements to its problem formulation process to
6 improve the ecological risk assessment of pesticides
7 with PBT characteristics, as outlined in Chapter 8 of
8 the White Paper.

9 In particular, please comment on the
10 Agency's proposed process for identifying pesticides
11 for potential PBT risk assessment issues that need to
12 be addressed; and the priority for developing new
13 models, methods, and information for addressing PBT
14 issues.

15 **DR. HEERINGA:** Our lead discussant on
16 this question is Dr. Donnelly.

17 **DR. DONNELLY:** Thank you, Dr. Heeringa.
18 I'm going to try to give a quick overview of what our
19 discussion was, and hope that the co-discussants will
20 fill in any details that I left out.

21 We worked on this several nights, and I
22 think, put together quite a bit of information. This
23 is almost the, what I would describe as the kitchen
24 sink question. Anything that was left out in questions
25 one through nine, kind of, fell into question number

1 ten. So, we did the best, I think, that we could to
2 address things, and as soon as we get our slides up,
3 we'll get going.

4 The first issue that they asked us to
5 comment on was the process for identifying or screening
6 pesticides for PBT risk assessment issues. Go ahead
7 and go to the next slide.

8 The comments that we had was that really
9 the criteria that are listed, which come from the
10 national and international screening criteria for
11 classifying chemicals for PBT and LRT characteristics.
12 These appear to be reasonable.

13 I don't think anybody had any questions
14 about that. And we, also, felt that meeting the
15 criteria for a particular attribute will help the
16 Agency identify which pesticides and which parameters
17 it needs to focus its efforts on. The only concern
18 that we had was that a number of the criteria that were
19 in Table 8.2 are pretty broad ranges.

20 And especially looking at the lower end
21 of those ranges, we thought it would be important to
22 analyze the sensitivity of models, and whether or not
23 some of the criteria might need to be modified or
24 adjusted a little bit. Next slide.

25 One of the panel members suggested that,



1 as an alternate screening criteria, the Agency might
2 want to try to identify level three fugacity model. It
3 could provide an overview of distribution of various
4 media.

5 This alternative model would provide a
6 more informed means of investigating persistence. It
7 would, also, allow the Agency to determine which
8 compartments should be the focus of additional
9 investigations of modeling efforts. And we've had some
10 of those discussions previously, with regards to
11 whether it would be sediment or surface water, et
12 cetera.

13 The Agency should probably considering
14 adding KOA or use multiple models. In the relevance of
15 using a Q toxicity for bioaccumulation persistence was
16 not clear as a criteria for this particular flat
17 chemical.

18 The second issue that we were asked to
19 comment on was priority for developing new models and
20 methods and information for addressing PBT issues. The
21 best method that we came up with to answer this or
22 comment on this was to use Table 8.1.

23 Table 8.1 in the White Paper is a list
24 of current challenges associated with ecological risk
25 assessment of pesticides with PBT characteristics. So,

1 what we did was come up with a new table, and in this
2 new table, we have added two new columns. One is a
3 column for comments, so that the comment on the various
4 risk assessment issues. And then we, also, gave, what
5 we thought was a first cut at trying to prioritize
6 those issues.

7 So, to begin with, on environmental
8 persistence, the issue was quantifying exposure to
9 parent and degradation compound. The comment that we
10 had was that we felt it would be good to look across
11 larger groups of chemicals, specifically, to see how
12 the results differ from the TR or RS method to the FD.
13 Which, again, is kind of the gold standard. This, we
14 felt, was a medium priority.

15 Second issue, interpreting predicted or
16 measured exposure concentrations that exceed
17 solubility. This we listed as a high priority issue,
18 something that we felt needed to be addressed fairly
19 quickly. The comments were, it needs additional
20 research to understand the differences between
21 laboratory's solubility and a parent solubility in the
22 water. And then, second comment was, there's a need to
23 develop a better understanding of the need to
24 incorporate transfer kinetics for precipitate
25 compartment model in the modeling effort. And this we

1 ranked as a medium priority.

2 Third issue was interpreting degradation
3 half-lives when dissipation processes dominate. The
4 comments that we had was, this is an experimental
5 artifact. Definitely needs to be resolved. And it's
6 possible that this could be resolved through modified
7 data requirements. This was ranked as a medium
8 priority.

9 And the fourth issue, quantifying
10 long-term exposure multi-year carryover in soils. We
11 did feel that this was largely covered with the
12 existing models, but there is a need to assess model
13 performance in estimation of sediment concentration.
14 And this was ranked as a medium priority.

15 Moving on to sediment dynamics, the
16 first issue was addressing, understanding the
17 importance of sedimentation processes on
18 bioavailability in the context of model agricultural
19 pond systems. This, we felt, was a relatively low
20 priority, and largely depended on the modeling approach
21 that was being used.

22 Second issue, identifying and
23 quantifying the principle processes related to sediment
24 dynamics. The comments were that there is a need for a
25 better understanding of sedimentation burial rates.



1 This, we felt, was a very high priority, as was the
2 second comment, which was the need to develop
3 additional receiving water scenarios. And this has
4 been discussed quite a bit in some of the previous
5 questions, as well.

6 The third issue on sediment dynamics,
7 was to identify appropriate methods for modeling these
8 processes for aquatic exposure assessment. The comment
9 that we had was assess existing models beyond the PRZM,
10 EXAMS, and AGRO models, but we did feel that this was
11 a relatively low priority.

12 Bioaccumulation, the first issue is
13 quantifying exposure by aquatic food web. The comment
14 was that, relative to most of the other pathways, this
15 was is, probably, pretty well characterized. And so,
16 we felt that there was a need to modify that, but
17 that's kind of where we left it.

18 Second one, interpreting and integrating
19 results from labs, fields, and model-based
20 bioaccumulation methods. This needs to be done to
21 assess the model's performance. We felt that this
22 could, probably, be done fairly quickly, and so, we
23 gave it a high priority.

24 And then, the third issue was assessing
25 bioaccumulation potential in terrestrial based food

1 web. This is a high priority. The comments were, we
2 need to identify all existing models for assessing
3 bioaccumulation. Second comment was to explore and
4 assess existing models to better understand the
5 implications of, and magnitude of, terrestrial
6 bioaccumulation, which we gave a medium priority.

7 We added a fourth issue to
8 bioaccumulation, which was to explore the links between
9 terrestrial and aquatic bioaccumulation. Comments on
10 this was, that it's needed to assess the model
11 performance, and there is a need to consider additional
12 terrestrial links to the model. Both of these were
13 ranked at medium priority.

14 And the last two, long-range transport
15 and toxicity. The issue with long-range transport,
16 number one, establish relationships between near-field
17 pesticide loadings and far-field concentrations. The
18 comments that we have, this may be resolved by
19 following current literature. There's an opportunity,
20 we think, there to mine a lot of the existing
21 information that's in the literature on some of the
22 persistent organic pollutants, such as chlordane, DDT,
23 DDE, to establish this relationship. We ranked this as
24 a medium priority.

25 The second comment was, there needs to



1 be a dialogue within the Agency with regard to how to
2 translate long-range transport into risk estimates, and
3 again, this was ranked as a medium priority.

4 Second, on the long-range transport
5 list, was understanding the applicability and
6 reliability of available models for screening transport
7 potential. We did feel that as a screening tool,
8 there's a need to develop a tiered approach. And I
9 think this is something that will be emphasized at the
10 end of this with some of Dr. Portier's comments. This
11 was ranked as a medium priority. And, again, the
12 second comment was the need to integrate some of the
13 existing models into long-range transport.

14 Finally, on toxicity, the first issue,
15 estimating combined toxicity of parent and degradation
16 products. The first comment was to use existing
17 information. The existing information that's available
18 seems to address this issue largely. There may be a
19 need to consider including the carrier influence on
20 toxic insolubility. This was ranked as a low priority.
21 And as a medium priority, the second comment was to
22 examine the possibility of using or modifying test
23 protocols to obtain residue levels in tissue.

24 The second issue on toxicity was to
25 assess toxicity due to multiple exposure routes and



1 steady state conditions, both of which may not be
2 adequately evaluated in a standardized test. The
3 comments that we had on this were to assess the
4 performance of different models, and, or field methods
5 to evaluate multiple exposure routes and steady state
6 conditions. This was ranked as a medium priority.

7 Finally, we've listed what we think are
8 some of the information needs, both to clarify some of
9 the issues in the White Paper, but also, to kind of
10 move this to the next step for the future refinement.
11 One of the issues is, there's a need to more clearly
12 define the input and output needs.

13 Some of this is in the White Paper, but
14 it wasn't always clear what inputs are required, and
15 then, what the anticipated outputs would be. One of
16 the things that I think has been emphasized several
17 times on this panel is a need to identify sources of
18 uncertainty.

19 We know these are there. We know, in
20 some cases, they're quite large. And I think, this
21 will, also, affect the next bullet, which is
22 sensitivity analysis. There's a consensus of the
23 discussant groups, seem to be that there are some
24 parameters for which you could almost use the default
25 factor, because they really don't influence the outcome

1 of the model. And I think, doing a sensitivity
2 analysis of input parameters would help this.

3 And, then, finally, this is an issue
4 that Dr. Portier will discuss in a little bit more
5 detail. I think there was, really, a consensus amongst
6 our group that there's a need to look at opportunities
7 to integrate some of these models. And with that, I
8 will allow Dr. Portier to finish the discussion on the
9 model.

10 **DR. HEERINGA:** Thank you, Dr. Donnelly.
11 Ken, I guess we'll go to the other associate
12 discussants after-

13 **DR. PORTIER:** I appreciate the
14 opportunity to speak at this point. I wanted to
15 address kind of the second bullet point, which is kind
16 of moving forward, and develop priorities or developing
17 new models, methods and information for addressing
18 these issues. I was of 2 minds as to whether I wanted
19 to say anything on this, but when Mr. Sappington put up
20 this graph, and I looked at it, I thought to myself,
21 okay, is this what I think is going on, and is this a
22 process that can handle 70 chemicals a year?

23 When I look at this draft, it basically
24 says that the information is being processed by one or
25 more risk assessors who stands in that blue box in the



1 middle, and grabs that material and is being asked to
2 integrate all this information and make some very key
3 decisions, on not only what we want to do with PPB
4 related chemicals, but pretty much all your risk
5 assessment kind of works this way.

6 What I want to do, if you could click
7 the...I want to talk about, is moving the conceptual
8 model from a peripheral location in the process to a
9 little bit more central location in the process. And
10 this is may be a conceptual approach that how EPA might
11 want to think about using these models to speed up the
12 process and to make the process a little bit more
13 steady. Next Slide.

14 When I think about models, I think about
15 what is the utility of those models. So you use a
16 model to integrate what we know. In the previous
17 graph, the risk assessor is the integrator. The risk
18 assessor is the person who integrates all the
19 knowledge, and then makes kind of a decision. I'd like
20 to put a model in there that allows, that helps the
21 risk assessor to do that integration.

22 Not only as a leveler for comparisons,
23 we're talking about a particular scenario here of a 10
24 hectare field, and a 2 hectare pond, and you've created
25 a conceptual model that helps you to run chemicals



1 through a scenario so that you can compare them. So
2 that model helps you compare things when the data
3 coming in may not be that comparable.

4 The kind of actual field measurements
5 and utilities, utilization, doesn't always lend itself
6 to direct comparisons of the raw data or the data that
7 comes out, so you pass it through a model to kind of
8 levelize things. The model is a means of gaining
9 insight into the expected effects, so you are able to
10 predict things out to address things like Dr Delorme
11 keeps saying, we need to look 5 to 20 years out into
12 the future.

13 That's kind of hard to do with existing
14 data, unless you pass it through a model. A model is a
15 focus for data analysis, and collection, so the model
16 really the whole process is using and integrating the
17 model forces you to look at the holes in your data, and
18 where do I not have information, where do I have
19 information? Since I guess that shifts in framing the
20 problem was at the top, so it's an interesting...when I
21 move my slides to Dr. Donnelly's slides things move
22 around.

23 In my way of thinking, data collection
24 and experimentation should support filling in the model
25 deficiencies, rather than the model accommodating the



1 available data. And I worry, not just in this panel,
2 but in a number of eco-risk panels, I worry some time
3 that EPA is using models that can accommodate the data,
4 rather than the model that's really a picture of the
5 situation you are dealing with.

6 And I think that you have to put the
7 horse in front of the cart, and I think that the model
8 that depicts the situation appropriately is the Harst.
9 And then there is always this discussion between the
10 empirical data and the association you see in the
11 theoretical data and the theoretical relationships that
12 you know you know exist, and how do these 2 kind of tie
13 to each other, next slide.

14 So, it's kind of my picture of, my
15 modification of the previous graph looks a little bit
16 more some thing like this, where the information of the
17 circles that are around.

18 You have information on
19 physical/chemical properties that we just talked a lot
20 about that, on toxicity, on metabolism,
21 bio-accumulation, long range transport. And that
22 information goes through a process that says, do I have
23 any new information for this particular scenario?
24 Which yes, I am going to estimate the parameters I need
25 to put into or model, or no, I'm going to use some kind

1 of default parameters.

2 And at that stage, which is really to my
3 way of thinking, the first part of a problem
4 formulation. What do I know, and what parameters do I
5 have good estimates, what parameters I can change for
6 this scenario. And it's also where I identify all the
7 uncertainties in those parameters.

8 The default parameters, we have the
9 uncertainties defined. It's always the new parameters
10 that you have to worry about. And then the second part
11 is kind of forming the model, and you have, I have the
12 major components of the model that we've been talking
13 about here. And I kind of have to extend my box off to
14 the right for PPB chemicals, because I need to put that
15 long range transport model in.

16 The Panel hasn't seen that before in the
17 eco risk that we've looked at before. We've had the
18 pesticide application model. How is the pesticide
19 applied to the field, used in practice?

20 We've had a lot of discussion on the
21 fate and transport models, EXAMS and the PRZM models,
22 and we've had a lot of discussion here and in previous
23 SAPs on food web effects and utility. Now we've got
24 long range models. If you put long range models in you
25 have to worry about these source emissions and

1 geographic variability.

2 But when you are forming that model, you
3 are really, that model has to address the assessment
4 end point, which is the second big part of the problem
5 formulation. What are we really interested in
6 measuring our output against. Is it human health
7 effects? Is it ecological population impacts, or what?
8 And then there's this other big issue which we haven't
9 talked about here, is whether the model is formulated
10 to look at what happens to the individual versus what
11 happens to the population?

12 And once you've got that model
13 formulated, then you can ask the general risk questions
14 against the model, or the PPT specific risk questions,
15 and I just kind of listed those out. You can also look
16 at national and international risk kinds of issues.
17 Next Slide. So there was a quote in some of the
18 material from Einstein that says, "Make things as
19 simple as possible, but not any simpler." I think
20 that's a good philosophy.

21 The big question is tough, how do you
22 get to what is the appropriate sized model? In this
23 presentation, and in past presentations, I think the
24 Agency has used kind of a forward approach. Which
25 basically says, you have some kind of core model that



1 everybody agrees on, and then you add components to the
2 model as they are needed.

3 So the risk assessor looking at the data
4 says I have to have a terrestrial exposure component,
5 so I go find a terrestrial model and I add it. And I'd
6 like to see the Agency kind of take/think about what I
7 would call a backward approach. And the backward
8 approach says we start from the most complex model that
9 everyone can agree on. That has all of the ecosystem
10 components there, and then when we look at a new
11 chemical we subtract components that we don't think are
12 going to be important in that model.

13 Now this has a real benefit, because 1,
14 you only have 1 full model that everybody can agree on.
15 And as you start thinking things out in the model, you
16 know there is a finite point at which you are going to
17 stop, because you can always go down to 0, right? In
18 the forward approach, it can be an endless process,
19 because someone can always think of something else to
20 add, right?

21 Some additional detail to go down. In
22 the forward approach, it's very subjective, and it's
23 very open-ended. In the backwards approach, it's more
24 defined and the process you know it has an endpoint.
25 And in problem formulation, subtracting from the full



1 model becomes 1 of the main tasks, it becomes like the
2 third part in the problem formulation, is what's the
3 level of resolution and what are the components that I
4 need in that particular model? So that's kind of
5 looking to the future, in thinking of a strategy that
6 you can develop. Next slide.

7 As we have been talking the last few
8 days, I've taken this model which is one of the graphs
9 in the presentation, and it's in the white paper, and
10 I've added some of the other things that we've talked
11 about and added it to it, and there is a strategy to my
12 coloring of this graph, because the things in red are
13 primarily processes, and the things that are in the
14 orange boxes are sources of fates really.

15 The source is up there at the top, the
16 application of the pesticide. And I've added a lot of
17 transport out, you see the little blue things that
18 indicate transport. In some of these things we have
19 talked about, but only briefly. For example,
20 terrestrial animals don't always stay in the field in
21 which they were exposed, so they're a net of...they
22 transport pesticide out of the area.

23 I'm always reminded of years ago there
24 was some presentation I saw on tortoises, utilizing
25 nuclear fuel rod storage ponds in the Savanna Research



1 Center, where they would go in the ponds, swim, they'd
2 pick up the radiation and go walking into the woods and
3 then die a kilometer away, and you had a nice little
4 exposure of radiation and they were able to track these
5 things. A net transport from the source.

6 So when I look at a model like this, and
7 I will be very brief, I think the Agency owes it to
8 itself to take some of the excellent modelers that they
9 have, and kind of turn them loose to see if they can
10 develop for their risk assessment purposes their own
11 modeling framework.

12 What I call a full and complex modeling
13 framework that can be very structured, very much into
14 components that interlock, that have processes that can
15 be placed in and moved out again. The computational
16 technology to build these kinds of models that can be
17 easily scaled up or down is available.

18 I just don't think the Agency has tried
19 to make a decision to move forward into this kind of
20 model, and your still looking around and trying to, -
21 what was the word?- linking together existing models.
22 At a certain point there is a lot of effort that goes
23 into linking that could actually go into creating your
24 own model that works for your purposes, that can be
25 documented to the level of resolution that you need for



1 your clients and you are not constantly depending on
2 someone else to add functionality that you need or
3 don't need.

4 I think a model like this, or a
5 structure like this would facilitate rapidly screening
6 and assessing those 70 chemicals per year, which I
7 can't even contemplate how you do that without this
8 kind of a structure.

9 Last slide. And the last slide just
10 says that within that structure we've had a lot of
11 discussion about, well sometimes we are going to need a
12 whole animal model, sometimes we are going to need a
13 part of the animal model, and these kinds of models can
14 now be structured so that that level of complexity can
15 be built in, but only utilized when you need it.

16 So you've got a generic animal, the
17 generic animal has inputs and outputs and internal
18 constructs, and it's a little bit getting closer to the
19 PBBK type modeling concept too. We need a component
20 when we need a component.

21 So you can create generic animals, and
22 then you say well certain changes this becomes a
23 rabbit, and certain change it becomes a quail, right?
24 But it's not necessary that you have to build a rabbit
25 model and a quail model for the kinds of things you are



1 doing. I think at that point I am going to stop, and I
2 had no idea how I'm going to write this up. It might
3 just be nice pretty pictures...but.

4 **DR. HEERINGA:** Thank you very much Dr.
5 Portier. What I'd like to do, is I like to turn to the
6 associate discussants. Give them a chance to weigh in.
7 We have had sort of 2 excellent overviews, but Peter
8 Delorme.

9 **DR. DELORME:** Just a couple of points. I
10 don't think by any means that when we were discussing
11 this we were able to capture some of the finer details
12 with respect to what might need to be done. So I would
13 encourage the other leads on the other questions to
14 identify things in their responses that we might be
15 able to add to the table, as well as some idea of what
16 they think the importance or priority is.

17 With respect to the priority, I can't
18 remember if Dr. Donnelly mentioned, but again we looked
19 at it from the point of view of if there is something
20 that is easily done, readily done, that you could knock
21 off quickly, then it might be a high priority.

22 The other consideration is, you know,
23 we're aware from comments provided by Dr. Bradbury and
24 Dr. Brady over the week that, you know, decisions are
25 coming up on chemicals that are PBT, and so things that

1 might impact your risk assessment probably need to be
2 dealt with sooner rather than later, in some way, shape
3 or form. So that was some of our thinking. We also
4 are trying to limit the number of things that were
5 identified as high priority.

6 Obviously if you look at it from a
7 disciplinary point of view, you know, everybody at this
8 point is going to think that their issue is the most
9 important to deal with. But the reality is that you
10 have to look at how they feed into the risk assessment,
11 and how they do that. So that was some of our thinking
12 in doing these things. We haven't ascribed time frames
13 for them. I didn't want to go there, recognizing the
14 resources that are available withing EPA to deal with
15 these things is another consideration.

16 **DR. HEERINGA:** Thank you Peter, I want to
17 mention too in our final report the presentation, the
18 table that KC presented I think, as other questions,
19 responses are assembled. Clearly if there are
20 additions there, or priority changes, they can be
21 reflected in this overview section too. Dr Maddalena.

22 **DR. MADDALENA:** Yeah, it may just be late
23 in the week, but I am running out of things to say, so
24 yeah, I can't add much right now.

25 **DR. HEERINGA:** Maybe it's a sign of



1 success, or... Dr. Meador.

2 **DR. MEADOR:** I have a few questions, I
3 guess some points about the Table 8.2, specifically the
4 top part, persistence bio-cumulation toxicity, the
5 attributes. I may have missed this, it doesn't seem
6 clear to me but they probably should be, well they
7 actually are independent attributes.

8 So I wondering, like on persistence, why
9 not have a half life for tissue? Since we are going
10 towards a tissue residue approach for toxicity,
11 especially bio-cumulation as an independent attribute.
12 You know, why not make that like 3 or 4? I guess I'm
13 not clear on your process. If you find one that's
14 persistent, it triggers it in with a category that you
15 would consider PBT, or 2 or 3 of the attributes or how
16 you actually approach that.

17 I'm just thinking of a refinement for
18 these different ones. So persistence, half life for
19 tissue; I don't know what that would be, 2 weeks, 3
20 weeks, 4 weeks maybe. Bio-cumulation; some compounds
21 may bio-cumulate and be very toxic and persistent at a
22 lower KOW. And as far as toxicity, I assume these are
23 environmental ambient concentrations, water, sediment,
24 whatever. So I would imagine eventually it would go to
25 a tissue number. And also I would recommend you change

1 that to a lower concentration, because that's a much
2 better indication of toxic potency. I think that's all
3 I have on that.

4 **DR. HEERINGA:** Thank you Dr. Meador. Dr.
5 Oris.

6 **DR. ORIS:** I'm kind of with Randy at this
7 point. I don't have a whole lot to say, but I do have
8 one question about problem formulation, and where you
9 are headed. I know from ORD and ecology there has been
10 discussions of using eco system services and valuation
11 as part of the problem formulation stage. Is that
12 going to be the case as we move forward with Pesticide
13 Risk Assessment?

14 **DR. BRADBURY:** The Pesticide Risk
15 Assessment is sort of independent of what...in the case
16 of what is different in the pesticides. The risk
17 assessment is an estimate of the risk, independent of
18 what the benefits may be.

19 The risk management decision is taking
20 into account what the risks of the pesticide are in the
21 context of the benefits that the pesticide provides to
22 agricultural production, fruit and fiber. Now in that
23 context, OPP is involved in a lot of Agency discussions
24 of ecosystem values, services, goods and services that
25 ecosystems provide and how that factors into the

1 benefits analysis of the overall risk management
2 decision.

3 Obviously there's feedback groups as one
4 starts to have a better understanding of ecosystem
5 goods and services and that may influence the
6 assessment end points that are used in the risk
7 assessment. So there is obviously feedback in the
8 dialogue.

9 **DR. ORIS:** I guess the concern I have is
10 with chemicals that may move very far from the source
11 of input. Those kinds of discussions may become more
12 important than in our typical pesticide assessment.

13 And if the trend is to use the idea that
14 ecosystem service systems are more valuable the closer
15 they are to human habitation, as has been discussed in
16 the past, then the value of worrying about chemicals
17 getting into the arctic in that scenario is sort of
18 tenuous to me.

19 So for example the only value that the
20 arctic has, as an ecosystem service, in that situation
21 is the ability to derive oil, if value is based on
22 where we are as human. So, I think that discussion
23 needs to be made in this context, because of the
24 ability of these things to move so far, that's my only
25 comment.

1 **DR. HEERINGA:** Thank you very much Dr.
2 Oris, Dr. Norstrom.

3 **DR. NORSTROM:** I'd also like to comment
4 on Table 8.2. We know for example that there are a
5 number of chemicals out there that have a low KOW's,
6 actually less than 4 that are still found in remote
7 environments.

8 So I think it's really an interactive
9 thing. I'm not sure that these things can be taken in
10 total isolation from each other. The comment that Dr.
11 Delorme made earlier about volume of production, and
12 that kind of thing. It's possible that something that
13 is produced in enormous quantities has a fairly low,
14 long KOW might still be of interest in long range
15 transport.

16 Whereas the same chemical produced in
17 small quantities wouldn't be. Simply because the
18 amount in the environment would be so small that would
19 be transported. So I think that has to be taken into
20 consideration. You can't really take them in total
21 isolation from each other, and I would certainly add
22 long KOA's, since we know now that that's also a
23 factor, in terms of persistence. Thanks.

24 **DR. HEERINGA:** Thank you, Doctor
25 Norstrom, Dr. Thibodeaux.

1 **DR. THIBODEAUX:** Louis Thibodeaux. You
2 are making a very radical proposal about the backwards
3 approach. It's almost philosophic. But I agree with
4 you, where you are trying to go, because we seem to be
5 in many aspects of modeling to add on.

6 Add on parts and start with one and add
7 on a module that does this, that...for example, the
8 EXAMs, which I cut my teeth on in the early days,
9 adding PRZM on it, onto it, as a driver for it, and
10 then now going on to AGRO. But that's the way science
11 works.

12 There's this big black unknown out there
13 that we all are striving to understand, and by a
14 process of hypothesis and experiment and mistakes, we
15 tend to push that back...the time..The world is a very
16 complex place, and the environment takes so many people
17 to try to understand it, it's very interdisciplinary,
18 as the make up of this room shows.

19 But we get to a certain point where
20 people need answers. These people have means and tools
21 to get answers, so we scientists sit around and say,
22 "okay, do we know enough about this to really stop the
23 clock at this time and build a model that they can use
24 as a tool?", and that's the way we do it.

25 Two points you made. One about the



1 model, that we could sort of use it, but I don't think
2 that the model will ever be complete. I mean I can sit
3 here and think of at least 100 reasons why what we are
4 doing now used to be vexed.

5 So it's a forward moving boundary. And
6 the other thing is I'm not sure you would get any more
7 than 2 scientists in one room who will ever agree on
8 what the model is anyway. So I see where you are
9 coming from, and it's an ideal that would be nice if we
10 had one and we start chunking things out, so that we
11 need the constraints of the problem we have and can
12 apply it. So it's really a refreshing approach, but I
13 guess I could say, well keep working on it.

14 **DR. HEERINGA:** We know he will. Dr.
15 Schlenk, and then Dr. Mehta.

16 **DR. SCHLENK:** One of the benefits you
17 have of sort of being on a permanent panel is you
18 actually get to see an assortment of different methods,
19 in terms of how different parts of the Agency address
20 different issues.

21 In our last panel I think I was the
22 only, sort of aquatic tox person in the whole room that
23 was present, and I got to see how human health risk
24 assessment was performed, and the problems associated
25 with that human risk assessment. And then before this



1 meeting took place, we were provided an insight into
2 turns and how the Agency is progressing. And the
3 National Academy of Sciences paradigm was put forth.

4 I had some discussions with Dr. Bradbury
5 yesterday, and was very encouraged in the fact that
6 that isn't just being relegated to the human health
7 realm. That those components will be implemented into
8 the eco-rest paradigm at some point.

9 So I just wanted to go on record to say
10 I would encourage the Agency to do that, there are a
11 lot of really -although this won't help you today, but
12 if we're assessing this second part of this particular
13 question 10, in terms of how to move forward,
14 particularly on the toxicity side of things, - I've
15 provided in my written comments some examples that I
16 won't go through here.

17 But I think there is some real benefit,
18 not only for PPT compounds but for all compounds, in
19 terms of the approaches that are being proposed in
20 terms of using a little bit more elaborate focused
21 approach, in terms of bio assay, the targeted Bio assay
22 testing. So I just want to go on record to say that.

23 **DR. HEERINGA:** Dr. Mehta.

24 **DR. MEHTA:** Yeah, I to liked Ken's
25 presentation, but I interpreted it a little

1 differently. I found what you meant was that there had
2 to be a conceptual framework, and then we may or may
3 not have any numerical or whatever model for, but it
4 allows you to look at the whole picture and say, well
5 we have this and have this, or we don't have this.

6 I like that idea, because it, as you
7 said, it allows you to encompass all the processes in
8 your mind, even though you may not be able to simulate
9 all of this. So I think that's the interpretation of
10 what you were saying. I could be wrong too.

11 **DR. HEERINGA:** Jim.

12 **DR. ORIS:** Yeah, I guess you're right in
13 terms of sediment. The model, I should have said, A
14 model framework. My concern is that when you...the
15 whole idea, EXAMs and PRZM and AGRO is that it's nice
16 when these things plug in, but a lot of the feedback
17 mechanisms that go between models aren't there, because
18 1 model feeds the next model.

19 And as long as EPA is just putting
20 models together, they can't incorporate this feedback.
21 That we already know that we agree as ecologists, that
22 we understand it there. We may not be able to measure
23 everything, but we understand there should be a link.
24 We may not know what that link is, and so my
25 encouragement is to think...okay, so that's part one.



1 Part 2 is that the framework can be
2 built at a number of levels of complexity. So you can
3 build a framework at a very high simplistic level, and
4 then each component can be made more complex, and more
5 complex as our knowledge grows or as we agree, that
6 needs to be in there.

7 It came to mind with the sediment issue.
8 We looked at least 3 different approaches to modeling
9 settlement in this room 3 days ago. One approach is to
10 look at it as a whole component that has mixing.
11 Another 1 was to look at layers and compartmentaling.
12 That kind of detailed model, those kinds of detailed
13 models, those kinds of models could be slotted in for a
14 sediment box and a simple model, the simple model is
15 there.

16 My third point is the model to me, acts
17 as a checklist for the risk assessment to make sure
18 that they are looking at all of the pieces. When
19 things are allowed, when a project is assigned to an
20 individual, you know that individual is going to
21 incorporated their own subjective knowledge in that
22 process. The only way to make things comparable was to
23 make sure everybody is working from the same checklist.
24 Have you looked at long range transport? Yes. Have you
25 looked at this?

1 Have you looked at terrestrial effects?
2 Yes. So to meet a consensual model works as a big
3 checklist to make sure that in these very complex kinds
4 of interactions and effects that we are talking about
5 here, that everything that we already know is at least
6 looked at, at some point in the process.

7 And I'm not always sure when I talk to
8 risk assessors that everyone of them has the same
9 mental image that they are working from. It may be
10 very subjective, and so they are coming at it and they
11 may get to the same place, I'm not sure. I'd rather
12 they all have the same checklist, so I can be a little
13 more sure they are going to get to the same place.

14 **DR. HEERINGA:** Dr. Steenhuis.

15 **DR. STEENHUIS:** I do agree it needs to be
16 more complex, the system has to be more complex. But
17 the big problem with making models more complex, and I
18 can talk about hydrology models, which can be very
19 complex. But they take years to validate.

20 The more complexity, the more input data
21 you need too. And I really think we should restrain
22 the complexity of models by the types of input data we
23 have. There is HDSF model for example for hydrology
24 out there. It takes 2 years to calibrate, get all the
25 parameters, and at the end you really don't know

1 whether you have the right parameters. The SHE model
2 in Europe, exactly the same, it takes too long.

3 While the precision you get in these
4 models are really not that much better in the overall
5 things than this exam model.

6 So I do agree partly with you. I mean
7 the complexity of the system, I mean you need to have
8 these linkages, but the models themselves within the
9 system should be restrained by the input data we have.

10 **DR. HEERINGA:** Dr. Lick, we'll come back
11 to you.

12 **DR. LICK:** I want to contribute or may
13 subtract from this discussion, I don't know. But I'd
14 like to comment on Einstein's statement about models
15 being as simple as possible, but not more so.

16 This is a very confusing and misleading
17 statement, and it's always been used by modelers to
18 justify what they've been doing. Incidentally, I have
19 never, nor has anybody else, ever found a reference
20 where or even if Einstein ever said this thing. So I
21 don't know if I can blame Einstein for this.

22 But the question is, when you develop a
23 model or if EPA asks for a model, I think the first
24 thing you should say is, "What's the question? What
25 are you trying to do with this model?" The second

1 question is, "How accurate do you expect this model to
2 be?". I mean I would like to see a factor of 2, but
3 nothing we've talked about in the last few days has a
4 factor of 2 in there.

5 It's more like a factor of 10, but you
6 know, you have to first of all try to say, "How
7 accurate do you expect the model to be?". Then you
8 look at this overall conceptual model with every damned
9 process that you can possibly think of, and ask
10 yourself, "Could it possibly contribute a factor of 2?
11 Or is it greater than 2, or is it 10 percent?". If
12 it's less than 10 percent, ignore it.

13 If you are asking for an accuracy with a
14 factor of 2, and this thing can contribute a factor of
15 2, you've got to include it. You don't have to include
16 it extremely accurately. I mean I think,
17 hydrodynamicists as we pointed out sometimes go
18 overboard, because they can make these hydrodynamic
19 models extremely complex, and with a lot of calibration
20 extremely accurate.

21 But so what? I mean it you are throwing
22 other processes in there, which you don't know the
23 order of magnitude it's a waste of time. So I think
24 the first thing you have to ask is, "What's the
25 question, how accurate do you want the model to be?",



1 and then include processes which can effect a solution
2 to that accuracy. If you can find Einstein's
3 reference, I'd appreciate it.

4 **DR. HEERINGA:** Dr. Mehta, Dr. Thibodeaux,
5 and then Dr. Delorme.

6 **DR. MEHTA:** I think many of these meeting
7 end up on the issue of models. This in the nth time
8 that we have had a discussion on the subject, but a
9 couple of things. One is that I think that Tammo made
10 a comment about constructing more, and I think this;
11 the only point that Ken is making is that we should be
12 aware of the processes and the feedback.

13 It's not to build the most complex model
14 should be the ultimate goal of an agency. If you just
15 want to work on one end of it, that would be fine. But
16 I think these things have to hold up in court, and if
17 you are not even aware of some of the processes.

18 I'll give you one example. If you take
19 mud from the coast of Louisiana, and you put it on a
20 board and you take a spatula, you could actually make a
21 block out of it.

22 What it is, it's a gel, and if you shake
23 it, it liquefies and it can roll down a slope. Which
24 is how 95 % of sediment actually rolls into the Gulf of
25 Mexico from the river. So in that kind of a situation

1 you don't even have this pick up and deposition
2 function important at all.

3 Now here there was a value judgement
4 made in one of your presentations that to do anything
5 beyond AGRO is a low priority. Well how do you know
6 it's a low priority unless you put the whole process
7 together?

8 So I think that the decisions we come
9 to, as far as what processes we should consider and not
10 consider, as per Dr. Lick there, depends on our ability
11 to look at the whole picture. I think that's the only
12 point that is being made, as far as I know by Ken.

13 **DR. HEERINGA:** Thank you Dr. Mehta. Dr.
14 Thibodeaux, you had a...

15 **DR. THIBODEAUX:** I can remember the time,
16 - see the color of my hair? - that model was a no no in
17 meetings like this. That you didn't talk about models.
18 Models were something that, - you guys don't remember
19 that - you sat looking at me, you know. I can remember
20 talking to an algae person, and he thought I was
21 absolutely crazy that I could try to model the algae
22 production process in the lake.

23 Times have changed. Now we feed the
24 models, scientists are feeding the models. The models
25 are growing in number, and I think your point is very

1 good. You almost want to say, let's stop with the
2 models, let's stop adding them on. It seems like we
3 have, we grow large models by just adding modules of
4 others.

5 Sometimes we should, and I think this is
6 a more far reaching issue than just this committee. I
7 think it's something that maybe should go up to the
8 upper level of the SAP and EPA, because I think it's
9 time to try to arrive at your goal of at some point
10 saying, okay, let's put all these together at this
11 space and time and be the best model, and get rid of
12 all these sub parts. So I like that idea, that maybe
13 that sort of over-reaching idea that there is a time of
14 maybe of model consolidation.

15 **DR. HEERINGA:** Thank you very much Dr.
16 Thibodeaux. My experience even with this process, with
17 the SAP, which is probably limited now to about 10
18 years. I haven't seen that full transition, but I know
19 in the early days there was a lot of challenge, and a
20 lot of work to build and justify and evaluate these
21 models.

22 And the SAB I know, even the whole
23 discussion of comp tox and all that, suggests that
24 there is a mind set change to essentially say we've got
25 to rely on these, we can not afford, or in other words



1 have the time or resources to essentially use old
2 methods to evaluate everything that needs to be
3 evaluated. Actually let me stay in order, Dr. Delorme,
4 and then Dr. Maddalena.

5 **DR. DELORME:** Of course I have to bring
6 my risk assessor view into this. I guess you're used
7 to it by now. Essentially the models we're talking
8 about are mathematical representations of reality,
9 okay, that's all a model is.

10 Put a bunch of equations together,
11 explore relationships between variables, you know, pull
12 the trigger and let it go and see what comes out.
13 They're a tool, okay, their one part of risk
14 assessment.

15 They're a tool that helps let us
16 characterize whether it's toxicity, whether it's
17 concentrations in the environment, it allowed, they
18 allowed us to explore relationships that you know,
19 maybe we can't get at easily otherwise. They're also a
20 tool that allow us to do our job simply and
21 efficiently.

22 But they're not the only thing that's
23 done. There are other types of models. There are
24 models up there which we would call like a mesocosm.
25 You can go out, put a chemical in a defined eco system,



1 and watch what happens to it, and measure it.

2 Maybe rather than spending money on
3 developing mathematical models, we should go back and
4 look at what we can get from some of the field data
5 that's out there. Arguably, the models that we use are
6 ultimately validated or benchmarked, whatever you want
7 to call it, against reality.

8 So I think what we are struggling with
9 is finding a balance between the two worlds in the risk
10 assessment community. You know reality is we don't
11 want to be making the wrong decisions, if there is a
12 right and a wrong decision. But when we are asked to
13 put a pesticide out in the open environment that's a
14 serious thing that we have to do.

15 We have to look for ways of
16 understanding where it's going to go, how long is it
17 going to stay there, who it might be toxic to, what
18 might be the ultimate effect. So we're trying to
19 balance off that in an efficient way, so they are a
20 tool.

21 I can appreciate where Ken is coming
22 from, and I think it's part of what I was trying to get
23 at, with the idea that you chain all these models
24 together...In the end, Steve is sitting there trying to
25 make a decision, and he's got uncertainty like this,



1 how is he going to make the decision? So we balance
2 off. The models are considered, the outputs are
3 considered, but we could also get empirical data
4 sometimes on these things to help us understand what's
5 actually going on.

6 **DR. HEERINGA:** Randy.

7 **DR. MADDALENA:** I appreciate Dr. Licks
8 comments on the complexity here. If you don't
9 understand the uncertainty that you are dealing with,
10 and you add something that's not going to reduce, it's
11 of concern. But I think what concerns me more with the
12 idea of consolidated models is that we might be invited
13 back to review them when they are actually built. And
14 that just scares the heck out of me.

15 **DR. HEERINGA:** I can guarantee you.

16 **DR. MADDALENA:** I think we should be
17 careful what we recommend here. But actually there is
18 a case study in this exercise, if you want to put, if
19 you want to look at the ultimate I think linked model,
20 side by side with the ultimate coupled or fully
21 integrated model, you could look at TRIM.FaTE and this
22 3MRA model.

23 Within the Agency, one of them was a
24 whole series of legacy models all stacked on top of
25 each other. And the other one was kind of the ground

1 up approach. You build a polygon, and it's going to
2 tell you how to stack the different media, and then
3 each of the polygons are fully coupled with this
4 fugacity concept.

5 And both of those monstrous, potentially
6 monstrous models, potentially take how many computers
7 did 3MRA take to run? It was a fascinating exercise in
8 modeling, because the modeling experience turned into a
9 engineering problem of linking hundreds of computers
10 together in an office just to run a simple sensitivity,
11 a relatively simple sensitivity analysis.

12 So caution in the growth of models, they
13 could be over-fertilized very quickly, and you end up
14 with something you can't really interpret. But
15 definitely look into those 2 models if you are trying
16 to decide which way to go.

17 And I think I would recommend a fully
18 coupled, compartmental model, that Dr. Oris has come up
19 with quite often. It's going to be necessary to step
20 back from...I believe that these chemicals step back
21 from the pond.

22 It's worked for years and it works
23 really good for a lot of pesticides I think, but for
24 some of these chemicals I think you're going to have to
25 step back and do a fully coupled system where if you

1 apply it to the soil it's going to go in a lot of
2 places. The lengths and the feedbacks are going to be
3 important to track.

4 **DR. HEERINGA:** Dr. Abbott, and Dr.
5 Norstrom and then I'm going to take a break and after
6 the break we'll come back and wrap up. Dr. Abbott.

7 **DR. ABBOTT:** Doesn't one model contain
8 all of what we need right now? It would be an
9 interesting theoretical exercise, but I wonder if we
10 could even do that if over time we wouldn't need to add
11 to that model as new issues arise.

12 As a risk assessor, and knowing how EPA
13 is schedule is going to demand them to keep pumping out
14 risk assessments and analyzing chemicals...although
15 that's a very interesting idea, I don't see where it's
16 particularly practical for them at this point. But
17 what I do see, that was very interesting from Dr.
18 Portier's discussion was using what you put up there,
19 maybe not as one large mathematical model, but as a
20 conceptual model.

21 When I think of performing a risk
22 assessment, I think not just of the modeling but
23 organizing all of the data that I have, not just the
24 data from the models, the data from experiments. Maybe
25 data that can't be easily combined quantitatively.

1 Qualitative data, and taking that whole record to make
2 my risk assessment.

3 What I liked about what your approach
4 did, it linked everything together in a conceptual
5 model. The only thing I would add to it would be
6 perhaps how the chemical was applied. So that you
7 would have more insight into what kind of agricultural
8 practices you would expect to see effected, so that
9 maybe you could predict what environments this chemical
10 might be accumulating in, and develop more scenarios to
11 address that.

12 **DR. HEERINGA:** Dr. Norstrom.

13 **DR. NORSTROM:** As having dabbled a bit in
14 modeling myself, and being a bit of a reductionist
15 determinist kind of person, I know that models take on
16 a life of their own. And modelers... sometimes because
17 the people that are using them don't entirely
18 understand how the whole thing works can drive the
19 whole thing. And I think that we need to kind of look
20 more at what we want for answers.

21 A model should only be useful, or the
22 best use of the model would be if it only answered the
23 questions that we want it to, and it does it with a
24 minimum data requirement.

25 So we can start with rather complex



1 models that are based on our concept of what we think
2 reality ought to be, but the aim should always be to
3 dropping as many of those things as possible. Other
4 than models, it doesn't really actually matter, the
5 answer we want to get out of it.

6 And that we can do that, you can
7 eventually get to the point where you have something
8 that will model most of the realities that you know,
9 and give you the answer you want with relatively
10 minimal data requirements that satisfy everybody,
11 including industry.

12 And I don't think that it's too possible
13 to do that with the way things are being done, as the
14 criticism has been linking existing models together,
15 unless you have some kind of almost like in house
16 control over what you do with those things. You need
17 some, I think, internal modeling expertise at the
18 development and not just simply buying package models
19 from outside, which are someone else's idea of what
20 reality is.

21 **DR. HEERINGA:** Thank you, Dr. Norstrom.
22 Dr. Meador, and then what I'd like to do is take a
23 break and come back and wrap up and get general
24 comments from the panel. Dr. Meador.

25 **DR. MEADOR:** Just a quick comment. As an



1 experimentalist, frankly models make me really
2 uncomfortable. Some models I think do a great job.
3 Minacules are a good one, chemical speciation model,
4 the SPARK model for KOW actually do a good job. The
5 ones based on physical chemical properties.

6 When you get to some of the fate models
7 based on fugacity, I think they do a decent job. But
8 when it comes to modeling what organisms do, I don't
9 even think we're close. They're really not just bags
10 of liquid, you can't model based on cumulative fugacity
11 or whatever. I mean they have kinetic rates.

12 We find animals that are very closely
13 related that have extremely different update
14 elimination kinetics. You just can't model that.

15 **DR. HEERINGA:** Thank you very much, Dr.
16 Meador. At this point in time, I'd like to call for a
17 let's make it a relatively short break of about 10
18 minutes, and plan to get back here at, well let's say
19 25 minutes of 11. And my intent would be to do any
20 final wrap up including a chance for Dr. Brady and
21 Keith Sappington to ask the panel questions on number
22 10. And then final general comments that anyone on the
23 panel might have, that they would like to make before
24 we conclude. Try to wrap up by 11:15...so it that
25 works for everybody.

1 **(WHEREUPON** , a break was taken)

2 **DR. HEERINGA:** Okay, with Dr. Thibodeaux
3 back I think we can turn to the, some of the questions
4 that...everyone will have an opportunity for wrap up
5 comments fro each of the panel members, but what I
6 would like to do right now is turn to Dr. Brady, to see
7 if there are any specific questions that they would
8 like us to again, sort of revisit or focus on.

9 **DR. BRADY:** Okay, I think we have 1 or 2,
10 we'll start with Dr. Bradbury.

11 **DR. BRADBURY:** We need to get ken back
12 here, but I'll start the questioning and we'll catch
13 him off guard and see what the answer is.

14 But I guess some of the discussion we
15 have had over the last few days and came up here and
16 this morning maybe we'll start with a full and complex
17 model, and one of the things that gets, and just
18 imagine that as a conceptual model sort of in the
19 problem formulation stage and one of the concepts that
20 we worked through with the risk assessor/risk manager
21 is trying to define the eco system potentially at risk.

22 So one thing that would I think would be
23 helpful as you put words around the picture is one
24 sense, or the sense of spacial scale. So how do we
25 define what the spacial scale slash ecosystem



1 potentially at risk is, when we look at that picture,
2 and does that picture change, how does that picture
3 change in terms of P, or B or long range transport
4 characteristics of the chemicals being thought about.
5 The pesticides P is sort of a given, because by design,
6 it's designed to control certain animals or pests.

7 And then I think one thing related to
8 that, - and that's important for the risk manager and
9 the risk assessor, - just to figure out what the heck
10 we are trying to protect, and how do we get our heads
11 around what that is. Is it near field, or is it soil
12 on the way to the Great Lakes, or is it from the
13 Mississippi to the Gulf of Mexico?

14 Where is the scale that we doing? And I
15 think related to that were the blue arrows in the
16 diagram that showed transport and the idea that it's
17 leaving the system. When do we need to wonder about
18 where the stuff is going, and the blue arrow.

19 Is it moving in that blue arrow to
20 another screen shot, which is the next ecosystem
21 potentially at risk, and when do you need to worry
22 about what's going in the blue arrow or not have to
23 worry about what's going in the blue arrow. I think
24 that gets back again to sort of the aspect of long
25 range transport, of different ways that blue arrow can



1 be important.

2 And I think there is another dimension
3 to this figure, which maybe is implicit in there, but
4 as you guys right this up it could be helpful, would be
5 the time dimension on that conceptual model. This gets
6 back again, ecosystems potentially at risk, and how
7 long should we thin about that ecosystem, and maybe
8 potentially at risk.

9 If the half life of the chemical is 2 or
10 3 days, and it's only used once a field system, or the
11 time frame of the ecosystem potentially at risk, not
12 ignoring the community level effect even the short
13 acting chemicals can have on community ecosystem
14 structure.

15 Just thinking about direct effect, our
16 time horizon for the ecosystem potentially at risk is a
17 lot different than if the half life is 200 years in
18 sediments, and those sediments can move from a second
19 order stream and eventually make their way to the Gulf
20 of Mexico. Not only are the ecosystems potentially at
21 risk a lot bigger than the second order streams in
22 Arkansas, it may be all the way down to the Gulf of
23 Mexico, but it may be in a time frame that's 10 or 20
24 or 30 years, again, depending upon the characteristics
25 of the chemical.

1 So it would be helpful in that concept,
2 which even as a conceptual model I think is very
3 valuable, some attributes to that description that I
4 think would help us.

5 Which sort of gets back to the one
6 question I asked yesterday before lunch and then
7 through events I couldn't control, - I apologize we
8 couldn't get back after lunch, - at the end of the day,
9 then you can tell me to shut up, and I'll read the
10 report when it comes out.

11 But when I left at lunch I had the
12 feeling that at the terrestrial ecosystem scale, in the
13 context of problem formulation question 10, it seems to
14 be, the discussion seemed to be at a temporal and
15 spacial scale. It was bigger, for a lack of a better
16 word.

17 And at the aquatic ecosystem potentially
18 at risk, when we were moving from a pond there is still
19 the feeling that we are looking at a stream leach or we
20 are looking at an estuary, which is bigger, but it
21 didn't seem to be at the same spacial scale. Maybe
22 it's correlated the same temporal scale, and I just, I
23 mean I reached back into Ken's graph there and that
24 would be a way to sort of capture what seems to be a
25 time/space discontinuity, but maybe I'm wrong. Maybe

1 you guys all figured it out yesterday?

2 **DR. HEERINGA:** Would one of the panel
3 members like to try to volunteer to...I think there was
4 a considerable amount of...particularly with Dr.
5 Bidleman's presentation. I don't know, I think
6 probably brought the aquatic up to the sort of at least
7 time and spatial scale of terrestrial. Peter Delorme.

8 **DR. DELORME:** For a questioning, in fact
9 I just happened to be working on my answer here and
10 specifically on that one. And what I had is that the
11 first part of the question dealt with whether or not
12 the issues had all been identified, and the issues that
13 had been identified were generally okay, but what I had
14 said was that the aerial scale of use and the aerial
15 scale of assessment, i.e. moving away from a field TL
16 assessment, are both important considerations that need
17 to be factored in.

18 These are not implicitly included in the
19 assessment issues discussed, although they can have a
20 profound effect on WRIT Characterization. So that will
21 be in the response. The 8th, I didn't separate it
22 between terrestrial and aquatic. I don't know that it
23 was specifically said about you need to like a Great
24 Lakes scenario or something like that, but I think it's
25 there. I think there would need to be further

1 discussion on, you know, what the appropriate scale
2 might be.

3 **DR. HEERINGA:** Dr. Hickie, if you could.

4 **DR. HICKIE:** I don't know if you were
5 here for it, but I think it was Terry Bidleman that
6 mentioned Trent Vonya's paper on arctic contamination
7 potential. And there they just chose the arctic
8 because that's what they were interested in, but
9 there's probably no reason that you couldn't take that
10 concept and pick another receptor and do the same sort
11 of analysis. Whether it's 500 kilometers from area of
12 use, or 1,000. I think the idea applies.

13 **DR. HEERINGA:** Dr. Maddalena?

14 **DR. MADDALENA:** So you ask one question
15 you get three different answers. I don't know how
16 helpful that is, but specifically your question is how
17 big to build the boxes in these models and we, when we,
18 the little bit what I participated in TRIM.FaTE at the
19 development in that process. I helped with some of the
20 plant update stuff and some of the initial mass balance
21 models. But once we got this thing built, then we just
22 stepped back and said, now what do we do.

23 How do you put this thing together? And
24 one of the questions was how big do you make the boxes
25 and this goes back a decade and a half to how deep do

1 you make the soil. It was the other question that came
2 up a long time ago. You know, plow depth was nice and
3 convenient in these mass balance models, so 15
4 centimeters, we go with that. But, it's really
5 chemical dependent.

6 And that's the take home message. The
7 tools are becoming available, how to deal with these,
8 as far as the depth of the soil, there's a -- number, I
9 don't know what, it's basically how far the chemical
10 will penetrate into the soil before it decays. A
11 combination of advection and reactivity.

12 We kind of use the same thing for
13 building the sides of the polygon using the
14 characteristic travel distance. How far is this
15 chemical likely to travel in the environment before
16 half of it is gone or some other bright line number is
17 gone. And so then you can begin to build your boxes
18 chemical specific in that sense.

19 **DR. HEERINGA:** Dr. Mehta and Dr.
20 Bidleman, then I think I'd like to move to the second
21 question. Dr. Mehta?

22 **DR. MEHTA:** The spatial and the temporal
23 states are related to each other, so you have a series
24 of boxes there. And just as an anecdote Ferum Falcon
25 worked out the time that some of the particles stayed

1 in air. Because I think he lived in Los Angeles. But
2 the longest time, if you look at some of the books, is
3 80 years, so obviously the temporal and spatial scales
4 would also be very different.

5 But also, I think the, one of the things
6 we look at in coastal engineering is to look at time
7 scales in some sort. Evolution of shorelines and so on
8 and so forth. And to know the equations for the models
9 also change, maybe because of the fact that you don't
10 want the details in some of the larger models. So, my
11 main point was that there is a cascading system that
12 conceptually could be developed. You may or may never
13 ever be able to actually develop a model or maybe even
14 there will be a model, but...

15 **DR. HEERINGA:** Thank you Dr. Mehta. Dr.
16 Bidleman?

17 **DR. BIDLEMAN:** I'd like to make a few
18 comments about arctic contaminants, partly in response
19 to Brendan's comments. The emphasis on arctic
20 contaminants is to a large part, due to the exposure of
21 indigenous people. Both in the Canadian Arctic,
22 Greenland, Alaska, Russia, the circumpolar arctic in
23 general. And because of this issue, the transport of
24 chemicals to the arctic has been viewed as a canary in
25 the coal mine.

1 We were very protective about getting
2 new chemicals up into the arctic. And when evaluating
3 transport to the arctic, or any of the long range
4 transport models, it's important to keep in mind that
5 mobility is key. Because when you use the OECD
6 screening tool, you put in generic factors and you put
7 in persistence values. They're at 25 degrees.

8 Well that may be good and well for
9 evaluating the chemical with respect to initial
10 mobility. But if it ever manages to get up to the
11 arctic, then the persistence of 25 degrees doesn't mean
12 squat. Because it's cold up there and the persistence
13 of chemicals is far, far greater in a cold environment.

14 One good example is the pesticide
15 lindane. The concentrations of lindane in arctic ocean
16 water are the highest of any oceans in the world. Part
17 of the reason for that is because the arctic is a cold
18 ocean and also because of a very heavy use of HCH's in
19 the Northern Hemisphere. The half life due to
20 hydrolysis of lindane in temperate waters, 25 degrees,
21 is half a year.

22 The half life in arctic ocean waters is
23 30 years, simply due to the temperature effect on
24 chemical hydrolysis. So it's very important to keep in
25 mind, if a chemical is mobile, if you assess the CTD or

1 any other measure of long range transport, to carry
2 this chemical a long way, you better be prepared to
3 evaluate it's persistent characteristics at the
4 receptor site. And this is certainly true for the
5 arctic, but it even holds true for a cold lake like
6 Lake Superior.

7 **DR. HEERINGA:** Thank you, Dr. Bidleman.
8 Dr. Simonich, and then we'll move on.

9 **DR. SIMONICH:** I concur with Terry's
10 comments, but I'd also point out that I think from a
11 long range transport potential standpoint, I think the
12 new canary in a coal mine is the mountains. And we see
13 both historic use pesticides and current use pesticides
14 being deposited annually in our high elevation
15 ecosystems and our U.S. National Parks.

16 And it even transfers to effects and so,
17 for example, we see both in Rocky Mountain National
18 Park and in Glacier National Park enhanced
19 phatelligenin and even intersect fish in some of these
20 remote high mountain lakes.

21 So effects that you might expect to see
22 at the outfall of a wastewater treatment plant, you in
23 fact can even see enhanced characteristics over time in
24 our high mountain lakes. So I think those are our new
25 canaries in the coal mine and I think they're important

1 and they're very close to agricultural areas in the
2 U.S.

3 **DR. HEERINGA:** I'd like to turn now, I
4 know there's a second question Dr. Brady wanted to
5 introduce.

6 **DR. BRADY:** I think we're okay.

7 **DR. HETRICK:** I just want a little
8 clarification. Dr. Parker in his presentation, and I'm
9 going to bring back this sediment dynamics question
10 again on burial. There's been a lot of discussion here
11 on the importance of burial when considering modeling
12 and in our little assessment we did in the white paper,
13 we see that really, the burial effect is more prominent
14 on those chronic concentrations.

15 It has a bigger impact on that. And
16 that's probably, from what I've heard with the
17 discussion, is the area that we need to be more
18 concerned about, is the chronic issues with these
19 particular type of chemicals.

20 And the other thing that Dr. Parker
21 said, and I think I'd like to get some clarification on
22 and get some recommendations on is that today after
23 this meeting, we break up and you guys go home, but on
24 Monday we come back to a situation where we have four
25 chemicals staring at us where we have risk assessments,

1 where we have to go in and we possibly have to do some
2 modifications and do some refinements to those risk
3 assessments.

4 Do you have any recommendations on how
5 to do that under the current process and knowing that
6 we use PRZM EXAMS and how do we do that to adequately
7 account for burial. Is the approach that's used in the
8 white paper, is that an adequate first approximation
9 burial to provide.

10 And then the other question is, and I
11 guess this goes back to what Dr. Mackay said. You
12 know, really, probably if we're going to look at
13 burials, we recommend that we look at non-burial and
14 burial and have those as a side by side comparison in
15 the assessment.

16 **DR. HEERINGA:** In the interest of
17 time-management, I'd like to give about ten minutes to
18 this question, but I'd like to begin with Dr. Mehta.

19 **DR. MEHTA:** Yeah, I had a talk with Ron
20 and a you know, I'll be able to send the 1-B model that
21 I talked about. But also, in methods that I think I
22 can see to determine the erosion and deposition
23 function or rates. So I can't do that. But I wanted
24 to say, Monday they'll be 40 students looking at me
25 too. So I also have a limited amount of time.

1 **DR. HETRICK:** I can appreciate that.
2 But I guess what I'm driving at is it's nice to have
3 another model that we're really working with in the
4 paradigm of the PRZM EXAMS in our current approach.

5 **DR. MEHTA:** Yeah, I know. I think that
6 under the current approach, this protocol that I was
7 sending should give a better idea about what the
8 velocity should be and what the erosion rate should be.
9 Now that is more for aggro, because in the present
10 model, you don't have any. You just have an omega or
11 something like that.

12 **DR. HETRICK:** Well, this is the dilemma
13 we're in and to be quite frank with you, to adopt a new
14 model is not something that happens overnight. Not
15 only does it require getting up to speed on the model,
16 but it requires integrating those models into
17 assessments and looking at those compared to older
18 assessments.

19 So I guess the question is, do you have
20 any recommendations on how we can use the PRZM EXAMS
21 model and incorporate burial into that and do it in a
22 defensive way. And be realistic.

23 **DR. HEERINGA:** Dr. Steenhuis and then
24 Dr. Lick.

25 **DR. STEENHUIS:** Concerning the present



1 model, the EXAMS, I mean if you look at it, the PRZM
2 EXAM is more conservative than the AGRO model. I think
3 if you have one model, you need to look to the
4 situation which is most, that gets the highest risk.
5 And the highest risk is really the situation where
6 there's no sedimentation and you can't think about
7 situations in the environment where there's no
8 sedimentation.

9 For example, if the pesticide is applied
10 to a grassland, that would be variable sedimentation in
11 the pond. You can also think about situations where
12 there's no pond, where the sediment goes in and goes
13 out. So, if you work with existing models, I really
14 think you need to take the most conservative estimate
15 and an estimate without sedimentation.

16 With the AGRO model, we can choose these
17 parameters in such a way that persistent chemicals
18 disappear. That is not difficult. I looked at the
19 aGRO model and I could get any answer I wanted simply
20 by choosing these parameters in a certain way.

21 **DR. HEERINGA:** Dr. Lick?

22 **DR. LICK:** As the main problem as of now
23 with the EXAMS is the fact that you deposit pesticides,
24 but you do not deposit runoff from the surrounding
25 area. So the correction is fairly obvious.

1 You not only deposit pesticides but the
2 runoff that goes with that pesticide. And if you keep
3 a constant depth of benthic region then when you
4 deposit at the surface, some will go out the bottom,
5 but the fact is that your concentration of the chemical
6 coming in on the soil will keep the concentration in
7 that benthic layer constant.

8 What your problem now is it goes up,
9 which is totally unrealistic. But if you deposit
10 pesticide and soil at the rate that it comes in, you'll
11 solve that problem. That's trivial to put in your
12 model. The other thing would be a simple correction to
13 this Priven parameter. Which I think is fairly easy to
14 do, based on that dimensionless parameter that I gave.

15 **DR. HETRICK:** I want a clarification on
16 that as well, since you brought that up. My
17 understanding that your dimensionless parameter is
18 estimated, now am I to say that it's using a desorption
19 coefficient or a desorption rate coefficient?

20 **DR. LICK:** Desorption time.

21 **DR. HETRICK:** Okay, so we don't put
22 that, we just....

23 **DR. LICK:** Well, no. If you have a
24 desorption rate coefficient, that's more or less an
25 exponential decay and you can deduce the time from

1 that. But it is a -1 of it's original value.

2 **DR. HETRICK:** But we're just getting
3 desorption coefficients, that's it. We're not getting
4 it as a function of time.

5 **DR. LICK:** Well it is a minus Kd kind of
6 thing? What do you mean by....

7 **DR. HETRICK:** We're just doing it, we're
8 just getting a simple equilibrium desorption
9 coefficient. At a set time, at 24 hours of
10 appropriation.

11 **DR. LICK:** Oh. Well if you've seen the
12 exponential, then you can get a time from that.

13 **DR. HETRICK:** Oh, I see. Let me run
14 this by you because I talked to Dr. Thibodeaux about
15 this yesterday. That we were discussing within our,
16 the science group upstairs, about the possibility of
17 having a PR Ben that is dependent, you could make it
18 dependent on two things actually.

19 Dependent on the total suspended solids
20 that come into the pond as a function of what's runoff
21 coming off the PRZM field, as well as the function of
22 the KOC of the compound. And that could vary then as a
23 function of those runoff events. And so therefore,
24 those compounds that have low KOC are going to be more
25 predominantly found in the water column versus those



1 compounds with high KOC's that are going to be wanting
2 to go preferentially into the sediment. You find that
3 as a reasonable first approximation of a possible fix
4 in the short term until we get some more sophistication
5 in our modeling.

6 **DR. LICK:** If you calculate carbon
7 reasonably well, then the fraction that stays with the
8 particles in the overlying water will equilibrate and
9 that's what I think Dr. Thibodeaux was talking about.
10 So that automatically will do that.

11 **DR. HEERINGA:** Dr. Mehta?

12 **DR. MEHTA:** Most of the transport in the
13 continental U.S. takes place under episodic conditions.
14 So if you look at the time series of storms, there are
15 substantial peaks and there are calm periods. So one
16 ratio could be the current period of a storm of a
17 certain intensity and the half life of the material in
18 suspension.

19 But I agree with Tammo in the sense
20 that, I get the feeling that you guys want to come up
21 with a lower number, but I think that the best way to
22 do is to do the most conservative calculation and that
23 would include no burial at all. Because how would you
24 know that there is not going to be a hurricane which is
25 going to pick up....for example, if you did that in

1 Florida, it would be quite different than doing it
2 somewhere else.

3 So since you are not considering more
4 things, you're only looking at these points, I just
5 don't see how you could come up with burial as a sure
6 thing that would reduce the concentration.

7 **DR. HETRICK:** And that's the million
8 dollar question, to be quite frank with you. Because
9 we're sitting in a seat where we have to make an
10 assessment and we don't want to miss a problem. And by
11 burying it, we might miss a problem.

12 **DR. HEERINGA:** Keith Sappington?

13 **MR. SAPPINGTON:** I think I'm
14 conceptually in between Steve and Jim here in that I
15 try to boil it down. Could we get a farm pond right
16 but everything else wrong? And that's the question of
17 scale and whether we're operating at the correct scale
18 for a problem and I just would like that, I know
19 there's been quite a bit of discussion on scale, but I
20 think that is kind of the core of what's in the back of
21 my mind. Thank you.

22 **DR. HEERINGA:** We're going to go to Dr.
23 Maddalena and then Dr. Delorme and then I want to move
24 on because we do have more.

25 **DR. MADDALENA:** I haven't had the luxury



1 of reviewing PRZM and exam, I haven't been in these
2 conferences before. So I just did in the last, during
3 this conversation, reviewed PRZM. It's not the right
4 model. It's a route zone model.

5 I'm sure it's got good runoff stuff,
6 it's got premium chemistry and mixing and stuff, it's
7 got great farm stuff. But the range of sources is
8 starting in the wrong place. Again, this is a five
9 minute review of what, a 200 and some page document and
10 a model that's been around for 20 years.

11 I said that in that way just to
12 highlight the fact that there are some very simple
13 options. Look up Tom McKone as a model, CalTOX. Don
14 Mackay, who I'm really glad to see here, he's got a
15 model, CHEMcan. Dick Vandemant's got a model, that
16 gone into USIS. These are all models designed and
17 have cut their teeth on these types of chemicals.

18 This particular type of chemical,
19 persistent chemicals that move in multi-media, stay in
20 the environment long enough for us to scratch our heads
21 and say what's going on. These are interesting
22 chemicals, challenging chemicals and these models are
23 out there, just to give you very coarse looks at
24 whether varial is important.

25 And yet I agree, they do a great job on

1 burials, but if you don't have good reaction rates on
2 the planet surface, I don't know if PRZM includes
3 degradation or any kind of reaction rate in the
4 cuticle. I mean there's a lot of details there that I
5 couldn't pick up.

6 **DR. HETRICK:** No, there is the ability
7 to put in plant wash-off and plant degradation kinetics
8 into that model.

9 **DR. MADDALENA:** So I guess the simple
10 answer from just one of the panel members is pick up
11 one of these off the shelf models and put your KOW,
12 your MS log and your solubility in, put a generic
13 application rate and see what gets into houses and
14 plants. Again, it's a cartoon world, and I can't go
15 past that. It's really easy to do those and the
16 information that gets up to that level is more general.

17 **DR. HEERINGA:** Peter Delorme? And then
18 I'd like to move on.

19 **DR. DELORME:** We're sitting here looking
20 at figure 4.8 in the white paper, which shows the mean
21 daily sediment deposition for a number of different
22 scenarios. And you guys picked the one that has the
23 absolute most in it and I mention that you're picking
24 one that's depositing 200 grams per meter squared per
25 day in what you presented.

1 Yet, the range is between .2 and 200.
2 You've got three orders of magnitude there, so a couple
3 of approaches. You could just take some of those other
4 things and see what happens with burial on them as
5 well.

6 **DR. HETRICK:** The concept here is what
7 we're thinking about doing is have this scenario
8 dependent so that each scenario, the runoff we could
9 calculate that as a function of scenario, the loading,
10 the average loading....we're just using a Mississippi
11 cotton just as an illustration, that's all that is.

12 **DR. DELORME:** So you've actually done it
13 for all of these?

14 **DR. HETRICK:** No, we have not done it
15 for all of them, but we're considering that depending
16 on what the recommendation of the panel is.

17 **DR. DELORME:** That might, I mean there's
18 a lot of scenarios to run there. I recognize how much
19 work that is to do, because I've done it. But you may
20 pick, sort of high, medium and lows, just to give you a
21 sense of what it does to your risk characterization.
22 Then somebody like Steve can take a look at it and say,
23 okay, it's not a problem if you have high levels of
24 varial, but it is if you do. And then you've got to
25 get into the interpretation of what kind of situation

1 you predominately have out there in the areas where
2 this is used.

3 **DR. HEERINGA:** Dr Hickie?

4 **DR. HICKIE:** Just a very brief comment
5 on that exact figure that Peter brought up. I took the
6 numbers of that and I calculated the arithmetic mean
7 and the geometric mean of those values and I can't find
8 the page right now. But it was something like 55 for
9 the arithmetic mean and 13 for the geometric mean of
10 those values, so, and I think you used 80 as your
11 illustrative, sort of selected high range. So it's how
12 you look at the numbers.

13 **MR. SAPPINGTON:** From one of the
14 chemicals, we actually ran all those scenarios. And
15 what we do see however, is a competition in terms of
16 the ultimate results between the delivery of the mass
17 to the pond and the varial potential.

18 So while a California tomato only gets
19 two tenths of a gram per meter squared per day and
20 that's just a daily average value, that's not actually
21 how it comes in, it comes in pulses, but just for
22 comparative purposes.

23 So the varial potential is much lower,
24 but if for these compounds, since the main vector to
25 the pond tends to be the absorbed sediment erosion, you

1 also have a lot lower loading to the pond. So there is
2 this kind of see saw if you will between those two.
3 Yeah, we ran all of those.

4 **DR. HEERINGA:** Okay, at this point, what
5 I would like to do is move on and give the panel an
6 opportunity and go systematically around and we'll
7 begin I believe, with Dr. Norstrom. Just to see if
8 there are any final comments or inputs that you'd like
9 to have based on the last three days or your knowledge
10 of the subject matter.

11 **DR. NORSTROM:** Certainly nothing
12 overarching. I think I made my point quite clearly.
13 Just thinking outside the box and it really comes to
14 bio-accumulation and aquatic and terrestrial
15 ecosystems. I think it's really important for this
16 class of chemicals.

17 **DR. HEERINGA:** Thank you Dr. Norstrom.
18 Dr. Meador?

19 **DR. MEADOR:** I second that and that's it
20 for me.

21 **DR. HEERINGA:** Dr. Mehta?

22 **DR. MEHTA:** No comments.

23 **DR. HEERINGA:** Dr. Steenhuis?

24 **DR. STEENHUIS:** I would much urge that
25 we talk about the sediment model in choosing

1 parameters. The problem with the model is not, the
2 model is arbitrary. The parameters in the model are
3 arbitrary. So I would urge, for the part that I know,
4 to improve the model in such a way that it becomes, it
5 can be done, becomes more scientifically updated as
6 soon as possible. Because you cannot justify the
7 parameters in this model in any way.

8 **DR. HEERINGA:** And that was the
9 sedimentation models. Dr. Simonich?

10 **DR. SIMONICH:** I have a few things to
11 say. I think I come to this from a fairly unique
12 perspective because I spent six years of my career, in
13 the first stages of my career after receiving my PHD in
14 chemistry, working in the consumer products industry.
15 So I have a unique perspective among the panel members
16 based on my consumer product industry experience and
17 also being a professor at Oregon State University.

18 So in my job working in the consumer
19 products industry, I was in part responsible for the
20 registration of new chemicals under TOSCA. So I have
21 direct experience under that. Not under FIFRA, but
22 under TOSCA.

23 So the point I'd like to make is when
24 we're looking at pesticides with PBT characteristics, I
25 think one point I'd like to make is that if approved,

1 they should have significant global and societal
2 benefits.

3 Because these are global chemicals with
4 global transport properties. So a significant global
5 and societal benefit. I think both the agency and the
6 registrant should be prepared to see unprecedented
7 scientific scrutiny.

8 Likely, along those lines, also
9 unprecedented data generation is required in that
10 consideration. And if approved, there will be
11 unprecedented acceptance of risk on the part of the
12 registrant and the EPA.

13 **DR. HEERINGA:** Thank you Dr. Simonich.
14 Dr. Oris?

15 **DR. ORIS:** I've got three general
16 comments I'd like to make and some of this will maybe
17 come from naivety or ignorance. But I'm going to say
18 them anyway. So the first one that I need to make is
19 that in general, overall, for the FIFRA risk assessment
20 process that risk quotients are not a measure of risk
21 and I really bristle at the use of the terms risk and
22 risk quotients.

23 They're really hazard quotients and they
24 don't give an indication of risk. And I always say
25 that, and I've been saying that for a long time and it

1 doesn't seem to have much of an effect. But I'll say
2 it again. The second comment is a general one but also
3 applies specifically to this case. And that's in
4 traditional pesticide risk assessments, my impression
5 is that the toxicity values are driven primarily by
6 acute toxicity for non-targets.

7 In PBT assessments, and again that may
8 be my naivety and inexperience here, but what I'm
9 driving at is a PBT assessment that's going to be
10 almost exclusively driven by chronic toxicity
11 assessments.

12 In chronic toxicity assessments, we use
13 the no observable effects concentration as an endpoint.
14 Statistically that has some disadvantages and I would
15 encourage you as you move forward and improve the
16 process, to use regression based approaches and dew
17 point estimation instead of using the NOEC.

18 The NOEC is an endpoint based on the
19 failure to reject an old hypothesis and I can go on and
20 on about the disadvantages of an NOEC, but using the
21 failure to reject an old hypothesis as an endpoint in a
22 toxicity test is invalid. It also, unfortunately when
23 you have the stake holders conducting the test,
24 encourages making type two errors. And again, we can
25 go into detail later on that.



1 But it certainly does. So that's my
2 second comment. My third one is basically why are we
3 doing this. If compound five turned out to be DDT,
4 would you approve it using your current process? And I
5 think that's a question I would like you to assess on
6 Monday when you have to do these things.

7 Do you want to see compound four, in
8 twenty years, causing problems? I don't think you do
9 and I just don't understand why we're going towards
10 more persistent chemicals that are going to get up and
11 move around the world.

12 Peter and I discussed this, if the glove
13 doesn't fit, you must acquit. I think the glove fits
14 pretty well here for the chemicals you're looking at
15 and so to put it in the risk assessment or risk
16 management context if I were the risk manager here, if
17 the uncertainties, and in my case the certainties, are
18 too high, you must deny. And in this case, that's
19 where I'm falling. Thank you.

20 **DR. HEERINGA:** Thank you Dr. Oris. Dr.
21 Donnelly?

22 **DR. DONNELLY:** I'm just going to echo an
23 earlier comment from Meador, that whenever possible,
24 you want to validate or confirm the results from these
25 models with laboratory and field data.

1 **DR. HEERINGA:** Dr. Portier?

2 **DR. PORTIER:** After this morning's
3 discussion, you know why I prefaced my comments as to
4 why I wasn't sure I wanted to bring the topic up.

5 **DR. HEERINGA:** Dr. Schlenk?

6 **DR. SCHLENK:** Nothing to add. Thanks.

7 **DR. HEERINGA:** Dr. Abbott?

8 **DR. ABBOTT:** I have nothing to add
9 either.

10 **DR. HEERINGA:** Dr. Bidleman?

11 **DR. BIDLEMAN:** I'm fine.

12 **DR. HEERINGA:** Dr. Delorme?

13 **DR. DELORME:** I'm looking forward to
14 seeing the risk assessments on some of these chemicals.

15 **DR. HEERINGA:** Dr. Doucette?

16 **DR. DOUCETTE:** Just a minor point I
17 guess regarding scales of models. I thought it was
18 interesting that we talked about input like KOW and KOA
19 for example and KOC as being key for parameters to
20 models when they themselves are models.

21 I don't typically worry about spilling
22 octanal in the environment and worrying about a
23 partition coefficient. In an octanal phase, octanal
24 air represents cuticle interactions and KOC is only
25 part of the soil. So sometimes I think in looking at

1 these grandiose models, we have to remember all the
2 assumptions that go into those and key parameters that
3 are taken for granted now are really in themselves, a
4 model.

5 **DR. HEERINGA:** Dr. Gan?

6 **DR. GAN:** I have a comment pertaining to
7 the refinement of tools for the future. I'm sure what
8 I'm going to say is not similar for tackling the four
9 chemicals you have on your mind. But as Bill said, we
10 assume KOW or KOC or KDOC as a constant and then we go
11 from there. But we know KOC can vary easily by ten
12 times and then we use models to estimate from KOW and
13 KOW estimates again from the structure of the chemical.

14 And very soon, I think the errors can
15 propagate through the models and you have some results
16 but you really don't know what the results mean and how
17 close they are. And the reason for these types of
18 chemicals, since I work on proliferates on a daily
19 basis, they are very similar I think. The reason why
20 we are trying to use this KOW, KOC, or KDOC is to try
21 to get to the free concentration. I think that's the
22 most essential parameter here, not just go with the
23 bio-availability, but that's really important.

24 But now, there's a, I know, you know,
25 for a fact that chemistry has advanced so much that

1 there are very good techniques that we use to measure
2 the free concentration. A lot of good work has been
3 done in Europe. Also by people here in the U.S. and I
4 hope EPA can look at this map instead of going around
5 and around that we indirectly estimate something we do
6 not know. You know, just to ask people to measure the
7 free concentration and just one thing I will say, that
8 you as EPA, if you ask, you get it, people will do it
9 for you. Thank you.

10 **DR. HEERINGA:** I think he just
11 bequeathed you powers that you may or may not actually
12 have. Thank you Dr. Gan. Dr. Hickie?

13 **DR. HICKIE:** I'm just thinking, poor
14 Randy he's the last one in the line. So I was trying
15 to think of something that hasn't been said and
16 temperature, it effects phys-chem properties, long
17 range transport, persistence, biology of organisms, and
18 bio-accumulation.

19 **DR. HEERINGA:** Dr. Lick?

20 **DR. LICK:** Yeah, while this is all
21 happening, go around, I was thinking about this
22 re-suspension deposition question and I asked myself,
23 why does it matter. To a first approximation, the
24 amount of chemical and the amount of sediment coming
25 into the pond is important because there is varial.



1 But re-suspension and deposition doesn't
2 change. It goes up, it comes down, it goes up, it
3 comes down. It doesn't modify varial to a first
4 approximation. It really doesn't modify chemical
5 concentration in the overlying water. So, I hate to
6 say this because I a sediment re-suspension guy, but
7 for a shallow pond and two first approximations I
8 would.

9 **DR. HEERINGA:** Dr. Maddalena?

10 **DR. MADDALENA:** Sorry if I came on too
11 strong about PRZM, I know it's a really good model. To
12 show how easy it is, I just ran chemical four in one of
13 these models and it's pretty much like DDT in it's
14 behavior in the environment. If you use all the
15 assumptions that we use in to build these models. I
16 don't know what you can do with that information,
17 but....

18 **DR. HEERINGA:** Okay, at this point we're
19 approaching the end of our scheduled session and I
20 think with travel plans and everything, I'd like to
21 bring it to a close. We've had three and a half
22 productive days and before I wrap up, I'd like to turn
23 to Dr. Brady and Dr. Bradbury to see if you have any
24 closing comments.

25 **DR. BRADY:** Not really, I'd just like to



1 repeat our appreciation for the work of the panel.
2 Thank you for all the feedback and discussion, we've
3 got a lot of useful feedback right now. So, we look
4 forward to the written report. And also, once again
5 I'd like to repeat my appreciation for the work the
6 E-FED scientists did to prepare for the discussions.

7 **DR. HEERINGA:** Dr. Bradbury?

8 **DR. BRADBURY:** I just wanted to echo
9 Don's thanks to the EPA team in putting it together and
10 also, once again thank all of you for the time and
11 effort in this meeting. I've been at several SAP's
12 over the years and this certainly is in the top tier or
13 95th percentile.

14 I thought there was some excellent
15 discussion of the challenging issues we're dealing
16 with. There's a little bit of looking back in time and
17 dealing with the present and looking into the future
18 and I thought from both the philosophy and the hard
19 core issues that we dealt with, it was very
20 instructive, both from a risk management and a risk
21 assessment perspective. So I thank you all for the
22 excellent discussion and input.

23 **DR. HEERINGA:** Keith?

24 **MR. SAPPINGTON:** I would just echo what
25 Don and Steve said. I think the feedback has been very



1 good. I know I had some angst about the depth and
2 thickness of the white paper and how that was going to
3 be a problem with the example chemical. And I
4 appreciate you all taking on this mission and the
5 charge and the level of detail that you provided. So
6 thank you very much.

7 **DR. HEERINGA:** On behalf of the SAP, I
8 want to express a note of appreciation to the
9 Environmental Fate and Effects division for bringing
10 these issues to us. We recognize that they're probably
11 more critical and urgent for you than even the
12 discussion here has let on. But it has enough of a
13 horizon, we think that makes these discussions very
14 relevant and something you can operate on.

15 Also, to the scientific staff in the
16 Environmental Fate and Effects division, I don't have
17 enough expertise to judge all of the components of the
18 white paper, but my reading of it and in comparison to
19 many of the things that we are able to see over the
20 years the whitepaper, along with the supporting
21 documents, I thought not only was well-written but
22 generally well-organized and integrated to the point
23 where I think it can generate and support the sort of
24 effective discussion we've had.

25 So I really wanted to commend everybody



1 for that work. You know what it takes to put that
2 together, various reports and papers and something with
3 that sort of comprehensive scope. An excellent job, I
4 felt. The other thing I'd like to do, I'd like to
5 thank all of the panel members.

6 I'm always pleased and the EPA FIFRA
7 staff who assemble these panels, that we can bring
8 together such expertise on so many dimensions on this
9 particular issue and bring you all to give your week to
10 this process. I certainly appreciate it. I thank the
11 EPA and ultimately we hope it is a contribution to
12 society and protection. I want to make a special note
13 to thank all the participants who came down from
14 Canada.

15 Clearly well-represented here not only
16 on the panel, but also among the formal presenters and
17 I think in the audience as well. A lot of shared
18 interests and I know a lot of collaboration between
19 PMRA and the EPA and I greatly appreciate your
20 participation in these meetings. I think I'll turn to
21 the designated federal official, Myrta Christian, for
22 some closing comments.

23 **MRS. CHRISTIAN:** I also want to thank
24 the panel for their participation and for the advice to
25 the agency. To the presenters, I also want to thank



1 for a job very well done. And as a last note, the
2 report for this meeting will be available in
3 approximately ninety days.

4 **DR. HEERINGA:** A final administrative
5 note. Panel members, if we could meet immediately in
6 the breakout room, we'll discuss briefly our schedule
7 for assemblage of written components and the process of
8 finalizing our written report. So with that, I would
9 like to again thank everybody for their participation
10 over the last three and a half days and bring this
11 meeting to a close. Thank you very much.

12 **(WHEREUPON, the MEETING was concluded.)**

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