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UNITED STATES NUCLEAR REGULATORY COMMISSION'S
ADVISORY COMMITTEE ON NUCLEAR WASTE

AUGUST 29, 2001

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1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION

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4 ADVISORY COMMITTEE ON NUCLEAR WASTE

5 (ACNW)

6 + + + + +

7 129 MEETING

8 + + + + +

9 WEDNESDAY,

10 AUGUST 29, 2001

11 + + + + +

12 ROCKVILLE, MARYLAND

13 + + + + +

14
15 The Advisory Committee met at the Nuclear
16 Regulatory Commission, Two White Flint North, Room
17 T2B3, 11545 Rockville Pike, Rockville, Maryland, at
18 8:30 a.m., Dr. George M. Hornberger, Chairman,
19 presiding.

20 PRESENT:

21 GEORGE M. HORNBERGER, Chairman

22 RAYMOND G. WYMER, Vice Chairman

23 B. JOHN GARRICK, Member

24 WILLIAM J. HINZE, Consultant

25 MILTON LEVENSON, Member

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1 ACRS/ACNW STAFF PRESENT:

2 JOHN T. LARKINS, Executive Director

3 SHER BAHADUR

4 LYNN DEERING

5 LATIF HAMDAN

6 HOWARD J. LARSON

7 RICHARD K. MAJOR

8 AMARJIT SINGH

9 RICHARD P. SAVIO

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(8:32 a.m.)

CHAIRMAN HORNBERGER: Okay. Now that we know what we are meeting about, the meeting will come to order.

This is the second day of the 129th meeting of the Advisory Committee on Nuclear Waste. My name is George Hornberger, Chairman of the ACNW.

Other members of the committee present are John Garrick, Milton Levenson, Raymond Wymer; and William Hinze, former member of ACNW will be a consultant.

During today's meeting, the committee will discuss the following. Well, we won't do that.

(Laughter.)

CHAIRMAN HORNBERGER: I can't change my script on the fly easily.

(Laughter.)

CHAIRMAN HORNBERGER: The committee will discuss the following. We will have -- that's October. So we will have -- bear with me -- we will have a discussion of preparation for our October meeting. We will have an update on the total system performance assessment integration. We will discuss Yucca Mountain preclosure. We will have a discussion

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1 on a proposed working group on research, and we will
2 have preparation of ACNW reports.

3 Howard Larson is the designated federal
4 official for today's initial session and is
5 responsible for the agenda.

6 (Laughter.)

7 PARTICIPANT: Or lack thereof.

8 CHAIRMAN HORNBERGER: This meeting is
9 being conducted in accordance with the provisions of
10 the Federal Advisory Committee Act. We have received
11 no written comments or requests for time to make oral
12 statements from members of the public regarding
13 today's sessions.

14 Should anyone wish to address the
15 committee, please make your wishes known to one of the
16 committee staff.

17 It is requested that the speakers use one
18 of the microphones, identify themselves, and speak
19 with sufficient clarity and volume so that they can be
20 readily heard.

21 Are there any other items before we start?

22 (No response.)

23 CHAIRMAN HORNBERGER: Okay. Let's plunge
24 right in the. Jit, I believe you are going to talk to
25 us about preparation for the October meeting.

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1 MR. SINGH: Yes. You have this new copy
2 in front of you.

3 CHAIRMAN HORNBERGER: Yes.

4 MR. SINGH: We are going to start by
5 meeting on October 15 at 5:30 with a PNP meeting, and
6 then -- excuse me. October 15th.

7 CHAIRMAN HORNBERGER: Yes, Monday up until
8 mid-afternoon, and then we are flying to --

9 MR. SINGH: It should be 5:40 though.

10 And then the next day, October 16, we have
11 a problem with that. We just had a meeting this
12 morning with the staff on the transportation issues.
13 They are not too sure if they can accommodate us. But
14 they will let us know by this afternoon or tomorrow
15 morning.

16 Yes, sir.

17 DR. GARRICK: I know we had quite a bit of
18 discussion about this, but did we finally resolve that
19 the transportation discussion would be limited pretty
20 much to the NRC staff, or were we going to try to get
21 other authorities that are involved in it?

22 DR. LEVENSON: If you will turn the page,
23 the next one is --

24 MR. SINGH: The next one is WIPP.

25 DR. LEVENSON: -- DOE presentation on

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1 lessons learned from WIPP.

2 DR. GARRICK: Yeah, I know.

3 DR. LEVENSON: Oh, you are thinking about
4 like DOT.

5 DR. GARRICK: Right. DOT, DOE, the
6 states, et cetera. Did we decide that that was --

7 DR. LEVENSON: Oh, that discussion was in
8 the context of a workshop or a special thing.

9 DR. GARRICK: Oh, okay. Well, I'm just
10 thinking of what happens if this falls through because
11 that's what Jit was saying, that the possibility
12 exists.

13 MR. SINGH: There's a strong possibility
14 it might fall through. They came and talked to us
15 this morning about 7:30.

16 CHAIRMAN HORNBERGER: Well, I sort of
17 liked the idea of making some contingency plan. So if
18 the NRC staff can't or won't do it, for whatever
19 reason, maybe we should just schedule a presentation
20 from some other experts, and say, well, the NRC staff
21 couldn't do it, but that doesn't mean that there isn't
22 anybody else out there who doesn't know something
23 about transportation issues.

24 MR. SINGH: But if you go to the next
25 page, we still have the WIPP people come and talk to

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1 us.

2 MS. DEERING: Is that definite?

3 MR. SINGH: No, we're not too sure of that
4 either yet.

5 CHAIRMAN HORNBERGER: Yeah, but we'll
6 probably be able to do that.

7 Well, if we cannot get DOE to present, we
8 know we can get people like Bob O'Neill I'm pretty
9 sure.

10 MR. SINGH: Okay.

11 DR. GARRICK: Well, this is not a casual
12 subject.

13 CHAIRMAN HORNBERGER: No, it isn't.

14 DR. GARRICK: You know, I'd hate to go
15 there and flub on the issue that's the most paramount
16 in their mind, and right now I get the impression that
17 this is very much up in the air, and I don't think
18 it's -- I haven't heard any alternatives that make me
19 very happy. So I don't know where it stands.

20 DR. LEVENSON: Well, maybe we need to have
21 some discussion and move a little bit up the chain of
22 command in NRC from the people we talk to this
23 morning.

24 MR. SINGH: See, management is the one who
25 is telling their staff it is not necessarily for them

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1 to brief the ACNW in Las Vegas because they have been
2 there so many times. So that is the reason we --
3 officially we have talked off line, but anyway, now we
4 are in the public, but we need to talk to the
5 management and stuff if we make it any different
6 because the management is the one who is directing the
7 staff.

8 DR. GARRICK: It's getting a bit late.

9 DR. LEVENSON: We need to do it today.

10 MS. DEERING: Give us names.

11 DR. LEVENSON: Yes.

12 (Laughter.)

13 MR. SINGH: I want to read my services
14 Lynn.

15 Anyway, I think we should need to talk to
16 the staff, to management.

17 DR. LEVENSON: We need to do it today
18 though.

19 MR. SINGH: Yes, sir. And I told the
20 staff to --

21 DR. LARKINS: Well, this is the first I've
22 heard of it. So --

23 MR. SINGH: It just happened 20 minutes
24 ago, John.

25 DR. LARKINS: Okay. I don't see any

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1 reason why we wouldn't raise it with the office
2 director to find out why.

3 MR. SINGH: That's what it was suggested,
4 that we should raise to the office director.

5 DR. LARKINS: Okay, all right.

6 MR. SINGH: It just happened 20 minutes
7 ago.

8 DR. LEVENSON: But I think it's more than
9 whether they do or don't come. I think we want to
10 specify what we want them to talk about.

11 DR. WYMER: Absolutely.

12 MS. DEERING: This wasn't your basic
13 presentation that they give out there, I thought. I
14 thought this was more related to what data has this
15 agency collected on transportation risk, and what
16 knowledge do we have about risk assessment related to
17 transportation.

18 DR. GARRICK: I think that would be an
19 ever so much more interesting approach.

20 DR. LEVENSON: The answer to that question
21 when we asked it was that they don't collect that kind
22 of data.

23 MS. DEERING: Okay. That's an answer.
24 Okay.

25 CHAIRMAN HORNBERGER: Well, of course, we

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1 could broaden it a little bit by asking what data they
2 use if they don't collect it themselves and what
3 information they use to make those kind of inferences
4 and decisions.

5 DR. LEVENSON: Well, they'll tell you
6 they're not responsible for shipping and so they're
7 not concerned about it.

8 CHAIRMAN HORNBERGER: They are responsible
9 for container integrity and licensing the containers,
10 and so presumably there are some risk insights that go
11 to that that are not totally independent of
12 transportation obviously.

13 I mean we recognize what the NRC does, but
14 still, they have to have some basis for making their
15 decisions, right?

16 DR. GARRICK: See, I'm beginning to really
17 appreciate the public's position in Nevada. This
18 whole issue just seems to be somebody that nobody
19 wants to deal with, and furthermore, it's kind of a
20 centerpiece for our meeting because our strategy for
21 this meeting was rather than have a public forum
22 exchange like we've had in the past, we have a regular
23 ACNW meeting, but with an agenda that's of great
24 interest to them addressing their issues.

25 And if we kick off our agenda with a

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1 stumble, you know, the whole concept loses its effect.

2 DR. LEVENSON: John, one of the reasons I
3 think we need to go up management a couple of chains
4 is what we really need is somebody to lay out the
5 entire transportation picture, all of the elements,
6 and then NRC staff does this. They can just
7 highlight. There's only these two out of these ten
8 that are NRC's responsibilities. This is DOE. This
9 is the state. This is DOT.

10 It seems to me one of the issues if I were
11 a member of the public -- I am a member of the public
12 -- me just personally, I have trouble trying to figure
13 out sometimes who is responsible for what,
14 particularly since it's different for Yucca Mountain
15 than it is for WIPP.

16 And just a road map that would define all
17 of the issues in all of the areas and who is
18 responsible would be a significant --

19 DR. GARRICK: Well, it sounds like DOE
20 should take the initiative on most of it.

21 DR. WYMER: Well, quite a bit of it.

22 DR. GARRICK: Yeah. Well, they certainly
23 have more of it than anybody else, but I don't know.
24 I don't know. You know, our approach here is to try
25 to first --

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1 DR. LEVENSON: I'm not sure if DOE would
2 agree with you on that because legally the shipments,
3 even if it's a DOE shipment, it's the trucking
4 companies that have big areas of responsibility, not
5 DOE.

6 DR. GARRICK: Well, that isn't the way
7 it's been built up at Yucca Mountain. I think in
8 earlier presentations we had on this out in Nevada, it
9 was indicated that DOE is taking a bigger role here.

10 DR. LEVENSON: And we've just demonstrated
11 why it's important that this be unscrambled. If you
12 and I don't understand exactly who's responsible, how
13 can you expect the public to?

14 DR. GARRICK: Yeah, well, that's my point.

15 DR. WYMER: Taking possession is not
16 really taking responsibility.

17 DR. GARRICK: What are you saying? Nobody
18 has responsibility?

19 DR. WYMER: I'm saying the states have it,
20 DOT has it.

21 DR. LEVENSON: Oh, but we're not going to
22 change who has responsibility under various laws, but
23 it seems to me that we ought to be able to trigger a
24 clarification of who is responsible, and that's why
25 I'm hoping we can get somebody in the NRC management

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1 to agree that they would undertake to at least make
2 the road map.

3 That is not expanding any of their
4 responsibilities, but the fact that it is in their own
5 self-interest to clarify their limited --

6 CHAIRMAN HORNBERGER: Yeah. I mean, to a
7 certain extent though, you know, we have heard pieces
8 of that at other meetings. So I'm sure that we
9 could --

10 DR. LEVENSON: Actually we heard pieces of
11 it.

12 CHAIRMAN HORNBERGER: Well, I'm not sure
13 that "pieces" is the right word. I think we've heard
14 a good chunk of it from when we had questions from
15 somebody and they laid it out. I mean maybe not in
16 diagram form like you want, but I'm not sure that
17 we're as much in the dark as you suggest.

18 I'm not suggesting that we don't want to
19 do that. That's fine, but it seems to me that where
20 we are now is that you have to check with NRC staff.
21 They may or may not accommodate this presentation, and
22 we're going to have to step lively to fill in, and I
23 think we also agree that what we don't want is some
24 standard, canned presentation.

25 What we would like is people to really

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1 give us this oversight and, as Lynn suggested, I think
2 that ultimately we would like at least to interact
3 with them, have questions about risk insights.

4 MR. SINGH: Well, we gave them this
5 morning in this meeting if they do come what we'd like
6 to have them to brief us.

7 CHAIRMAN HORNBERGER: Okay.

8 MR. LARSON: That was the purpose of this
9 morning's meeting, for them to understand from Milt
10 and Ray what --

11 DR. GARRICK: Well, when I looked at that
12 presentation, and I didn't attend the meeting, and if
13 I were a member of the public, I wouldn't get anything
14 out of that presentation that would tell me what the
15 problem is.

16 MR. LARSON: That was discussed.

17 MR. SINGH: That was discussed.

18 DR. GARRICK: Yeah. You know, there was
19 not world one about what's the hazard here, and this
20 is a safety business that we're in. And to be able to
21 just talk about a massive cask and structures that are
22 going to protect people and so forth, the obvious
23 image that's left is that they're hauling a disaster,
24 and I don't know where the responsibility starts and
25 ends here, but I think we're doing a terrible job of

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1 this issue on everything I've seen, and it's just
2 passing the buck from one agency to another and nobody
3 has stepped forward and is saying, "Okay. I'm going
4 to put this whole picture together."

5 DR. LEVENSON: You take my speech this
6 morning.

7 DR. GARRICK: Yeah. Well, I think, you
8 know, we've been wrestling with this for four years.
9 Every year we go out there, and they tell us what the
10 number one issue is, and we're never responsive.

11 You know, you come to a point where you
12 say, "Well, what the check? Maybe they've got an
13 issue. Maybe they've got a point."

14 CHAIRMAN HORNBERGER: Okay, Jit. Where
15 are we?

16 MR. SINGH: Okay. Item six, and number
17 five is, as I said, we haven't got any confirmation
18 from WIPP yet, but we'll find out soon, pretty soon
19 this afternoon.

20 Number six --

21 MR. MAJOR: Let me comment on item number
22 six. I spoke with the project manager at the end of
23 last week. The integrated IRSR is going to be coming
24 out in the next few weeks. It's coming out as a pre-
25 decisional document. It will remain pre-decisional I

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1 was told for a year.

2 So if you want a discussion of this in
3 public, we need to, again, get in contact with NMSS
4 management and just see what the story is.

5 CHAIRMAN HORNBERGER: Yeah, and that's
6 exactly the question I was going to ask. So if, in
7 fact, they say, "No, this is pre-decisional and we
8 cannot discuss any of the details in public, I think
9 we would question whether or not we are going to be
10 well served by having a three hour chunk of time
11 devoted to it because we know what -- I mean, all we
12 get is bland generalities when we cannot discuss the
13 specifics.

14 DR. LARKINS: Rich, did they say why this
15 is going to be pre-decisional?

16 MR. MAJOR: They did not.

17 DR. LARKINS: I don't understand that.

18 CHAIRMAN HORNBERGER: Bill Reamer.

19 MR. REAMER: Bill Reamer, staff.

20 The document we just received, the
21 integrated document, is a contractor document. So the
22 first step we have to take is to review it from the
23 staff so that it can become a staff document. I am
24 quite aware from the meeting yesterday of the interest
25 of the committee in documenting issue resolution,

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1 which is what the integrated issue resolution status
2 report would do once it is complete, and you know, I
3 would like to accommodate that as best we can. The
4 committee is interested in the documented basis, the
5 technical basis for issue resolution to help answer
6 the dangling questions yesterday: what's the basis
7 for the 280 agreements?

8 It is in that document, but it will take
9 time to assemble the documented basis. We cannot just
10 kind of snap our fingers and produce it overnight.
11 What we have as I said right now is a contractor
12 document that addresses issue resolution up to
13 approximately, I think, May, when we had to basically
14 stop the inputting and work on the reviewing, or the
15 center stopped the inputting and began the review
16 process.

17 A lot has happened since May, and I would
18 like to see that part of issue resolution, such as
19 TSPA, igneous activity, preclosure, also in the
20 documented report before we release it in accordance
21 with our plan to release it as a NUREG.

22 I've asked my project manager on the
23 document to give me a schedule. Basically I heard the
24 committee's interest last night in the need for this
25 document. I asked what is the schedule that we could

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1 come up with to produce a document.

2 I am hopeful that we would be perhaps
3 talking in the range of the first quarter of next
4 year. It would be to me, at least thinking right now,
5 feasible for us to give an intro type presentation in
6 October about where we are, what we're doing, maybe
7 respond to specific questions that the committee has.

8 But I think that's probably a pretty small
9 downpayment for what you really want, and we may be
10 looking at a later meeting to give you, you know,
11 really what you want.

12 DR. GARRICK: I don't know. That sounds
13 like a weak topic, too, given the ground rules that we
14 had laid out for how to put this agenda together.

15 CHAIRMAN HORNBERGER: Yeah. While you're
16 at the microphone, Bill, yes, we'll discuss that a
17 little more. We hear you, and thanks for that update.

18 On the Thursday -- I'm sorry, Jit, for
19 jumping ahead.

20 MR. SINGH: That's okay.

21 CHAIRMAN HORNBERGER: We have the update
22 on the Yucca Mountain review plan. You're pretty
23 confident that we're going to be there.

24 MR. REAMER: Let me tell you the reality,
25 which is that --

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1 CHAIRMAN HORNBERGER: That's what I want.

2 MR. REAMER: -- typically the review plan
3 states the position of the staff to implement a
4 regulation, and the first step is to finalize the
5 Commission's regulation, and that process is ongoing,
6 but I cannot predict when it will be complete.

7 Then we need a period of time after that
8 regulation is finalized to make the review plan
9 consistent with the regulation, and I'm not terribly
10 optimistic that we will be there in the middle of
11 October, given that we're at the end of August and not
12 final regulation has been issued.

13 CHAIRMAN HORNBERGER: So what you're
14 telling me is because that would still be pre-
15 decisional even though you really are essentially
16 there, you wouldn't want to discuss it in public
17 anyway.

18 MR. REAMER: Yeah. Now, I would think we
19 could talk about how the document is risk informed or
20 how we would intend a review plan to be risk informed.
21 We could perhaps talk conceptually. I don't, again,
22 know whether that meets the committee's desire in
23 October or not.

24 DR. GARRICK: Yeah, again, I don't think
25 that the public is very or that the errata people are

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1 very interested in that.

2 CHAIRMAN HORNBERGER: Yeah. I mean,
3 they'd be interested in the plan, but if it's not
4 going to be released, then --

5 DR. GARRICK: Yeah.

6 CHAIRMAN HORNBERGER: Let' see. So then
7 let me ask you two other questions while you're there.
8 At one time I think that we were going to -- or maybe
9 that was November that you had agreed to discuss the
10 performance confirmation. We're not going to be ready
11 to go before November on that, right?

12 I'm just trying to think what we could do
13 that would be interesting and useful in Nevada.

14 MR. REAMER: Yeah. I'd be happy to look
15 at that. We really had put together kind of a plan
16 that was oriented more toward your November meeting.

17 CHAIRMAN HORNBERGER: Right.

18 MR. REAMER: I'm not sure what we can do
19 to accelerate that. There is surely a possibility
20 that Part 63 --

21 CHAIRMAN HORNBERGER: Yeah, that was my
22 last question.

23 MR. REAMER: -- will be issued at that
24 point, and perhaps that's a topic that the committee
25 might be interested in considering.

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1 CHAIRMAN HORNBERGER: Okay. Thanks.

2 Okay, Jit. I think this is dangerous, but
3 we're going to have to --

4 MR. SINGH: We really have to revise the
5 whole day.

6 DR. LARKINS: Why don't we step back and
7 take a look and see if maybe the timing of this
8 meeting is off a little bit.

9 DR. GARRICK: I agree.

10 DR. LARKINS: I don't see us being able to
11 have the items of interest to the public or the
12 committee in October. So maybe we ought to rethink
13 whether or not we ought to have this in October.

14 DR. GARRICK: I agree because the whole
15 idea here is to conduct a meeting as we address
16 specific topics and choose topics that are of special
17 interest to Nevada.

18 CHAIRMAN HORNBERGER: What would be the
19 option, John? Moving -- saying that we would do it in
20 November instead?

21 DR. LARKINS: Or December.

22 CHAIRMAN HORNBERGER: Or December. Oh, I
23 see. Just cancel the October meeting.

24 DR. LARKINS: I mean because of what's
25 going on with Part 63 still be deliberated upon by the

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1 Commission and the staff's, you know, being put in a
2 position where they can't move forward on several
3 documents until they've gotten some action from the
4 Commission.

5 That's either going to happen now very
6 shortly or it's going to be months from now.

7 DR. GARRICK: That may also -- at least
8 I'm not suggesting we do that, but it would certainly
9 put us in a much better position to orchestrate a more
10 interesting transportation discussion as well.

11 DR. LARKINS: That might give us time.

12 MR. LARSON: Yeah, the staff told us this
13 morning that they were planning on going out and
14 talking about risks in the updated package performance
15 study and other things in March-April time frame next
16 year, and as a matter of fact, they said, "Would that
17 be of more interest? And could we integrate it with
18 your meeting?"

19 And we said, "No, that is when we're going
20 out."

21 But John's perception --

22 DR. LARKINS: Yeah, but that's only a part
23 of, I think, what --

24 MR. LARSON: Sure. No, I realize that.

25 DR. LARKINS: I'm not even sure if it's a

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1 major part.

2 CHAIRMAN HORNBERGER: Do we want to make
3 that decision right now?

4 MR. SINGH: Well, we need to.

5 DR. BAHADUR: My suggestion would be why
6 don't we postpone this until tomorrow when we talk to
7 Margaret Federline and get a real sense of what's
8 going on in NMSS, which could be more exciting for
9 this meeting.

10 And I agree with John. I think the time
11 has come for us to look back and see whether we do
12 need it in October or not. It's very clear October is
13 too early to have this meeting, but whether November
14 or December is also too early or not, I think we
15 should decide that after tomorrow

16 CHAIRMAN HORNBERGER: But if, in fact,
17 October is too early, then we could make part of the
18 decision right now because if it's too early, if
19 that's the decision, then --

20 DR. LEVENSON: We'll cancel the October
21 one.

22 MR. SINGH: October is definitely too
23 early.

24 DR. LEVENSON: So if we definitely cancel
25 October, that would be important for me.

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1 DR. WYMER: Let's think about it.

2 CHAIRMAN HORNBERGER: Okay. Ray wants to
3 think about it, and we'll come back and revisit it
4 tomorrow.

5 MR. SINGH: Okay.

6 CHAIRMAN HORNBERGER: Okay?

7 DR. LEVENSON: But I think it has reached
8 the point where the issue is not -- shouldn't hinge
9 at all on the transportation issue. The others are
10 much bigger.

11 CHAIRMAN HORNBERGER: I mean, it's all
12 rolled up into the same thing. We're unable to
13 arrange to have topics that are of interest discussed.
14 Okay?

15 MR. SINGH: Okay. Item eight, opening
16 statement, again, on October 17.

17 Then nine, DOE summary of international
18 peer review of TSPA internal report. They're going to
19 do that.

20 CHAIRMAN HORNBERGER: That could be fun.

21 MR. SINGH: It was. Carol?

22 MS. HANLON: Excuse me?

23 MR. SINGH: Item nine?

24 MS. HANLON: Yes.

25 MR. SINGH: Thank you.

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1 MS. HANLON: I don't have a copy of the
2 item, but, yes, we agree with it.

3 (Laughter.)

4 CHAIRMAN HORNBERGER: Well, it says here
5 Carol Hanlon will --

6 (Laughter.)

7 MS. HANLON: You'll be happy.

8 MR. SINGH: My apologies, Carol.

9 MS. HANLON: Thanks, Jit.

10 MR. SINGH: Okay, and this continues.
11 Then item nine, and then we go to item ten. DOE's
12 update, which will induce corrosion research.

13 The next item is the Chlorine 36.

14 DR. LEVENSON: Excuse me. Before we jump,
15 Carol, is the Chlorine 36 presentation -- they'd be
16 prepared in October for that?

17 MS. HANLON: Yes, they would.

18 DR. LEVENSON: They would. Okay.

19 MS. HANLON: The question on the Chlorine
20 36 was would you be requesting DOE or would you again
21 be looking for the larger presentation where you can
22 receive the data that you had last time. But we are
23 certainly prepared. Zel Peterman is prepared to talk
24 to you.

25 THE REPORTER: I'm not getting this.

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1 CHAIRMAN HORNBERGER: Oh, you need to use
2 the microphone. We're being recorded.

3 MS. HANLON: Sorry. Zel Peterman is
4 prepared to talk to us about Chlorine 36, and his only
5 question was would that be a DOE presentation on our
6 results and our progress only or would that be
7 combined, for instance, with Gene Cline at UNLV.

8 So that was his only question. We're
9 prepared.

10 DR. GARRICK: Now, give your name and
11 affiliation for the --

12 MS. HANLON: I've only been here nine
13 years.

14 (Laughter.)

15 MS. HANLON: Carol Hanlon, Department of
16 Energy.

17 CHAIRMAN HORNBERGER: It wasn't because we
18 didn't know you.

19 (Laughter.)

20 MS. HANLON: I knew that, too.

21 DR. LEVENSON: We need it for the record
22 so that when you're misquoted in the press, we know
23 who to misquote.

24 CHAIRMAN HORNBERGER: That's right.

25 MR. SINGH: Okay. Then on that day, that

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1 afternoon, 3:15 to 5:15, we're going to have a public
2 interaction with the state, counties, and others.
3 That's going to be a formal presentation, any of
4 these, about ten minutes each, and I have a few calls
5 so far. They will present about ten minutes each.
6 That's for two hours.

7 Then we will break, and then we will have
8 a --

9 CHAIRMAN HORNBERGER: There will be
10 presentations?

11 MR. SINGH: Just like we had last year,
12 you know, in different counties and states.

13 DR. LARKINS: Excuse me. What was the
14 conclusion on the Chlorine 36 question that Carol
15 raised?

16 CHAIRMAN HORNBERGER: Oh, Carol asked the
17 question and we didn't answer it. I mean, I think,
18 speaking for myself, probably the biggest questions
19 that we would like to have an update on relate to the
20 DOE work.

21 So my guess is a presentation by Zel
22 Peterman would be just fine.

23 MR. SINGH: Okay. Then Item 12, we'll
24 have open house as you discussed before. This time
25 open house, we're going to have just one on one, no

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1 formal presentations, and members will be available.
2 Any public wants to come in, that's what we're going
3 to have for two hours, the format, what we had in the
4 past.

5 Then October 18th, Item 13, again, opening
6 statement by the Chairman. Then we will spend some
7 time in preparation of the ACNW reports.

8 Then Item 15. We're going to have a --
9 now, we said that we don't know if we're going to have
10 that or not, but like Bill Reamer said, update on the
11 Yucca Mountain review plan. So we don't know about
12 that.

13 And then, again, we have a lunch and
14 letter writing continue that afternoon, and we
15 conclude at 5:30.

16 CHAIRMAN HORNBERGER: Okay. Because of
17 the situation, I propose we just put this on hold and
18 we'll revisit it at least briefly tomorrow.

19 Does anyone else have any comments?

20 DR. GARRICK: Is there a reason that we
21 did not move the update on Yucca Mountain up to the
22 beginning such that we had our ACNW report and letter
23 writing session all together and with continuity? Is
24 there a reason for that?

25 MR. SINGH: No, there's no reason. We

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1 could do that.

2 DR. GARRICK: Yeah.

3 MR. SINGH: There's no reason.

4 DR. GARRICK: And it would seem that it
5 would also accommodate the recording process.

6 MR. SINGH: That's fine.

7 DR. GARRICK: And everything else.

8 MR. LARSON: If you did move to December
9 though, George, are there dates that the committee
10 could do it? I mean you've already selected your
11 dates for 2002. So those are available in the event
12 when you do talk to management here, but I don't know
13 if there's any dates in December that the committee
14 could meet.

15 CHAIRMAN HORNBERGER: Do we want to do
16 that now or do we want to wait until tomorrow if we
17 make a decision?

18 DR. LEVENSON: My December is fairly open.
19 So --

20 CHAIRMAN HORNBERGER: Okay. Well, just
21 off the top of my head, AGU Week is the 6th.

22 DR. LEVENSON: Third. December?

23 CHAIRMAN HORNBERGER: Yeah.

24 DR. LEVENSON: The 6th is a Thursday.

25 CHAIRMAN HORNBERGER: Oh, 6th is a

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1 Thursday. So, no, it's the following week then.

2 DR. LEVENSON: Tenth?

3 CHAIRMAN HORNBERGER: Yeah, it's the week
4 of the 10th.

5 DR. GARRICK: And the first week of
6 December is the Society for Risk Analysis' annual
7 meeting.

8 DR. LARKINS: We discussed this a little
9 bit last month in preparation for a Commission
10 meeting. It looked like the 17th and 18th were the
11 only days that were open.

12 CHAIRMAN HORNBERGER: Yeah. So it will
13 probably be the week of the 17th if we were to do it
14 in December.

15 MS. DEERING: And remember the public
16 usually probably would tell us that's not a good time
17 for them.

18 CHAIRMAN HORNBERGER: We could do it the
19 following week.

20 (Laughter.)

21 DR. GARRICK: I always use that to get a
22 lot done.

23 MS. DEERING: We could probably get some
24 hotels that day, conference rooms.

25 DR. LEVENSON: Well, for you two guys who

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1 have conflicts, are those whole week conflicts or
2 could we do it at the end of the week?

3 CHAIRMAN HORNBERGER: No. AGU -- my
4 problem is that I'm probably going to be tied up the
5 whole week. I have commitments, and they're probably
6 going to fall on both ends of the week.

7 DR. GARRICK: And the other is three to
8 four days.

9 DR. GARRICK: We might be better off
10 looking actually at -- oh, no, January is supposed to
11 be when we're going to meet the Commission.

12 DR. GARRICK: And retreat.

13 CHAIRMAN HORNBERGER: And retreat.

14 MS. DEERING: We could do a retreat out
15 there though. We did it one other year.

16 CHAIRMAN HORNBERGER: We did it one other
17 year out there, oh, in that horrible room. Remember
18 in that dingy casino that time?

19 MS. DEERING: No, no, that was the view of
20 the Funeral Mountains.

21 CHAIRMAN HORNBERGER: Oh, no, that was
22 very nice.

23 MS. DEERING: And diamond shaped.

24 CHAIRMAN HORNBERGER: That was very nice.
25 Yeah, we could do that.

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1 Okay. Look. We're going to have to wait.
2 We'll wait until tomorrow because Ray wants to think
3 this over, but if we do cancel the October meeting, I
4 don't know. We may have to pick it up in February or
5 something. I just don't know.

6 DR. BAHADUR: Actually February may not be
7 a bad time, and that's a time when we can also have
8 our one day retreat out there.

9 CHAIRMAN HORNBERGER: Well, another thing
10 to think about is if we did cancel the October meeting
11 and if we couldn't go to Las Vegas until February,
12 there would be a chance that we could pick up a day or
13 two in December and actually do the retreat in
14 December.

15 DR. LARKINS: And that might work out in
16 terms of a Commission meeting also.

17 CHAIRMAN HORNBERGER: Right, exactly.

18 DR. LARKINS: And picking up some of
19 these other --

20 CHAIRMAN HORNBERGER: Picking up some of
21 the other issues. So you know, we could give that
22 some thought, too. But Ray wants to think about it.
23 So nothing's definite.

24 DR. LEVENSON: So start thinking.

25 DR. WYMER: I am, slowly.

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1 CHAIRMAN HORNBERGER: Okay. Jit, you've
2 gotten us all the way up to the break.

3 MR. SINGH: I'm fast.

4 CHAIRMAN HORNBERGER: I suggest that we
5 move some of our other discussions in here. Let's
6 see. I wonder what we might want to do.

7 DR. SAVIO: We could talk about the
8 research working group.

9 CHAIRMAN HORNBERGER: We could talk about
10 the research working group. I don't know if Dick is
11 ready.

12 DR. SAVIO: Yeah, just give me a few
13 minutes.

14 CHAIRMAN HORNBERGER: Yeah, go ahead.
15 Take a few minutes.

16 We have a couple -- we have to find some
17 time to work on these letters, which we have three.
18 I mean, there are several things we could do. Where do
19 we stand on GTCC?

20 DR. WYMER: I've reworked it some. I've
21 reworked it some. I've not completed it yet, but you
22 know, it doesn't require much more.

23 CHAIRMAN HORNBERGER: Okay.

24 DR. GARRICK: Well, I think we decided
25 yesterday that at the appropriate time we need to

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1 caucus and go to our word processors and finish the
2 letter.

3 CHAIRMAN HORNBERGER: I wonder if -- well,
4 my question is are there things that we should discuss
5 about the TSPA letter, for example that would help you
6 do any polishing that you might want to do.

7 DR. GARRICK: It could. That's possible.

8 CHAIRMAN HORNBERGER: That one is probably
9 farthest along. That's the reason I've seen it.

10 DR. GARRICK: Yeah. Sherry, have we got
11 a copy of that somewhere?

12 MS. MEADOR: Yeah, I can go make copies.

13 DR. GARRICK: Okay.

14 MS. MEADOR: If you want it up on a
15 screen, it's going to --

16 CHAIRMAN HORNBERGER: Well, do we want to
17 do that or do we want to have our discussion on the
18 research working group and --

19 DR. GARRICK: I think we ought to have the
20 research because --

21 CHAIRMAN HORNBERGER: Okay. Let's do
22 that.

23 DR. GARRICK: -- I think we're ready to
24 read that letter.

25 CHAIRMAN HORNBERGER: Let's do that

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1 because the other letters we just need to -- I think
2 all of them are in the same boat. They need a little
3 work.

4 We also have a research letter that we
5 should distribute and people can read and we can
6 collect general comments on. I don't know. Maybe
7 you've seen the latest version. I'm not sure, but
8 again, Dick would know that.

9 So what we're going to do is the
10 discussion is going to be about the proposed November
11 working group on research, and there are a couple --
12 because of November, there are decisions that have to
13 be made, and we have to move forward, and what Dick
14 has done is he has a sheet, a couple of sheets of
15 paper with some suggestions on how we might organize
16 this, and we really need some committee brainstorming
17 on exactly how to do this.

18 Dick, do you want to lead this discussion
19 or do you want me to?

20 DR. SAVIO: Go ahead.

21 CHAIRMAN HORNBERGER: So the first thing
22 is in terms of this objective, we had kicked around
23 the idea that we need to review the status of research
24 programs, and we don't think that's a very good topic
25 for a working group. We need to do some of that.

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1 But the second paragraph there is what we
2 were thinking of, and that is the develop insights to
3 the information that will be needed by the NRC in the
4 future for regulatory decision because that's what
5 frames research.

6 And then I had thought that if we try to
7 do the whole spectrum of the NRC, we might be an inch
8 deep and a mile wide and not get very far. So I had
9 thrown out the idea that perhaps we could focus on
10 radionuclide mobilization and transport, which is a
11 topic that cuts across high level waste,
12 decommissioning, you name it.

13 But that's a real question, okay, as to
14 first of all, whether we do want to focus like that,
15 whether that's the right focus or whether we should
16 have a couple different foci. So that's the first
17 item of discussion.

18 DR. GARRICK: George, I like the idea of
19 the focus particularly with respect to the source
20 term, the mobilization. Now, are we talking about
21 something specific there? Are we talking about Yucca
22 Mountain?

23 CHAIRMAN HORNBERGER: No.

24 DR. GARRICK: Or are we talking about the
25 general problem?

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1 CHAIRMAN HORNBERGER: Yeah. What I would
2 like to do is keep it more general than Yucca Mountain
3 because the Office of Research, of course, is
4 prohibited from working on Yucca Mountain, and
5 therefore, RES, all caps, as we know in NRC, has
6 nothing to do with Yucca Mountain.

7 So what I think we would like to do is
8 pick a topic or topics that can cut across both so
9 that we can have some engagement on center topics as
10 well as RES topics.

11 DR. HAMDAN: I would just -- we have the
12 word "source term" along with "transport" because
13 really that's part of the problem usually, is you
14 define "source term," and then the transportation, and
15 if you don't do that, then you know, they aren't as
16 useful usually.

17 CHAIRMAN HORNBERGER: What do you think?
18 Do you want me to go through this whole thing and then
19 come back and talk about the focus or do you want to
20 talk about the focus?

21 Okay. Let's focus on the focus. Okay.

22 DR. LEVENSON: One comment, and that is
23 based on the statement you've just made, we cannot,
24 should not include waste package integrity because
25 that's strictly Yucca Mountain.

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1 CHAIRMAN HORNBERGER: It's not strictly,
2 but that was my feeling, too. My own feeling on waste
3 package integrity is that we've done working groups on
4 Alloy 22 and some other things, and we may not want to
5 choose that as a focus.

6 DR. LEVENSON: Well, that really is
7 specific to Yucca Mountain.

8 CHAIRMAN HORNBERGER: Yeah. Well, I mean,
9 waste package integrity could be concrete barriers.

10 DR. LEVENSON: Yeah, okay.

11 CHAIRMAN HORNBERGER: Ray, comments on the
12 focus since you wanted to focus on the focus?

13 DR. WYMER: Yeah. I think we ought to
14 decide, get some idea at least of what kind of waste
15 problem we're considering. We're talking about high
16 level waste, low level waste, leaks into the ground
17 from various places, decommissioning activities?

18 CHAIRMAN HORNBERGER: Yes.

19 DR. WYMER: We ought to work out a list of
20 something like that.

21 CHAIRMAN HORNBERGER: Well, even if we
22 worked out such a list, and I think that the simple
23 answer to the question is that, yes, we know that NRC
24 is concerned with all of those topics, right?

25 DR. WYMER: It would help to focus the

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1 focus if we identify them specifically.

2 CHAIRMAN HORNBERGER: Okay. So another
3 way to focus would be not -- I mean, my argument would
4 be if we include source term, source term,
5 mobilization and transport covers every aspect that
6 you just mentioned.

7 But another way to focus would just be to
8 pick something like decommissioning, and we'd focus on
9 decommissioning research.

10 DR. WYMER: I think we'd pick three or
11 four of them.

12 CHAIRMAN HORNBERGER: Well, okay. So
13 that's the question. Do we pick three or four?

14 And I understand the reason for wanting to
15 do that, but I also would argue that the more diffuse
16 you get, the less likely we're going to be able to get
17 the people to respond in the way we want to for the
18 workshop.

19 DR. WYMER: Well, I think unless you
20 identify these specific problems, you can't really get
21 the research needs.

22 CHAIRMAN HORNBERGER: Okay. So maybe what
23 I should do is let's go through the overall concept of
24 the workshop, and then maybe that will help us come
25 back to this. Okay?

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1 DR. LEVENSON: Let me just make one
2 comment. Maybe what you're both saying is right, but
3 you do it in the other order. That is, you focus on
4 radionuclide transport and mobilization, and then you
5 make a list of different conditions where that's
6 important.

7 DR. WYMER: Yeah, importance is important.

8 CHAIRMAN HORNBERGER: Okay. Let's come
9 back to this.

10 DR. BAHADUR: Let me come back to the
11 comment that you made earlier, George. I agree with
12 you. If we look at the research from the point of
13 view of high level waste, we get the Office of
14 Research completely out because they are not doing it.

15 If we take it as a radionuclide in
16 transport in the philosophical sense, then we have to
17 ask ourselves the question whether center's work is
18 that important to us or not because they are basically
19 a federally funded organization for the high level
20 waste. Of course, they are doing other work as well.

21 In my opinion, if we take this as a
22 philosophical subject of radionuclide transport and
23 mobilization, be applicable to high level waste or low
24 level waste or decommissioning, that may perhaps be a
25 better way of spending the committee's time rather

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1 than taking a specific problem of Yucca Mountain or a
2 decommissioning site.

3 DR. GARRICK: Sher, are you saying that
4 one strategy might be to look at what we're doing,
5 say, at the center in terms of mobilization and
6 transport and using the workshop as a forum for
7 bringing in other experts and challenging it and
8 stimulating that whole process?

9 DR. BAHADUR: And take it into your
10 philosophical discussion of radionuclide transport and
11 mobilization as applicable to a variety of things and
12 not just the high level waste.

13 DR. WYMER: I think the more general you
14 are, the less likely you are to be able to focus.

15 CHAIRMAN HORNBERGER: Okay. Time out,
16 okay, because all of this is good, but unless we're
17 going to do it in the context of the structure that
18 we've set out, we're going to spin off in directions
19 that I'm going to have difficulty controlling. Okay?
20 So let me --

21 DR. LARKINS: I would suggest that you
22 maybe go through this and then come back and define
23 the objectives clearer.

24 CHAIRMAN HORNBERGER: That's right. I
25 don't want to, you know, deflect any of this

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1 discussion, but what we do need to do in the time
2 available is to make sure we reach our objective.

3 So the committee may or may not agree with
4 the structure that Dick and I evolve, but be that as
5 it may, here is the overall idea that we had. It was
6 stimulated, I think, last time. We had a little
7 discussion, and I believe it was Milt who pointed out
8 that in some industrial settings, Xerox or something,
9 that one of the things they found effective was to
10 have the problem holders come in and discuss the
11 problems and then have the researchers discuss
12 potential solutions, and that really stimulated us.

13 So if you skip over the introduction, et
14 cetera, and you go down to the bottom of the first
15 page, the idea here, the knowledge and technical tools
16 needed, the idea here would be to get people to come
17 in and we would ask them very specifically to address
18 the question of what kind of advances in terms of
19 tools and knowledge does the NRC need to be more
20 effective in regulation now and perhaps even more
21 importantly, in the future to be effective in risk
22 informed, performance based regulation.

23 So to really try to get people to look
24 into their crystal ball and say, "Here is what we
25 would really like to have in the way of new knowledge

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1 and new tools to let us do our job better," and they'd
2 have to be people who were familiar with the needs of
3 the NRC.

4 And, again, bear with me. so that's the
5 first -- that's the aim of the first set of questions.
6 Whether or not we can accomplish this or not I don't
7 know, but that is the aim.

8 Then if you skip over to the next page,
9 the middle of the page, the idea here was to bring in
10 some research experts and basically with them having
11 had the benefit of the discussions by the problem
12 holders the previous day. The question we would ask
13 them is: all right. Given these needs of the problem
14 holders, how would one structure a research program?
15 What kind of topics would be needed? What kind of
16 research needs to be supported?

17 That's the idea, to get people to address
18 that. Again, whether or not we can be successful I
19 don't know, but that's the idea.

20 We also anticipate that at the far end of
21 that discussion we are going to have identified
22 research programs of a size that would far outstrip
23 the NRC's ability to fund them. Okay?

24 And then so this leads us to the third
25 question for the workshop, and that has to do with the

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1 topic that we have beaten on a little bit, perhaps
2 more than a little bit, and that is how you go ahead
3 and have a prioritized focused research program. How
4 do you make decisions in a resource limited
5 environment?

6 And the idea here is that we would try to
7 get people in who know about managing research, who
8 have some ideas about how prioritization occurs.
9 Possibly as John suggested last time, we could get
10 somebody who knows how decision analysis has been
11 applied in such instances.

12 But again, the whole idea would be then we
13 would have, if we were successful in structuring the
14 workshop that way, we would have the problems
15 identified by the problem holders, the research
16 programs identified by researchers, and the ideas for
17 how to prioritize developed by those who know about
18 managing research programs.

19 And we would be able then to put those
20 insights together into a letter that we think would be
21 useful to the Commission.

22 Okay. That's sort of our high level
23 philosophy. Now, given that we started down that
24 track, that's why I thought that if we tried to do all
25 of the potential research across NMSS that we wouldn't

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1 be able to do it. We wouldn't get very far. It would
2 be too shallow, and therefore, I come to a vertical
3 slice approach.

4 And of course, the vertical slice that I
5 thought of because we had just had the presentation on
6 the radionuclide transport plan for RES had to do with
7 mobilization and transport. So that's where we are.
8 Okay? That's the overall philosophy.

9 Now we can come back and discuss the items
10 in turn if you like.

11 DR. LEVENSON: Do you want any discussion
12 of the philosophy?

13 CHAIRMAN HORNBERGER: Yeah.

14 DR. LEVENSON: The first item, I would
15 suggest we consider splitting from the standpoint that
16 first we need to generate a list of what are perceived
17 to be the decisions that NRC will have to make in the
18 next decade or whatever, and then you address what
19 tools and knowledge are needed to address those
20 decisions because that might be different people.

21 CHAIRMAN HORNBERGER: That's a good point.

22 DR. LEVENSON: Otherwise I like the idea.

23 DR. LARKINS: Milt, are you looking at
24 that globally or are you looking at that just in terms
25 of the high level waste program or are you --

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1 DR. LEVENSON: No, globally. I think
2 particularly since this is RES, we're saying and we're
3 focusing, if we end up focusing on radionuclide
4 transport mobilization, what kind of decisions is the
5 NRC likely to be facing in the next ten years where
6 this might be a factor? This would include some
7 decisions about decontamination, about possibility of
8 entombment, about on-site disposal, about --

9 DR. LARKINS: Okay.

10 DR. LEVENSON: You list what are all of
11 the potential --

12 MS. DEERING: High level waste?

13 DR. LEVENSON: High level waste also
14 because this is generic, not Yucca Mountain, but high
15 level waste, low level waste, on-site disposal,
16 without any idea that somebody is or is not making an
17 application, but just the list of for a -- you know,
18 when you're talking about research, you've got to talk
19 about a decade or two ahead.

20 What are likely to be the decisions that
21 NRC might face in that period?

22 DR. LARKINS: One of the things that came
23 up yesterday in our discussions with one of the
24 Commissioners was looking at the fuel cycle waste
25 disposal for advanced designs, and that's something

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1 certainly the agency has not thought about and whether
2 or not we're really talking about global.

3 DR. GARRICK: Yeah, that's absolutely
4 correct.

5 DR. LEVENSON: Well, for instance, there
6 might be issues of, I mean, if they're going to face
7 licensing a MOX plant, this becomes an issue.

8 DR. GARRICK: Yeah.

9 DR. LEVENSON: So you just identify all of
10 the decisions for the next two decades.

11 DR. GARRICK: Yeah, I agree. That's a big
12 apple.

13 DR. LEVENSON: Oh, yeah. But I think what
14 we're going to end up identifying is that there are
15 enough decisions that are going to have to be made and
16 enough knowledge that has to be acquired before you
17 can make those decisions to highlight how inadequate
18 is the current budget for research.

19 DR. GARRICK: Yeah, that seems to have a
20 very logical progression as to, as you say, Milt,
21 identify what decisions we're going to have to make,
22 and then we pick up with this panel discussion.

23 The one thing that I would --

24 DR. LARKINS: Well, if you're going to do
25 that, you're going to have to extend this list of

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1 stakeholders from Ashok and Marty to also include NRR.

2 DR. GARRICK: Well, I was going to comment
3 on this. On this panel, I think one of the things
4 that I'm seeing happen with a lot of our presentations
5 and what have you is a movement away from real
6 technical stuff and an increasing amount of process
7 information.

8 And I don't think that's quite what we're
9 here for. And I would hope this panel, for example,
10 if it had ten members, that six of them would be
11 technical authorities and maybe three or four of them
12 would be managers and legal and whatever else is
13 involved.

14 But I think if we get too many managers in
15 these discussions, we ain't going anywhere, and I
16 think that would be something we really want to be
17 careful about because the most successful working
18 group meetings we've had is where it was dominated by
19 the technical experts that were there.

20 The one we had on engineered barrier
21 system comes to mind as the perfect example. That was
22 an excellent session, and it nurtured our tree for two
23 or three years as far as technical direction and
24 technical substance.

25 So I would hope that out of this --

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1 DR. LARKINS: It also provided some
2 insights for some issues which came up later on like
3 on the Alloy 22.

4 DR. GARRICK: Right, absolutely, and it
5 was the best session still we've had where there was
6 a real articulation of the different approaches to
7 corrosion modeling and some of the real technical
8 solutions.

9 But I kind of like this format.

10 DR. LEVENSON: John, my comment and
11 implications when I talked about splitting it, that,
12 in fact, you would have two panels, and the one would
13 be 100 percent technical people. The other helps you
14 define what are decisions that have to be made in the
15 future, and then you'd have technical people say what
16 knowledge and tools might be developed to help with
17 those decisions.

18 CHAIRMAN HORNBERGER: I still -- again, if
19 this is the way we want to go that's fine -- but I
20 still worry if we articulate a complete laundry list
21 across all of NMSS and expect to have the technical
22 expertise in the room and expect to digest it, that
23 we're going to be successful because John points out
24 the engineered barriers. That wasn't across the whole
25 spectrum, and I think one of the reasons it was

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1 successful was that we focused on some fairly specific
2 topics: corrosion. And then you can be successful.

3 If we go across the whole of NMSS and also
4 include NRR, I don't see how we're going to do it.

5 DR. LEVENSON: I was making my comment in
6 the context that we are focused on radionuclide
7 transport mobilization.

8 CHAIRMAN HORNBERGER: Oh, okay.

9 DR. LEVENSON: We've already focused on
10 that.

11 CHAIRMAN HORNBERGER: I misunderstood.

12 DR. HINZE: Even that is a very broad
13 topic.

14 CHAIRMAN HORNBERGER: Oh, yes.

15 DR. LEVENSON: Yeah, it is.

16 DR. HINZE: You know, because you've got
17 all kinds of media in which you transport.

18 CHAIRMAN HORNBERGER: I agree.

19 MS. DEERING: specially if you include
20 source term because that can even bring EDS in.

21 DR. LEVENSON: I agree.

22 DR. HINZE: Well, you also have to really
23 determine what is the status, and I think John is
24 right. You need the technical expertise for people to
25 tell you what the status of the research that is going

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1 on and the various groups.

2 CHAIRMAN HORNBERGER: Yeah. Now, the
3 problem, again, we discussed that, too, and you'll
4 notice that at the beginning Dick put down that we
5 would try to accumulate paper ahead of time that would
6 enlighten us on what was going on in various programs
7 because if we try to do a workshop and review
8 everything that's going on everywhere, we can't do it.

9 DR. HINZE: No, no, but if you have the
10 technical experts --

11 CHAIRMAN HORNBERGER: Who know what's
12 going on.

13 DR. HINZE: -- who know what's going on
14 and can pull out, extract those pieces which are going
15 to be useful --

16 CHAIRMAN HORNBERGER: But not as
17 presentations of overviews, right?

18 DR. HINZE: Yeah, I agree.

19 CHAIRMAN HORNBERGER: Just that they have
20 the knowledge.

21 DR. HINZE: Right.

22 CHAIRMAN HORNBERGER: Yeah.

23 DR. WYMER: I think mobilization and
24 transport is a fine focus. I think also that the
25 amount of research that can be done in this area is

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1 very limited, and in order to be sure that what's done
2 embraces everything or most everything that should be
3 embraced, that we have to start with a discussion of
4 the specific problems in various areas, and then
5 select from those the common themes, which is why I
6 suggested that we had to have high level waste, low
7 level waste, leaks from tanks, decommissioning as a
8 starting point to ferret out the central features of
9 each of those, and then use those in the sort of
10 generic research.

11 Otherwise you're going to miss the mark.
12 You're going to be too specific and solve the problems
13 in one area and miss them in the other areas with the
14 limited research that we can do.

15 MS. DEERING: George, can I ask a
16 question?

17 DR. BAHADUR: One way of looking at this
18 would be to see what the committee will do after the
19 workshop is over. What would we be producing after
20 the workshop is done? Would we be saying that the
21 NRC's research program meets the future needs?

22 And if not, these are the areas in which
23 the needs are not met. Is that the kind of letter
24 we'd be writing, or would we be writing that all the
25 needs are met, but the priorities are not right, and

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1 this is the priority in which the research needs to be
2 done, or are we going to say the way the structure is
3 where the center is doing something and the Office of
4 Research is doing something else and the EPRI is doing
5 something else, there is no platform where all of
6 these things are coming together?

7 I mean, I do not know what the committee
8 will be comfortable writing at the end of the workshop
9 because once you focus on that, then maybe it will be
10 easier for us to then step back and see what we need
11 to listen before we have to write what we plan to
12 write.

13 MR. LARSON: One approach would be to have
14 decision one, existing programs. Are they appropriate
15 and are they being done well?

16 Decision two, are there future needs in
17 the way of NRC work? Are we accommodating that? What
18 do we have to do to get there?

19 And then the third topic is recognizing
20 that we're constrained with resources in a serious
21 way. How do you make sure that you use what you have
22 to get the maximum value added to these decisions or
23 that they're as good as they can be, that they are not
24 conservative when they would otherwise not have to be,
25 and so on?

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1 CHAIRMAN HORNBERGER: Lynn wanted to.

2 MS. DEERING: Oh, thanks, George.

3 Consistent with what I think Sher was
4 saying because I was thinking in the end is the real
5 objective to insure that NRC is focusing or is
6 anticipating research needs down the line that are
7 risk significant and/or play into the risk informed
8 aspect of the agency's direction. And is that really
9 fundamentally the concern?

10 Are they anticipating something that's
11 going to be necessary later versus what Dick was also
12 trying to bring out? Are we concerned about the
13 quality and the correct focus of what's already in
14 place?

15 DR. GARRICK: Isn't the real thing that
16 we're after here is where are the knowledge gaps in
17 the management of radioactive waste with the focus
18 being on mobilization and transport? Isn't that what
19 we're trying to do?

20 I would hesitate to get too locked into
21 reviewing existing work. It seems to me that we've
22 got to jump ahead of that and ask the question where
23 are the knowledge gaps, given the decisions that the
24 NRC has to make in the next two or three years with
25 respect to mobilization and transport, maybe just

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1 mobilization.

2 You know, we may want to just --

3 DR. WYMER: I think transport. If I were
4 to pick one of the two, I would have picked transport.

5 DR. GARRICK: Well, I wouldn't because you
6 don't have anything to transport until you have a
7 source term.

8 DR. WYMER: But you're always going to
9 have a source term of some kind, and then whether or
10 not it moves is the important thing.

11 Well, this is a matter of how you view it

12 DR. LARKINS: I agree with John. I think
13 the -- except that, you know, the committee has
14 commented on the RES program in the last two or three
15 years, and I don't know, you know, what the
16 committee's views are on the program now, but there's
17 been, you know, some activity and a couple million
18 dollars a year for the last few years, and are we
19 getting any payoff for this?

20 And this is the issue that you raised
21 three years ago.

22 DR. GARRICK: Right.

23 CHAIRMAN HORNBERGER: So to a certain
24 extent I think that particularly, again, if we pick
25 the mobilization and transport as a focus, we get to

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1 have our cake and eat it, too, in the sense that we
2 had a presentation by Sher and Bill last time on the
3 radionuclide transport plan. That's available. They
4 have a laundry list of topics in there. We can make
5 that available to the experts we bring in. We can
6 indirectly or really directly get comments back on
7 whether they've identified the important issues in
8 RES.

9 Ray is going to come up to the
10 geochemistry meeting at the end of September that's
11 put on by RES. He will gain some insight as to what
12 the products are.

13 Ray and I just were at the center. We
14 know something about the research that's going on in
15 radionuclide transport at the center. So we have a
16 background about what's going on, and we can actually
17 have some discussion, but not in the context of
18 reviewing the plan, but simply as Sher said or as Bill
19 Hinze said, to know what's going on here.

20 DR. LEVENSON: Well, you know, John, your
21 comment that we need to identify the holes, the
22 problem in a way is that the holes will be somewhat
23 different for each application and each decision, and
24 yet what research should be funding is only in one
25 sense those things that are common to multiple

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1 decisions.

2 So this isn't really plugging holes, but
3 it might be that, in fact, that could be a valuable
4 second product in addition to what ought to be done
5 with this minimum budget, is if we could help identify
6 if you are going to face Decision X, in addition you
7 need this. That might be a valuable product.

8 CHAIRMAN HORNBERGER: Yeah. You know,
9 what I'd like to do is move away from the
10 philosophical discussion and get down to the nitty-
11 gritty because this has to be organized, and we need
12 specific guidance, but let me make an attempt to
13 follow up on what you just said, Milt, to answer
14 Sher's question.

15 And that is that in my mind if I said,
16 "Well, what would our letter have to say that would be
17 valuable?" we have talked about prioritization. We
18 talk about it in the draft letter that we're going to
19 look at later, and we've talked about it in sort of an
20 arm waving way.

21 And so if at the end of the day we could
22 prepare a letter that said, "Here are, you know, ideas
23 on the issues that are going to be faced by NRC, and
24 here are the ideas that people have about how one
25 effectively decides on priorities in funding, given

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1 resource constraints," I think that would be valuable.

2 So it's not so much a review of programs
3 in RES or the center, but how one might look forward
4 and anticipate needs and then make hard decisions,
5 which is what we're all about.

6 DR. WYMER: Let me say something that's
7 premature at this point --

8 CHAIRMAN HORNBERGER: Good.

9 DR. WYMER: -- because it's sort of --

10 CHAIRMAN HORNBERGER: Do you want to wait
11 until it matures a little?

12 DR. WYMER: No, I don't want to wait till
13 it matures.

14 (Laughter.)

15 DR. WYMER: I want to say it now. I think
16 that given the limited budget that NRC will have for
17 carrying out this research, this is where it's
18 premature. It is likely that what we'll decide is
19 that the kind of things we ought to look at in
20 research are the kind of things that will help provide
21 input to the various models, like the hydrology models
22 and like the mechanistic Kds, things like that.

23 So we will probably come up with a list,
24 a short list of very generic things that we ought to
25 look at that relate specifically to the modeling

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1 activities that have to be carried out. That's
2 basically what the NRC does. They model things and
3 validate the models, and that way they can make
4 predictions.

5 So I think with a limited budget we'll
6 probably focus on those kinds of things. So we ought
7 to, as we said earlier, I said and Milt said again,
8 that we ought to pick out the broad based problems
9 across a spectrum of areas of waste release and
10 transport and then identify the needs with respect to
11 what the input has to be.

12 Maybe it's modeling itself. Maybe we
13 should support research on hydrology. I'm sure that
14 Schlomo would support that.

15 CHAIRMAN HORNBERGER: Schlomo would
16 probably agree with you, yeah.

17 (Laughter.)

18 DR. WYMER: But this is the way I think it
19 probably has to go in light of the limited budget and
20 the generic nature of the problem that has to be
21 solved.

22 DR. BAHADUR: I know you are in a hurry to
23 wrap this up. Let me just --

24 CHAIRMAN HORNBERGER: Not wrap it up. We
25 have work to do, serious work to do.

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1 DR. BAHADUR: Let me just take two minutes
2 to summarize what my understanding of what you said
3 that the committee wants to do.

4 I think there are four questions that the
5 committee needs to answer. The first question is:
6 what are the NRC's regulatory decisions that need to
7 be made in the future?

8 Number two, what are the technical
9 questions that need to be answered in order for the
10 agency to make those decisions?

11 Number three, is the present research
12 responsive to answer to those questions?

13 And number four, if not, what are the
14 research needs to be conducted in order to answer
15 those questions so that the agency can make the
16 regulatory decisions?

17 CHAIRMAN HORNBERGER: I disagree with
18 those last two. I'm with you on the first two, but I
19 don't think we can do the last two, and that's why
20 we're --

21 DR. BAHADUR: Okay. So we're getting
22 somewhere. So not at least we know how much we can
23 bite in order to chew that.

24 CHAIRMAN HORNBERGER: Yeah.

25 DR. GARRICK: Yeah, I just want to point

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1 out that there may be a difference between the
2 technical questions that the NRC has to answer and
3 where the knowledge gaps really exist. In other
4 words, one is a subset of the other.

5 But we need to know the one first. We
6 need to know what technical questions need to be
7 answered, but that may not necessarily be an adequate
8 focus is my point.

9 CHAIRMAN HORNBERGER: Okay. Can you pick
10 up your train of thought or did we disrupt you
11 effectively?

12 DR. BAHADUR: No, I think you have been
13 most effective.

14 (Laughter.)

15 DR. BAHADUR: And I think very
16 efficiently.

17 CHAIRMAN HORNBERGER: The reason that I
18 worry about answering your third question is that we
19 then have to know in detail not only -- we have to
20 know in detail exactly what research is being done to
21 answer the question of is it being responsive to the
22 needs, and that gets us back to an in depth evaluation
23 of the research program, and I just don't think we
24 have time to do that.

25 DR. LARKINS: Well, not necessarily.

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1 DR. BAHADUR: The thing is if you stop at
2 the questions that needed to be answered for the
3 agency to make the regulatory decisions, if you stop
4 at that, then I do not know how the Commission would
5 be benefitted by knowing that.

6 CHAIRMAN HORNBERGER: Okay.

7 DR. BAHADUR: Without next to the nexus
8 stage, where either we should be able to say, "Yeah,
9 the present state of research is applicable to those
10 questions," or, "yeah, it is applicable, but only
11 partially," or some evaluation of some sort.
12 Otherwise you will only be framing the problem, but
13 not coming up with a recommendation.

14 CHAIRMAN HORNBERGER: So what we would be
15 doing is framing the problem, but as I said, my view
16 is that we do go one step beyond that and talk about
17 that we recognize that NRC can't fund everything that
18 needs to be funded, and then we talk about procedures
19 or proper approaches for selecting priorities from a
20 list.

21 Okay, and if we provide that, my view is
22 that then within that framework, Ashok or somebody
23 over there can say, "Yes, look. Here's how things
24 match up. Here's what we're doing in these topics,
25 and we've missed out on this."

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1 You know, somebody can do it, but for us
2 to go through the whole research program and try to
3 match it up and make some recommendations on, you
4 know, where they've missed out on things, that
5 requires, I think, a more in depth knowledge of the
6 research program than we have time to guess.

7 DR. LEVENSON: There's another piece to
8 that, George. That is, we've identified the decisions
9 to be made. We identified the technical issues that
10 have to be resolved, but a piece that's missing is
11 that the applicants will be providing part of that,
12 and it isn't up to NRC to provide all of the answers.

13 CHAIRMAN HORNBERGER: Right. That's
14 correct.

15 DR. LEVENSON: And that will be variable,
16 depending on how much the applicant does.

17 CHAIRMAN HORNBERGER: Correct.

18 DR. HINZE: Major breakthroughs come as a
19 result of advances in technology and science, and one
20 of the things that really needs to be stated is
21 something about where we are with that and how we're
22 moving from it.

23 If you're looking for real advances, it
24 takes more than the questions. It takes new
25 approaches.

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1 CHAIRMAN HORNBERGER: Yeah. We're going
2 to get -- maybe we shouldn't go there.

3 MR. HAMDAN: Can I ask you something?

4 CHAIRMAN HORNBERGER: Yeah.

5 MR. HAMDAN: This is an excellent
6 discussion, no doubt, but I do think that the
7 framework that you came up with is excellent, and
8 these ideas, every one of them, including what Milt
9 said and Sher, will be discussed as we go within in
10 the framework.

11 Let's agree on the framework. It looks
12 good to me, and then if there's some second thoughts
13 on the framework, we can talk about that. but if the
14 framework is good, let's proceed, take advantage of
15 the time that we have to make each one of the items in
16 the framework run in an effective way. That's where
17 really the challenge is.

18 CHAIRMAN HORNBERGER: Okay. So --

19 DR. GARRICK: What you're saying is if we
20 have a good structure, we can't lose.

21 CHAIRMAN HORNBERGER: Yeah, I think that's
22 what Latif is saying.

23 So what I'd like to do is move off the
24 philosophical discussion, and we can come back and try
25 to accommodate everybody within this structure as

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1 Latif said, but what we need to do is brainstorm a
2 little bit and actually make some suggestions on
3 people whom we might invite to do these various
4 things.

5 Given Milt's suggestion that we split that
6 first one into two, I wonder whether we can fold that
7 back and say that the first part of Milt's question,
8 the decisions the NRC will have to make -- maybe we
9 don't need the NRC sponsored research and technical
10 assistance program needs that we scheduled there with
11 Ashok and Marty. Maybe what we need to do is
12 substitute directly there Milt's first question.

13 And do you have any ideas on, you know,
14 who it is who could create this list of possible
15 critical needs?

16 DR. BAHADUR: You're talking about the
17 regulatory needs?

18 CHAIRMAN HORNBERGER: That's right. So
19 these are the decisions. What decisions?

20 DR. HINZE: What are the decisions that
21 will be faced in the next ten years.

22 DR. BAHADUR: I think the Licensing Office
23 would be the best source to give us that list.

24 DR. LARKINS: I'm not sure.

25 CHAIRMAN HORNBERGER: I'm not sure either.

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1 DR. LARKINS: The Licensing Office
2 sometimes tends to take a very near term look at
3 issues, and I think one of the charters or missions
4 that research should have is to take the longer term
5 look at issues, and that's what I think Ashok is
6 trying to do.

7 I think Marty is more and Sam is more
8 focused on what's happening to them today and tomorrow
9 and are not always in a position to sit back and think
10 about what needs to be done five years from now.

11 DR. LEVENSON: From your list here, I
12 mean, people like Ken Rogers or somebody from NEI or
13 maybe Bernero, people that have been involved know
14 something about it.

15 DR. SAVIO: People on the Academy board,
16 Bernero.

17 CHAIRMAN HORNBERGER: You've got to use
18 the microphone. Everybody has to use the microphone
19 when they speak.

20 DR. SAVIO: Sorry about that. Some of the
21 individuals from Academy board on line with Milt's
22 discussion are Hearn, Bernero, Budnitz.

23 DR. BAHADUR: There was a research about
24 two years back or one year back, has conducted an
25 expert panel on the nuclear safety research. We think

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1 we can build upon that, their work, and look what they
2 have come up with and see whether some of those
3 identified issues could be used, and that's even a
4 possibility.

5 DR. LEVENSON: See, we're starting at the
6 other end in a way. Normally if you ask people to
7 identify research needs, they do that in the context
8 of ongoing programs and ongoing decisions.

9 CHAIRMAN HORNBERGER: Right, right.

10 DR. LEVENSON: We want to step back a
11 little bit for this first panel, I think.

12 CHAIRMAN HORNBERGER: Right. Now, if
13 we --

14 DR. GARRICK: Who within NMSS and research
15 thinks more about this than anybody else, just from a
16 decision standpoint? You know, this on the surface
17 sounds like it's research, but it could be some NMSS
18 staff person or persons that have been thinking a long
19 time and hard about upcoming issues.

20 It seems to me it's got to be somebody
21 who's really been focused on the waste issue. And
22 where is that? That's either NRC, DOE, or possibly
23 the Academy, although I'm not as optimistic about the
24 Academy because I was once Vice Chairman of the Board
25 on Radioactive Waste Management. While there's --

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1 CHAIRMAN HORNBERGER: It's gotten better
2 since then, John.

3 DR. GARRICK: Yeah.

4 (Laughter.)

5 DR. GARRICK: While I know that there's
6 excellent review capability there, I consider that a
7 little different than what we're trying to do here.

8 No question about it that these people who
9 are on this list are extremely competent and can make
10 a contribution, but if we could just find the right
11 one or two people, it would ever be so much better.

12 DR. LARKINS: I think it varies from
13 office to office. I think in research you'll find
14 within the divisions or at the division director
15 level, some other individuals who have been there for
16 years have some good insights on what types of issues
17 seem to keep popping up and the types of things that
18 should be looked at.

19 MR. MAJOR: You know, what Milt was
20 talking about was who has the problem, and the NRC
21 doesn't have the problem. It's the utility or a
22 national lab that's trying to clean up the waste or
23 somebody with EPRI that's trying to provide problem
24 solutions to the industry, and maybe those are the
25 people we ought to be inviting in, I mean, somebody

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1 with a power plant they're trying to decommission or
2 somebody with a site that needs remediation.

3 CHAIRMAN HORNBERGER: Yeah, it strikes me
4 that, you know, this is exactly what begs the question
5 about whether NRC should be doing research because if,
6 in fact, it's the power plant that has the problem and
7 has to solve it, why shouldn't NRC just use the work
8 that -- I mean, on one hand --

9 DR. LARKINS: Yeah, but NRC doesn't have
10 the knowledge, the skills and the tools to evaluate
11 what comes in, and they can't make a reasonable
12 decision.

13 CHAIRMAN HORNBERGER: Right. They can
14 make a decision. I understand, but --

15 MS. DEERING: Well, it goes back to them.
16 It kind of shifts back to them.

17 CHAIRMAN HORNBERGER: No, it's --

18 MS. DEERING: They're the ones that have
19 to make the call.

20 DR. LARKINS: It has always been that the
21 agency maintains certain knowledge, skills and tools
22 in order to --

23 CHAIRMAN HORNBERGER: Okay. Let's come
24 back to what we're trying to do is decide on -- how
25 many people do we want to address this first question,

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1 the decisions that NRC will have to make, let's say,
2 in the next decade?

3 DR. HINZE: Two to three.

4 CHAIRMAN HORNBERGER: Two or three? Is
5 that --

6 MS. DEERING: Six.

7 CHAIRMAN HORNBERGER: Six?

8 DR. GARRICK: No more than five.

9 DR. HINZE: Yeah, five is too many.

10 CHAIRMAN HORNBERGER: Four?

11 DR. GARRICK: Four?

12 DR. LEVENSON: Is it possible to get some
13 feedback from the Commissioners' offices themselves as
14 to what they perceive are decisions that they might
15 have to make in the next decade?

16 CHAIRMAN HORNBERGER: I doubt it, but --

17 DR. HAMDAN: When we think about it, you
18 have decommissioning. You have licensing. You have
19 high level waste, low level waste. Maybe you can go
20 that route to see what constitutes -- in the next ten
21 years.

22 CHAIRMAN HORNBERGER: Okay, but what I'm
23 looking for the rubber meets the road right here.
24 We've got to focus in, and we've got to select. We've
25 got to make some names. We have to make a list of

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1 some names of people not in broad generalities, but
2 people because we've got to invite these folks.

3 DR. GARRICK: Well, I think there's very
4 few of them around, and I think we've just tried to
5 put together at DOE a working group on Generation IV
6 reactors in the fuel cycle area, and that group has in
7 it probably some of the kinds of people we're talking
8 about that really, really understand the waste issues
9 from a process standpoint.

10 And, Ray, you can help me here, but some
11 of the kinds of people that come to my mind are people
12 like Alan Croft, who thinks very well at the level of
13 identifying research needs, for example, in the waste
14 field.

15 Charles Forsberg, Dave Coker, Dave Wade at
16 Argonne; these are excellent, and there's not many of
17 them around. They were all taught by -- most of them
18 were taught by Manson Benedict, and there's no longer
19 a Manson Benedict around teaching that kind of stuff,
20 and I'm thinking that if we had two or three of those
21 kind.

22 CHAIRMAN HORNBERGER: Okay, but aren't we
23 one step ahead? Aren't those the people that --

24 PARTICIPANT: That's the second panel.

25 CHAIRMAN HORNBERGER: Isn't that the

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1 second group, the tools and knowledge that we need?
2 That is the research community or more research --

3 DR. GARRICK: Well, probably, yeah.
4 They're probably the ones that are in the category of
5 identifying --

6 CHAIRMAN HORNBERGER: Tools that they
7 need.

8 DR. GARRICK: -- what the needs are.

9 CHAIRMAN HORNBERGER: Right. That's the
10 second group.

11 DR. GARRICK: but I'm a little worried
12 about getting a strong connection between the
13 decisions and that. I think it's a tougher question
14 to ask what decisions do we need to make than it is to
15 ask where are the knowledge gaps.

16 CHAIRMAN HORNBERGER: Yeah.

17 DR. HAMDAN: Actually that was my -- I
18 thought that we were at the problem holder's level,
19 the first item, and I frankly think that the branch
20 chiefs at the NRC and possibly somebody from research
21 and the center would give the committee an excellent
22 insight on what kind, you know, will be needed over
23 the next few years.

24 So long as you are talking about the
25 problem holders, that's where we can look out for

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1 that.

2 DR. WYMER: I tend to agree. I think if
3 we're talking about the decisions that NRC needs to
4 make, we ought to talk to the people at NRC.

5 CHAIRMAN HORNBERGER: Okay. So what we
6 have to do is, again, not just broadly, but we have to
7 decide which people at NRC. So let me go through a
8 couple of names.

9 Are we talking about Ashok?

10 DR. GARRICK: Bob Bennell (phonetic).

11 CHAIRMAN HORNBERGER: No, he's no longer
12 in NRC, but he's still a candidate. I agree.

13 Ashok Thadani?

14 DR. BAHADUR: I think that would be a good
15 idea.

16 CHAIRMAN HORNBERGER: Okay. Wes Patrick?

17 MS. DEERING: Yes.

18 PARTICIPANTS: Yeah, that's a good one.

19 CHAIRMAN HORNBERGER: Okay. From NMSS,
20 Marty?

21 PARTICIPANT: No.

22 MR. SINGH: Lower.

23 CHAIRMAN HORNBERGER: A little lower.
24 Okay. So --

25 MS. DEERING: Someone from spent fuel.

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1 CHAIRMAN HORNBERGER: Okay. Who's from
2 SF, spent fuel?

3 DR. BAHADUR: I was thinking more in terms
4 of Ken Rogers and Bob Bernero.

5 DR. GARRICK: Yeah.

6 DR. BAHADUR: Somebody who can give you,
7 I think, a more conceptual thinking --

8 DR. GARRICK: I thin Bernero would be very
9 good.

10 PARTICIPANT: I think Bernero would be
11 excellent.

12 DR. BAHADUR: -- in the future of the
13 decisions to be made.

14 DR. LEVENSON: Since we're not asking for
15 details or justification or explanation, we're just
16 asking for opinions on what future decisions need to
17 be made, is that something that could be done pre-
18 meeting by asking a whole bunch of branch chiefs to
19 just identify what do they think they will face in
20 decision making?

21 CHAIRMAN HORNBERGER: Well, we could
22 certainly --

23 DR. LEVENSON: And then you have a few of
24 these --

25 CHAIRMAN HORNBERGER: -- get some

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1 feedback, but somebody is going to have to summarize
2 it.

3 DR. LEVENSON: Oh, yeah, yeah, yeah.

4 CHAIRMAN HORNBERGER: The people in the
5 office, I wouldn't want to throw out any names without
6 having an opportunity to talk to the office director
7 or division directors first.

8 DR. LEVENSON: Okay. Fair enough.

9 CHAIRMAN HORNBERGER: So maybe we could
10 supplement if you're going to have Ashok and
11 Bernero --

12 DR. LEVENSON: Yeah, we need more names.

13 CHAIRMAN HORNBERGER: -- with three or
14 four of the names.

15 DR. LEVENSON: Yeah, we need more names.
16 I mean I personally think that when we got to six that
17 was too many, but to --

18 CHAIRMAN HORNBERGER: But to get four, you
19 need to start with six or seven.

20 DR. LEVENSON: -- to get four, we would
21 need at least six or seven names, but you know, I
22 would hate to ask everybody and then be surprised and
23 then have seven of them say yes because that's going
24 to be too many.

25 So we have to go in order. Jit.

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1 MR. SINGH: Just a comment. I think Wes
2 Patrick we should not consider because it might have
3 a conflict out there because he's -- if we do any
4 research, it goes up there. So kind of a perception
5 is there that we are using him. I think we have to be
6 careful of that.

7 CHAIRMAN HORNBERGER: Yeah, I don't know.
8 Dick and I talked a little bit about that, and as long
9 as we recognized potential bias, that's okay.

10 DR. WYMER: Yeah, he's not making the
11 decision.

12 MR. SINGH: Of course not.

13 CHAIRMAN HORNBERGER: Okay. How about if
14 we move on to the second part of the question? And
15 now this has to do with what tools and knowledge and
16 what the gaps are, et cetera.

17 And John has suggested a whole bunch of
18 chemists, and not an earth scientist in the group.

19 DR. GARRICK: That's right.

20 (Laughter.)

21 DR. GARRICK: It took some real effort to
22 get a balance on this committee.

23 (Laughter.)

24 CHAIRMAN HORNBERGER: So, again, I think
25 to a certain extent we're going to have to figure out

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1 to what extent we have presentations by these people,
2 to what extent it's a moderated panel discussion, et
3 cetera, how long we give these people, but let's just
4 try to get some names of people.

5 So John has given out, I think, four
6 names. So we have those four names. Did you get
7 them, Dick? I didn't write them down.

8 DR. SAVIO: Yea. I'll check them.

9 CHAIRMAN HORNBERGER: Now, again, this
10 second part of the question is given -- and to a
11 certain extent this is always difficult to orchestrate
12 because unless we have some idea beforehand from these
13 folks about what the critical decisions NRC will face
14 is, how in the heck can these people follow logically
15 by saying what the knowledge gaps are in the light of
16 those critical decisions?

17 But to a certain extent everybody knows
18 the direction that things are going to go, and we can
19 comment on that.

20 DR. GARRICK: Now, one thing that might be
21 good on this panel, and here I'll yield to the earth
22 science community, would be somebody that has really
23 been in the trenches in the performance assessment
24 work.

25 CHAIRMAN HORNBERGER: Chemists and

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1 performance assessment people, eh?

2 DR. GARRICK: Well, you put the emphasis
3 on chemists.

4 CHAIRMAN HORNBERGER: Yeah, I agree. No,
5 I agree.

6 DR. GARRICK: I put the emphasis on
7 engineering. All those people I mentioned are
8 engineers or physical scientists, but it would seem
9 that the panel would benefit from somebody that's
10 really been under the pressure of tying all of this
11 stuff together into --

12 CHAIRMAN HORNBERGER: I agree. Somebody
13 from WIPP would be --

14 DR. GARRICK: Yeah, somebody from WIPP.

15 DR. WYMER: How about the low level waste
16 in Texas?

17 DR. GARRICK: Yeah. By the way, John
18 Helton would be an outstanding candidate.

19 CHAIRMAN HORNBERGER: Latif.

20 DR. HAMDAN: Yes. George, you mentioned
21 the chemist scientist, but did not say that you are
22 going to supplement Dr. Garrick's list with some
23 scientists, but the PA expert would be very good, of
24 course. So I just want to make sure that you are
25 going to include some earth scientists.

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1 DR. GARRICK: Oh, of course.

2 CHAIRMAN HORNBERGER: I'd never let him
3 get away with it.

4 DR. WYMER: Mike Ryan might be a
5 reasonable choice based on his experience with the low
6 level waste facility, and now his work at the
7 University of North Carolina, wherever he is. He has
8 a health physics background, but he's much broader
9 than that. I think he knows quite a bit about this
10 entire area.

11 DR. GARRICK: You know, this might be a
12 good testing ground for Dave Coker, too, for a chance
13 to get a good look at him.

14 DR. WYMER: Yeah. they are similar in
15 talents, background.

16 DR. GARRICK: Yeah, right.

17 CHAIRMAN HORNBERGER: Yeah. In part I now
18 am concerned about what Milt suggested was splitting
19 the first topic into two, but what I think we've done
20 is we've spilled over already into topic three that I
21 had, and that is what are the research needs.

22 And so, you know, this is blurred, whereas
23 what I thought we were going to do was to have -- you
24 know, when I had only the single question, focusing on
25 the tools and needs were, again, still from NRC's

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1 standpoint what were the tools and needs that they
2 saw, and then this was going to be followed on by the
3 research community talking about how this could be
4 satisfied, how the needs could be satisfied.

5 And we seem to have mixed this up because
6 what we're talking about now is we're talking about
7 researchers, and I don't object to that, but I just
8 wanted to point that out, that it doesn't make a lot
9 of sense, I think, to have somebody like Mike Ryan or
10 Coker and Schlomo Newman in that group and then follow
11 it with Rod Ewing and Jane Wong and some others.

12 We're really talking about the same kind
13 of people.

14 DR. WYMER: I've had second thoughts about
15 including mobilization. I'm not sure what NRC's
16 direct interest is in that. I think what you say is
17 there is a source term, and that leads to a problem if
18 it moves around, and I'm not sure why I care about
19 that.

20 DR. GARRICK: Boy, we are a mile, a
21 century apart there because from a risk perspective
22 you ain't got a problem until (a) you know what the
23 hazard is and (b) you've got a source term.

24 You know, the whole issue at Yucca
25 Mountain is the source term. The whole issue at WIPP

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1 was the source term. We didn't get anywhere in WIPP
2 until we finally resolved the technical path to the
3 source term.

4 DR. WYMER: I agree with that, John, but
5 I don't see how NRC is concerned with the way that
6 comes out, you know, the way it's mobilized.

7 DR. GARRICK: Well, they sure as heck
8 should be, it seems to me, because it's --

9 DR. WYMER: Dave, there's nothing they can
10 do about it.

11 DR. GARRICK: -- it's one of the most
12 critical pinch points of the whole risk assessment of
13 the process.

14 DR. WYMER: Yeah, but they're not going to
15 do anything about it.

16 CHAIRMAN HORNBERGER: Well, I mean, you
17 could say they're not going to do anything about
18 transport either.

19 DR. WYMER: Yes, they are. They're going
20 to put together their models and they're going to make
21 measurements to see whether their models are right.

22 CHAIRMAN HORNBERGER: Well, presumably you
23 can say exactly the same thing about mobilization.

24 DR. LARKINS: Yeah, it's two parts. It's
25 prevention, you know, and mitigation. And the

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1 prevention part deals with inhibiting or reducing the
2 likelihood of mobilization of radionuclides either --

3 DR. WYMER: But I don't see that NRC does
4 that.

5 DR. LARKINS: Well, they do.

6 CHAIRMAN HORNBERGER: It's hard for me to
7 see how you can have a transport model without knowing
8 how the stuff you're transporting arises, but really,
9 this is again we're back in -- fine, we'll --

10 DR. LEVENSON: Back to your point, I think
11 it's a very valid one, and I think the names that were
12 mentioned really belong in the third.

13 CHAIRMAN HORNBERGER: Right.

14 DR. LEVENSON: Maybe the thing is in
15 splitting the first one we need to split it into a
16 very narrow sense. In other words, the one group is
17 just to identify what future decisions they might
18 make.

19 CHAIRMAN HORNBERGER: Right.

20 DR. LEVENSON: Then maybe you need
21 somebody from the regulatory side to say, "Before we
22 could make this decision, we would need to know this,
23 this, and this.

24 That's highly technical, and then the
25 highly technical group is if that's what you need to

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1 know, this is how you go about getting it.

2 CHAIRMAN HORNBERGER: I'm not sure that I
3 know where we are.

4 MR. SINGH: Actually, can I --

5 CHAIRMAN HORNBERGER: I'm now confused
6 myself.

7 MR. SINGH: Can I comment on this?

8 CHAIRMAN HORNBERGER: Sure.

9 MR. SINGH: As much as, you know, I like
10 Ms. Jin (phonetic) and Swedish Jin (phonetic) over the
11 next ten years and so on and so forth, really these
12 two are one and the same. You cannot identify the
13 tools that you need without thinking and considering
14 (unintelligible) that one would make. So one can
15 argue that in preparing the tools which were in the
16 initial framework, yeah, you have to look at the
17 decisions you are making and what you make.

18 Splitting them is fine, and I like that
19 idea of thinking about this because it forces you to
20 go where you want to be, but I don't think we should
21 make a big deal out of this. That's my point.

22 DR. LEVENSON: The reason I think they're
23 quite difference is that, for instance, the people
24 that end up making the decisions and need to know what
25 tools they need, they may have no idea; it may not

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1 occur to them that somebody is going to come in with
2 an advanced reactor design or a MOX fuel. What
3 decisions the agency may face is a separate kind of
4 thing really.

5 CHAIRMAN HORNBERGER: Okay, and I agree
6 with that, but, again, let's not argue these points.
7 Here's my own take on how I would resolve the issue.
8 When we talk about the decisions that NRC would have
9 to make and the names that we talked about, I would
10 say let's have Ashok Thadani and Ken Rogers address
11 that question because I think that's the level that
12 they could address it best.

13 And I would say what tools and knowledge
14 would be needed to answer those critical questions.
15 Then I would say people like Bob Bernero and Wes
16 Patrick I would put there to answer that question
17 because that's sort of their focus. They're technical
18 people.

19 I would then say, "Fine. When we get to
20 the research needs, that's where I would put all of
21 the other people that we've been talking about, and
22 that may be where we need to spend more time than on
23 the other aspects.

24 DR. HINZE: Oh, yeah. That third one I'd
25 take more time than the first two put together.

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1 CHAIRMAN HORNBERGER: Right, right.

2 DR. HAMDAN: George, may I suggest that in
3 the second category you may want to think about having
4 somebody from Research Office. That's just an idea.
5 I think it would be worthwhile not only to balance the
6 ticket a little bit, but Research Office may have
7 insights that it doesn't have.

8 CHAIRMAN HORNBERGER: Yeah. Okay. So one
9 of the other things that we had kicked around, that
10 Dick and I had kicked around is you'll notice that we
11 have these presenters, and then we said, well, we
12 could have a panel discussion at the end of the
13 session, and in that panel discussion we had put like
14 NRC representatives.

15 What I was thinking there of was whether
16 or not we could invite people like Tim McCartin and --

17 DR. HAMDAN: Tom Nicholson.

18 CHAIRMAN HORNBERGER: -- Tom Nicholson.

19 DR. GARRICK: Dick Codell.

20 CHAIRMAN HORNBERGER: Yeah, Dick Codell,
21 to basically be on that panel and in some ways be able
22 to react to what they've heard. So we might be able
23 to do it that way.

24 DR. GARRICK: Yeah. There is one thing I
25 guess I would want to cautious us about on the first

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1 two groups versus the third, and that is there is
2 such a thing as decisions that need to be made, and
3 then decisions that can be made.

4 In other words, there may be some
5 identification of decisions that need to be made that
6 cannot be supported from a science standpoint, from a
7 technical standpoint. So there needs to be some sort
8 of a cross-connection between these panels, and I
9 would guess that the workshop would accommodate that.

10 But my point being I don't think we can
11 leave it up to the managers to know what decisions are
12 feasible in all cases because it may just not be
13 possible to provide them with the technology that's
14 required to make those decisions, or as somebody else
15 pointed out, we may be talking about an entirely
16 different kind of spectrum of decisions that are as a
17 result of somebody else who's maybe more technically
18 inclined, has a vision of where the nuclear power
19 industry is going to go in the next 50 years.

20 You know, the Pebble bed reactor gives us
21 a whole set of different kinds of waste problems than
22 anything we've faced with before, and so I think it's
23 kind of important to have some of that vision up front
24 if there's a way to do that.

25 DR. LEVENSON: In fact, you get a list of

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1 all of the decisions that NRC might have to make in
2 the next decade or two. There are going to be some
3 that have no technical content. They're based on
4 political or legal things. That doesn't mean we
5 shouldn't put them in the list. You try to get a list
6 of all of them, and you identify which have technical
7 content.

8 CHAIRMAN HORNBERGER: Well, I mean, I
9 think to a very great extent the more information we
10 can give to the people that we ask to do
11 presentations, the better off we are. So if we can
12 focus them, if we can say we're not only talking about
13 necessarily near term problems that, you know, you're
14 going to face next year or the year after, but things
15 like advanced reactors and what problems they might
16 come to, but we're particularly interested in
17 technical issues. Then we may be focusing --

18 DR. LEVENSON: Then the next year or the
19 year after research can't help.

20 CHAIRMAN HORNBERGER: Yeah, but -- well,
21 okay. Again, we probably don't want to go there.

22 DR. WYMER: I'm not ready to fold yet on
23 this business of mobilization.

24 CHAIRMAN HORNBERGER: Okay. That's fine.
25 I'll fold. I mean we'll call it something else. I

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1 don't want to get hung up on the word. I mean, I just
2 don't see the distinction because I just --

3 DR. WYMER: I do. I don't see what
4 business it is of a regulatory agency to decide
5 whether or not stuff is being mobilized.

6 CHAIRMAN HORNBERGER: Well, what business
7 is it of being transported? I mean, I just don't
8 understand. How can you transport without mobilizing
9 it?

10 DR. WYMER: Well, assume it's mobilized.

11 CHAIRMAN HORNBERGER: I mean if it just
12 stays there, then it -- but you have to know what the
13 rate at which it is being mobilized.

14 DR. LEVENSON: You've got to evaluate the
15 risk, and so you need to know --

16 CHAIRMAN HORNBERGER: You have to.

17 DR. WYMER: I just don't see it.

18 DR. LARKINS: I think we could talk about
19 that a little bit.

20 CHAIRMAN HORNBERGER: Yeah, we can talk
21 about that.

22 DR. LARKINS: And we can give you examples
23 in the regulation to try to prevent the release of
24 fission products from reactors and other things to
25 make it clear.

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1 CHAIRMAN HORNBERGER: What I would ask
2 because we have run out of time, and we need to take
3 a break, I would ask that given the benefit of this
4 discussion, we really need to accumulate a list of
5 nominees, just what we are doing, for this third
6 research topic identifying thing, and again, if we're
7 going to focus on transport or possibly mobilization
8 and transport, I think that we should make sure that
9 we pick people who have something to say in that area.

10 I mean, we can have some broad thinkers,
11 but we don't just want all broad thinkers and nobody
12 who really knows the area.

13 And the other thing is that potentially we
14 could even pick somebody like Schlomo Newman, even
15 though he has this potential bias that he's going to
16 benefit from any recommendation that we give, but we
17 have people who know what's going on. Give Dick your
18 suggestions.

19 Now, the last thing that we didn't get to,
20 maybe I can take 30 seconds and at least tell you what
21 I want, is this prioritization. How should it be
22 done?

23 And there we don't have a list of people.
24 I don't think that -- again, I don't think that we
25 would want a group of four decision analysts to come

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1 and talk to us about decision analysis. We have to
2 have some engagement in research. We might have one
3 of the members be more of a decision analyst, but the
4 kind of people I was thinking of were John Kessler,
5 who has managed a small research program for EPRI;
6 perhaps Martha Krebs, who was over at DOE; maybe
7 somebody else.

8 DR. GARRICK: Maybe did you say a decision
9 analyst?

10 CHAIRMAN HORNBERGER: Yes.

11 DR. GARRICK: Like Ralph Keaney or Detlof
12 Van Vinterveldt or somebody like that.

13 CHAIRMAN HORNBERGER: Right.

14 DR. WYMER: Doesn't somebody from NRC need
15 to be involved in that?

16 CHAIRMAN HORNBERGER: Possibly. Again,
17 what I would ask, we really do have to take a break
18 because we have to start at 10:30, but what I would
19 ask is you give some thought to this. We may have a
20 chance to come back to this at least briefly to
21 accumulate some names.

22 DR. LARKINS: But you've decided you are
23 going to go with the framework that's currently laid
24 out here?

25 CHAIRMAN HORNBERGER: That's what I hear.

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1 DR. LARKINS: Okay. So we do have a
2 decision.

3 CHAIRMAN HORNBERGER: We have the first
4 decision.

5 Adjourned until 10:30.

6 (Whereupon, the foregoing matter went off
7 the record at 10:17 a.m. and went back on
8 the record at 10:31 a.m.)

9 CHAIRMAN HORNBERGER: Okay. The meeting
10 is back in order.

11 We are going to now proceed to dabbling
12 some more in total systems performance assessment, and
13 so I'm going to turn the meeting over to my colleague,
14 John Garrick.

15 DR. GARRICK: I gave my speech yesterday
16 on TSPA and on the technical exchange meeting we had.
17 So I'm not going to repeat that, and I'm delighted
18 that we have the team we have here today to share with
19 us a little bit of what went on. I saw all of these
20 people in action and was quite impressed with the
21 process and the depth and substance of the exchange.

22 So with that and giving you the maximum
23 amount of time, I'll turn it over to Jim, Jim Firth.

24 MR. FIRTH: Okay. Thank you.

25 I'm going to -- is the mic picking up? --

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1 I'm going to go through some of the programmatic and
2 process that we followed to try and resolve or change
3 the status of the total system performance assessment
4 and integration subissues.

5 We also have here a number of other
6 presenters that are going to talk about selected
7 technical issues that we had, and these represent the
8 biggest areas of question and concern that we had to
9 address.

10 We will also try and talk a little bit
11 about risk informing and the process that we used.
12 There may be some more that we may want to follow up
13 as part of the discussion as well.

14 I want to acknowledge the people
15 presenting: Mike Lee, David Esh, and Bill Dam from
16 NRC; Sitakanta Mohanty and Gordon Wittmeyer of the
17 center; and also some of the other subissues leads
18 that we had were people involved at the center that
19 are not here presenting, and those would include James
20 Weldy, Stefan Myer, Roland Benke, Mike Smith, and
21 Osualdo Pensado.

22 And I guess moving ahead to the
23 presentation, after we got through two technical
24 exchanges on performance assessment, the status that
25 we got is that multiple barriers -- that subissue

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1 became closed-pending as a scenario analysis and
2 overall performance objective. Model extraction is
3 still remaining open.

4 And there's a couple of footnotes there
5 that I wanted to highlight in terms of what is and
6 what is not meant by the status of the subissues.

7 We went through an intensive effort to try
8 and document all of our comments and concerns and
9 performance assessment based on information that we
10 had through DOE's total system performance assessment
11 for the site recommendation.

12 We received the science and engineering
13 report later in the process, in May of this year, and
14 the supplemental science and performance analyses.
15 That information was not used to develop the status of
16 resolution. So we still may have some comments
17 relating to the science and engineering report and the
18 supplemental science and performance analyses.

19 And the latter is going to be the subject
20 of upcoming technical exchange in mid-September with
21 the Department of Energy, where we will be raising
22 some of our questions on the range of operating
23 temperatures.

24 Multiple barriers and total system
25 performance assessment, these two subissues start to

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1 get close to what we would be reviewing as part of a
2 license application if DOE were to submit one. We
3 want to be very careful that we're not reviewing too
4 far into what DOE is submitting, and the status of
5 resolution, even though we have agreements that
6 allowed multiple barriers and overall performance
7 objective to be classified as closed-pending, there
8 are some things that we really didn't review at this
9 point in time because we're just trying to make sure
10 that we will have the information that we would need
11 to review a license application if one were submitted.

12 So even though they may be closed-pending,
13 you have to take that in the proper context that it is
14 more limited than some of the other areas.

15 Also, if things are classified as closed-
16 pending, that could be because we have agreements with
17 the Department of Energy and we still have to see what
18 they're going to provide, and as we get the new
19 information, that may raise new questions or we may
20 not feel that it fulfills what we were expecting with
21 the agreement, although we will be working with the
22 Department of Energy to see that what does come out of
23 their future work will meet what we would need.

24 Model abstraction is remaining open at
25 this point in time. We have a technical exchange

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1 scheduled on September 5th that is relating to igneous
2 activity and some of the other biosphere related
3 questions that we had combined.

4 We had a number of questions in
5 performance assessment could either be tracked at the
6 performance -- at the process level or through TSPA,
7 and as we were planning the TSPA technical exchange,
8 we decided which comments would go in which process,
9 whether it's through IA or TSPA.

10 The way we took the approach we took for
11 addressing the subissues is that we wanted to focus on
12 the NRC staff concerns or questions, and to make the
13 process very transparent, we went through and
14 identified explicitly all of our comments and
15 questions.

16 And given the number and the breadth of
17 what we had to cover, this also allowed us to track to
18 make sure that we covered all of our comments and
19 questions, and it also I feel resulted in transparent
20 process to show how we got to closed-pending in those
21 that we did get to closed-pending.

22 And if model abstraction becomes closed-
23 pending at some point in the future, we have the
24 record of what comments and what the responses were
25 and what the agreements were that led us to that

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1 point.

2 Then DOE presents the status of the
3 activities and their path forward is their
4 recommendations. In some cases this may be
5 sufficient, and we may feel that we may not need an
6 agreement that would allow us to go to closed-pending.

7 In some cases we felt we needed an
8 explicit agreement. Then we went through and if the
9 questions or comments were not addressed by the DOE
10 presentation, then we went through each of the
11 comments in turn in the level of detail that we felt
12 we needed to document the process and to get the
13 agreements that we need.

14 The agreements identified what was needed,
15 when it was to be provided, and then we documented as
16 part of the meeting summary, and the whole process of
17 going through and getting the agreements helps to
18 narrow down what the feature questions are that we
19 would need from DOE.

20 So Department of Energy now has specific
21 targets in terms of the agreements of what work
22 they're trying to provide us so that we could do a
23 review, and this is a step forward when things go to
24 closed-pending rather than keeping the landscape open
25 where further questions may come up.

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1 Now the questions are defined by what the
2 agreements are and new information.

3 As I alluded to earlier, there is an
4 overlap between the total system performance
5 assessment subissues, as well as the process key
6 technical issues, subissues.

7 What our subissues within performance
8 assessment do is they establish a framework for
9 evaluating DOE's performance assessment. Then we
10 developed integrated subissues, which is a little bit
11 newer than the key technical issues, and these were
12 developed specifically to help have an integrated
13 review of DOE's model abstractions.

14 These integrated subissue teams included
15 representatives from all of the pertinent key
16 technical issue teams, and their size, depending on
17 the scope and what disciplines were needed in that
18 area.

19 Since we had to coordinate reviews among
20 an umber of different key technical issues, a lot of
21 different technical disciplines, and because there is
22 the overlap between the process KTIs and performance
23 assessment.

24 What we did was we tried to clearly
25 identify what the roles and responsibilities were of

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1 the different groups working as part of the review.
2 The process KTIs are closer to the data that's being
3 developed in particular areas, the process models that
4 are being developed.

5 So the way we broke it out is that
6 features, events and processes within their expertise
7 would be reviewed by the IS in terms of is there
8 sufficient information to do the screening, the basis
9 for the events with probability greater than ten to
10 the minus eight. So that's getting into what the data
11 is and what that speaks to the probability, and four
12 of the five acceptance criteria within model
13 abstraction we felt were best led by the process KTIs
14 through the integrated subissue teams.

15 So there's other areas that performance
16 assessment had the lead, but we wanted to clearly
17 identify what the different roles and responsibilities
18 were.

19 DR. GARRICK: Jim, as this process
20 progresses and we get more confidence in the TSPA
21 results and its ability to identify the issues, does
22 that lead to a reordering of priorities and the
23 possible elimination of consideration of the KTI
24 issues and subissues?

25 MR. FIRTH: The KTI --

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1 DR. GARRICK: Because that's not
2 necessarily driven by performance assessment
3 considerations. It's influenced by, but as I
4 understand it, it's not really.

5 They actually came before the PAs were
6 advanced enough to be a resource for that sort of
7 thing.

8 MR. FIRTH: All right. The KTI subissues
9 in their questions and needs are pretty much imbedded
10 within the integrated subissues, and to the extent
11 that that information is needed, depending on what any
12 features performance assessment would say, that would
13 determine the level of importance in those areas.

14 But for completeness, we're continuing to
15 track those KTI subissues as being imbedded within the
16 integrated subissues, and depending on what's in the
17 performance assessment and the degree of importance,
18 that will determine whether something is or is not
19 relevant, and if it is relevant, what degree of
20 importance and what degree of emphasis we put in our
21 review.

22 So it's really the elimination is more if
23 it's no longer relevant. If it's relevant, we'll
24 still keep track of it, but it will get the emphasis
25 that's appropriate given what we know of the system.

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1 DR. GARRICK: Yeah, and the question has
2 to do with what really determines relevancy, and I
3 think you're saying that TSPA plays a major role in
4 that.

5 MR. FIRTH: Performance assessment does
6 play a major role in that, but there are limits in
7 terms of what the PA gives us, that depending on what
8 you put in the model and how you incorporate it, that
9 will influence what you get out of it. So what we try
10 to do for risk informing our review is to look at
11 information flow going from the process models up to
12 the performance assessment and what's included there,
13 as well as what the performance assessment is telling
14 us.

15 So there's a feedback there that we're
16 trying to use to identify what's important and what we
17 have to focus on in the performance assessment, as
18 well the supporting information.

19 CHAIRMAN HORNBERGER: Jim, just a question
20 on the process here. You mentioned that you assign
21 leads, roles and responsibilities on the basis of
22 these subissues. That is correct, is that not, or the
23 acceptance criteria rather?

24 MR. FIRTH: Yes.

25 CHAIRMAN HORNBERGER: Okay, and the leads

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1 are sort of spread across your team and include center
2 people as well as NRC staff?

3 MR. FIRTH: The process we used in terms
4 of performance assessment, we had one lead at NRC and
5 one lead at the center for each of the TSPAI
6 subissues, and we did this so that we could get
7 consistency across all of the other groups doing the
8 review, as well as addressing generic issues and being
9 a way of consolidating and coordinating the effort.

10 Then within model abstraction and within
11 scenario analysis, we also had all of the integrated
12 subissue team leads that were doing specific parts of
13 the review, and their responsibility was coordinating
14 and working with the teams to develop these are our
15 questions based on a more integrated look, and then
16 work on trying to get our questions answered.

17 So there's several different layers of
18 leads.

19 For scenario analysis, what we had from
20 the Department of Energy was an initial list of
21 features, events and processes. The approach we took
22 was that we apportioned this list among all of the
23 different integrated subissues so that we had
24 integrated subissues dealing with engineering, such as
25 degradation of the waste package and the drip shield,

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1 the quantity and chemistry of the water contacting the
2 waste package and waste form, some relating to the
3 unsaturated zone subissues, saturated zone, direct
4 release dose, which is biosphere, and these generally
5 also are not captured very well in the other key
6 technical issues.

7 So performance assessment also has a very
8 strong role in all of the dose integrated subissues,
9 and then there were a number that didn't fit in any of
10 these, and some of these are called system level FEPs
11 in DOE's terminology, and these performance
12 assessment, we took the lead in terms of looking at
13 all of those.

14 So once we had this initial list, we
15 wanted to review to see that the basis for either
16 excluding or including these things was appropriate.

17 Then there's a question of is this initial
18 list complete, and what we asked was that all of the
19 integrated teams would look in their area to see if
20 they could identify other things that may not be
21 included in that initial list.

22 So it's taking the whole list,
23 apportioning it so that we can do a review in
24 parallel, as well as a series of audits to see that
25 there's anything else that needs to be added.

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1 The IS teams again looked at
2 comprehensiveness, and the screening arguments.
3 Performance assessment looked at the system level
4 FEPs, coordinating the review, looking at integration
5 and consistency so that if there are generic questions
6 that are raised by any of the IS teams or if they
7 identified something that is new, we would then look
8 to either apportion that to one of the other ISIs or
9 address the issue generically.

10 Performance assessment also addressed the
11 methodology questions, and these were very important
12 in terms of trying to get to closed-pending in this
13 subissue.

14 For model abstraction, I've taken one
15 example of degradation of engineered barriers, which
16 gets the designation ENG-1. ENG-1 is generally
17 comprised of container life and source term,
18 repository design, and thermal mechanical effects,
19 evolution of the near field environment, and thermal
20 effects on flow as the process KTIs that are most
21 involved.

22 And ENG-1, Tae Ahn has basically been the
23 NRC IS lead. So he was responsible for coordinating
24 with this team in terms of all of the different
25 issues, working them through the process.

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1 And in terms of the acceptance criteria,
2 system description model integration is something that
3 covers integration issues, as well as things that are
4 more pertinent to the process levels. So we gave this
5 to the performance assessment team as the nominal
6 lead, and for the other acceptance criteria, data
7 sufficiency, data uncertainty, model uncertainty, and
8 model support.

9 These are things that all of the process
10 KTIs are dealing with on a more regular basis. So
11 they're better suited for making some of the final
12 calls on these questions.

13 However, there's the performance
14 assessment component that we would provide input based
15 on our review for consideration, and although it's not
16 listed, performance assessment is also involved in
17 each of the integrated subissue teams.

18 So we have all of the acceptance criteria
19 that are being addressed, and we have roles and
20 responsibilities of performance assessment or ENG-1
21 and lead organizations that would then help us to make
22 the final decisions in terms of what agreements we
23 might need or which comments we already have enough
24 information for.

25 Also illustrating the process is that

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1 there was a lot of work that had gone on last year and
2 this year. We had all of the KTI technical exchanges,
3 and these are listed here in this middle box, and a
4 lot of the questions that would be pertinent to
5 performance assessment get filtered out at this
6 process; that questions on data uncertainty, data
7 support get answered through agreements or find out
8 that there's already enough information through all of
9 these technical exchanges.

10 We also had a criticality -- technical
11 exchange on criticality, which is currently addressed
12 through screening of features, events and processes.
13 So that was also an effort that had gone on to allow
14 us to get to closed-pending in performance assessment
15 on some of our subissues.

16 Then there's a number of questions that
17 arise through our review of TSPA-SR or when people
18 start looking at things from the integrated subissue
19 perspective. There may be some things that were not
20 addressed here.

21 We tried to address them through the KTI
22 technical exchanges, but there were cases where there
23 were some things that we need to still address.

24 So then we went through and identified all
25 of the remaining issues, and went through those, in

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1 turn, to document the process.

2 And within performance assessment we
3 really started our part of the review of TSPA-SR when
4 we received it in January of this year, and it took a
5 lot of people and an awful lot of effort to get
6 through the technical exchange in August. So there
7 was an awful lot of up front work that we needed to
8 support our two technical exchanges.

9 To give you a summary of some of the
10 comments and scenario analysis, we had several general
11 questions or comments and 103 comments on specific
12 features, events, and processes, and scenario analysis
13 tends to be process oriented. The question is: has
14 DOE considered the things that they need to consider?
15 Have they documented what they need to either exclude
16 it from further consideration or include it in the
17 performance assessment?

18 So although some of these may not be as
19 risk significant as some of the other questions, being
20 process oriented as the subissue is, we did have a lot
21 of questions that we needed to ask and have addressed.

22 And multiple barriers, we had 11 comments
23 based on where DOE was in terms of addressing multiple
24 barriers; that you still don't have a final Part 63,
25 for example. We had 11 comments, but what came out of

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1 that was two agreements.

2 So we didn't try to stay focused on
3 getting one agreement per comment or question. We
4 tried to synthesize it and look at the big picture to
5 see what is it that we need and if it's broken down to
6 address a specific comment, that's fine, but we did
7 try and do it at a higher level where we could.

8 In overall performance objective, we had
9 two general comments, and these represent the
10 synthesis of our review. So we had the specific
11 comments and the things that we're finding from our
12 review.

13 And we saw two things that really provide
14 the specific trend that we want to address
15 generically, and with these we gave examples. So to
16 address those we were hoping to have the examples as
17 well as the generic concern addressed.

18 WE also had 27 specific comments in model
19 abstraction. Again, we had general comments with
20 examples, four general transparency and traceability
21 comments, and the transparency and traceability
22 comments are things that we felt we wanted addressed,
23 but they were not of the same level of importance in
24 terms of the information not being there in terms of
25 data needing to be collected or analyses needing to be

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1 done. So we classify those as slightly different.

2 We had 112 specific comments. You'll
3 notice that these are dominated largely in the
4 engineering integrated subissues which tend to be the
5 most important when you have a waste package that will
6 last for 10,000 years, if that's what DOE intends to
7 eventually support.

8 We have does integrated subissues that
9 were not addressed as thoroughly in the other KTI
10 subissues that came earlier, and then we have a mix of
11 unsaturated zone, direct, and saturated zone IS
12 comments.

13 And there's also a number that were not
14 listed here that we're addressing through igneous
15 activity.

16 The top issues that we're going to try and
17 run through for you is the comprehensiveness of DOE's
18 list of features, events, and processes. That was our
19 biggest concern through our scenario analysis,
20 technical exchange, multiple barriers. What is DOE's
21 general approach, and how are they going to provide us
22 the information so that we can see and make an
23 assessment that they do have multiple barriers?

24 In model abstraction, we've elected to
25 talk about three of the top concerns. Did uncertainty

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1 in corrosion, quantity, and chemistry of water contact
2 in the waste package and drip shield and DOE's
3 approach to developing abstractions in parameter
4 distributions.

5 An overall performance objective, we have
6 stability of results and model validation, computer
7 code verification.

8 This last one overlaps with model
9 abstraction, and we're just going to talk about it
10 once. So now what we're going to do is we're going to
11 go through each of the top issues for you. If you
12 have questions on those, you can either ask them as we
13 go through them or at the end.

14 And we're going to start with scenario
15 analysis, and Mike Lee will present this information
16 for you.

17 DR. GARRICK: Are there any questions of
18 Jim before we proceed?

19 DR. WYMER: I had one. It wasn't clear,
20 Jim, where the relative risk of these various things
21 came into play with respect to the amount of effort
22 required to look at the KTIs as subissues or even if
23 some could be rejected based on their relative
24 unimportance.

25 MR. FIRTH: Okay. In terms of scenario

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1 analysis, what we've tried to do is use the integrated
2 subissue teams as the first filtering mechanism for
3 what is the degree of importance. As we get more
4 information in terms of DOE's performance assessment
5 results, and as we get more information from our own
6 performance assessment, we use that information to
7 help to try and risk inform our review.

8 DR. WYMER: Would you, for example -- oh,
9 excuse me. Go ahead.

10 MR. FIRTH: And a lot of the KTI meeting
11 occurred before we had DOE's performance assessment.
12 So it was a lot more difficult at that point in time
13 to try and risk inform our review.

14 Once we had DOE's performance assessment,
15 we had a technical exchange in January of this year,
16 and there DOE provided us their results of their
17 performance assessment. So we had that information so
18 that as we continued our review, for example,
19 reviewing TSPA-SR, we could use that information to
20 help try and focus our review in terms of the areas
21 that are most important.

22 Also as part of the process, the
23 performance assessment team gave information on our
24 sensitivity studies to the Yucca Mountain team, and
25 the Yucca Mountain team is a mechanism that we use to

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1 disseminate information, and all of the KTI leads, KTI
2 members in terms of members of the teams, as well as
3 the integrated subissue teams and members, all can get
4 information from that Yucca Mountain team meeting, and
5 we've also disseminated that widely.

6 So that information also was able to be
7 used to risk inform the review, and Dave Esh is going
8 to talk, I think, a little bit in more detail in terms
9 of the process we used in model abstraction. I'm not
10 sure, Dave, if you want to --

11 DR. WYMER: Well, one more --

12 MR. FIRTH: -- talk about it now.

13 DR. WYMER: -- little follow-up on that.

14 Does the possibility even exist based on relative
15 risk, does the possibility exist to actually throw
16 something out?

17 MR. FIRTH: Yes. There were a number of
18 questions that we identified through our preliminary
19 review that we decided that we did not need to convey
20 to the Department of Energy. They were things that we
21 felt we did not need either agreements or that what
22 was there was sufficient enough that -- it wasn't that
23 the information was wrong because if we see something
24 wrong, we need to bring that to the Department of
25 Energy's attention because their responsibility is to

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1 give us adequate documentation and correct information
2 in any license application if they were to submit one.

3 So if we see something wrong, that's still
4 a comment, but if it's something that is in a gray
5 area and it's not very important, we may elect not to
6 pass that forward.

7 DR. WYMER: Thank you.

8 DR. GARRICK: Any others?

9 Okay. Thanks.

10 MR. LEE: Can you hear me from here?

11 DR. GARRICK: Make Jim stand up the whole
12 time.

13 (Laughter.)

14 MR. LEE: Good idea.

15 I'm going to talk briefly about scenario
16 analysis, and the first slide is just intended to
17 provide a review or remind folks what the staff views
18 regarding FEPs in the context of the proposed
19 regulation is. We require or are proposing to require
20 consideration of those FEPs that could affect
21 performance of have an adverse effect on performance.

22 Certain FEPs with events of annual
23 probabilities of less than ten to the minus eighth per
24 year can be excluded, and most importantly, the rule
25 does not specify though how FEPs are to be

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1 investigated. We defer to the potential licensee,
2 DOE, to do that.

3 So in that regard, we view the FEPs to be
4 an important aspect of the performance assessment
5 process because it describes what's been considered
6 and what has been excluded from any PA calculation
7 that takes place subsequent in DOE program.

8 I'd kind of liken the FEPs screening
9 process to the first page or chapter in a PA
10 scientific notebook. the first couple pages or
11 chapters are dedicated to the identification of FEPs
12 and the formation of scenarios. Later chapters are
13 dedicated to model abstraction based on those
14 scenarios.

15 Subsequent chapters are based on the
16 numerical methods that are used to express those
17 abstractions, and then lastly, the end of the book
18 would be the actual evaluation of compliance with some
19 standard, such as proposed Part 63.

20 DR. GARRICK: Mike, are you going to give
21 us your definition of a scenario? Here you label this
22 scenario analysis, and then you talk immediately about
23 FEPs. Can you tell us what you mean by a scenario and
24 how that is structured with reference to the TSPA?

25 MR. FIRTH: Mike, do you want me to? I

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1 guess --

2 DR. GARRICK: Because, see, one of the
3 confusing things about this is that scenario analysis
4 in a lot of risk work has a very specific meaning. Z
5 It's a cradle to grave path of which there may be
6 hundreds and thousands and maybe even millions of
7 them.

8 Here it's used very differently, and it's
9 not quite the same, and I think it's important to
10 understand just where it fits in the grand scheme of
11 things.

12 MR. FIRTH: Okay. We use scenario
13 analysis to talk generally about the process that is
14 used to identify those features, events, processes
15 that are included or excluded from the analysis.

16 It also covers the approach for using
17 groups of these in terms of scenario classes that are
18 a group of scenarios that are very similar, like they
19 all have igneous activity present that might be used
20 to streamline the analysis.

21 But to address your initial question of
22 what is a scenario, generally a scenario is as we've
23 defined it in the integrated issue resolution, status
24 report for performance assessment, is basically one
25 realization or one possible feature of the repository.

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1 So imbedded within that is all of the boundary and
2 initial conditions and the events and their attributes
3 that may occur within that possible future.

4 And that's slightly different than
5 scenario analysis which is addressing the methodology
6 that is used for either deciding what's included in
7 the performance assessment, what's excluded, and if
8 you are going to try and group things, such as
9 assuming that for these sets of scenarios an igneous
10 event or a criticality event is going to occur, that
11 it also includes decisions that are made there.

12 But it's that more specific where
13 realization is a numerical representation of the
14 scenario, is how we use it.

15 DR. GARRICK: Okay. Thank you.

16 MR. LEE: Thanks, Jim. I couldn't have
17 said it better.

18 Okay. Next slide.

19 Having defined that regulatory framework
20 or proposed framework, the next slide is intended to
21 address what NRC's expectations are regarding the
22 implementation of a scenario selection process, and as
23 I just noted, the DOE can use whatever method it
24 chooses.

25 However, we think that the method should

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1 include adequate technical justification and be well
2 documented. This is consistent with the transparency
3 and traceability themes that we constantly remind DOE
4 about.

5 And, in particular, we think that the
6 methodology should be thorough, provide the correct
7 characterization of treatment as FEPs as singular or
8 universal, have the sound probabilistic arithmetic,
9 and consider FEP representative as some variability.

10 And this particular bullet ties back to
11 things that we've been talking to DOE about since 1997
12 when we first engaged DOE aggressively in talking
13 about what their FEPs screening methodology was and
14 how they intended to implement it in the context of
15 their program.

16 And the last bullet talks about the
17 attributes of an acceptable FEP screening approach or
18 methodology, and these have been devised previously in
19 Rev. 3 of the IRSR for TSPAI or TSPA -- yeah, TSPAI.

20 As Jim has noted, we see the FEPs
21 screening process as being very process oriented. So
22 we think it should in many respects proceed in a
23 manner that begins with the initial identification of
24 FEPs, subsequent categorization. After that we can or
25 one can screen the FEPs into scenario classes, and

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1 then you can, having defined your scenario classes,
2 you can screen them based on screening arguments that
3 you develop.

4 The DOE approach to their scenario
5 analysis methodology is that they initially relied on
6 the NEA FEP database that's been around for a few
7 years and subject to periodic update. Based on the
8 results of site characterization, they augmented that
9 list, and NRC has subsequently over the last several
10 weeks and months provided additional comments on FEPs
11 that should be considered or added to the database or
12 requested some clarification as to whether or not
13 those FEPs are there.

14 As a result of this process over the last
15 several months and years, for that matter, DOE
16 initially came up with 1,808 FEP entries and screened
17 them down to 328 individual FEPs which were divided
18 among 135 FEP classes, and the results of this FEP
19 screening process have been documented in a series of
20 AMRs, and I think there's approximately six of them.
21 If you read that, it will give you an idea of what the
22 specific FEPs are that DOE has identified.

23 In the next slide, based on our
24 interactions over the last several weeks leading up to
25 the technical exchange, I think the bottom line we can

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1 say is that the DOE evaluation of FEPs may be
2 comprehensive, but the process isn't particularly
3 auditable.

4 The identification and categorization
5 steps that I outlined earlier are combined by DOE as
6 part of their FEP screening process, and as a result,
7 you wind up with a level of detailing FEP descriptions
8 that isn't always uniform.

9 And this is important in terms of the
10 transparency and traceability themes, it's hard to
11 figure out in some instances how these activities
12 relate to the larger PA process that is of interest to
13 all of us.

14 And as a result of the interactions we've
15 had with DOE a couple of weeks ago, DOE has agreed to
16 the following enhancements or commitments to their
17 FEPs screening process, the first of which is they're
18 going to improve the FEP definitions and the level of
19 detail in these descriptions, which we think would
20 improve independent understanding of what FEPs were
21 actually considered.

22 And in that regard, they intend to improve
23 the documentation of FEP disposition relative to the
24 overall TSPA process. We're risk informing our --

25 DR. GARRICK: Is the reason you say it's

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1 not auditable boil down to it's just not worth the
2 labor that would be required to provide the background
3 and documentation to make it auditable?

4 MR. LEE: I wouldn't characterize it in
5 those terms. It's not auditable because the way the
6 process was implemented, it's not apparent to the
7 staff what the initial list of FEPs were that were
8 considered and how that initial list got whittled down
9 because DOE combined a couple of steps. It's just
10 muddied the water.

11 DR. GARRICK: Does the QA effort get down
12 to this kind of level?

13 MR. LEE: Yes. Jim?

14 MR. FIRTH: Yeah, I was going to add that
15 as we're going through in terms of some of our
16 comments on DOE's FEP list, we had a number of
17 examples that we didn't see and that we raised as this
18 is something that should be added that you should
19 consider, and sometimes the response is that it's in
20 this FEP, but there's no way of really seeing that in
21 terms of the documentation.

22 So in terms of not being auditable, it's
23 saying that there's no documentation of what DOE has
24 considered, how it had been considered, and if you
25 don't have that information or if the level of detail

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1 is varying by very large orders of magnitude, if you
2 get very specific in one area, you look for something
3 comparable in another area, and there's no
4 documentation to show that you would not see that.
5 You can't audit the list.

6 DR. GARRICK: Yeah. So DOE may have made
7 the decision that the documentation wasn't worth the
8 effort. Somebody --

9 MR. LEE: Well, I think the answer, the
10 DOE answer -- and DOE can certainly speak for
11 itself -- but more often than not when we identified
12 what we thought to be a missing theft, the response
13 was, well, the FEP was there. It's just we didn't
14 express it in those particular terms or we could have
15 expressed it in a little more detail to cover that
16 particular FEP that you thought was missing.

17 More often than not, the FEPs in DOE's
18 view were embodied in these broad FEP classes, but
19 they just didn't articulate them in the words that we
20 were looking for or in the level of detail that we
21 thought was adequate to express that coverage or
22 comprehensiveness.

23 So I believe the work has been done. I
24 think it's just a question of how the documentation
25 has been developed.

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1 DR. GARRICK: Is there any merit when you
2 get down the line a ways and you know what's really
3 important and you now have brought into clear focus
4 the FEPs that are really driving things; is there any
5 merit at that point in going back and reexamining them
6 from an auditability standpoint?

7 MR. LEE: Well, the last tick under the
8 last bullet, I think speaks to that. DOE, I think,
9 has come around to recognize that they need some kind
10 of configuration management control, if you will.
11 There is no FEPs database right now. There's just a
12 series of reports, and if you were to read those
13 reports and compile the information yourself, you
14 could develop a list.

15 But I think DOE, as a result of the
16 interactions we've had over the last couple of weeks
17 or a couple of weeks leading to the technical exchange
18 and the technical exchange itself has recognized that
19 they need to, for lack of a better word, modernize
20 their management of that information so that as they
21 do conduct their performance assessment and they do
22 interrogate the system, they find out what FEPs or
23 scenarios or aspects of a particular issue are driving
24 performance, they can trace that through, if you will,
25 the PA process.

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1 And it's particularly important in the
2 context, we think, of like design decisions. For a
3 particular thermal loading regime, it may introduce
4 FEPS or eliminate certain FEPS, and we think DOE needs
5 to be in a position to answer those questions,
6 especially as they may relate to some design decision
7 that they're going to make.

8 MR. FIRTH: Mike, if I could add, those
9 features, events, and processes that are important to
10 the performance assessment are the things that we
11 would expect would be carried forward into model
12 abstraction. So in terms of the screening, that's
13 generally done on things that are of lesser
14 importance, and an example in terms of the
15 auditability and the level of detail is biosphere
16 characteristics could include almost anything in the
17 biosphere, and then you have examples like hydrogen
18 embrittlement of the classing.

19 So you have those two very different
20 approaches. What DOE had indicated is that they used
21 like the NEA database and the level of importance to
22 determine whether things are done more broadly or at
23 a more specific basis, but there's no documentation of
24 that process in terms of how they made the decisions,
25 what is an appropriate level of detail that they need

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1 to include, and if they are to base their decisions
2 and their approach on the NEA database, they need to
3 justify what they're carrying forward because it's
4 their responsibility if they want to take that product
5 as their own or the foundation of their work.

6 CHAIRMAN HORNBERGER: While you're on that
7 example, I was going to ask Mike to just give me an
8 example of a FEP that you raised DOE as being missing,
9 just one example to help me.

10 MR. LEE: I think the example that Jim
11 just presented with the biosphere description. The
12 biosphere FEP was so broadly written you could read
13 anything into it you want.

14 CHAIRMAN HORNBERGER: So give me a
15 specific example of what you didn't think was in
16 there.

17 MR. LEE: Swamp coolers. Is Sitakanta
18 here? Oh, here is Pat La Plante. He's the swamp
19 cooler expert.

20 DR. GARRICK: I thought you were going to
21 say the latrine or something.

22 MR. LA PLANTE: What exactly do you want
23 me to clarify?

24 CHAIRMAN HORNBERGER: For the record, you
25 have to give your name.

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1 MR. LA PLANTE: My name is Pat La Plante.
2 I work for the center.

3 MR. LEE: Well, swamp coolers wasn't
4 included in the --

5 CHAIRMAN HORNBERGER: In the biosphere.

6 MR. LEE: -- biosphere.

7 CHAIRMAN HORNBERGER: And so presumably
8 you had some thought that swamp coolers were an
9 important part of dose pathway in the biosphere that
10 DOE was not incorporating.

11 MR. LA PLANTE: Well, I think when you're
12 looking at FEPs, you have to -- the identification of
13 FEPs leads into your model development, and so you
14 have to start out with a comprehensive list first and
15 then screen from that list.

16 So in the beginning you need to consider
17 everything first to know what -- to end up with a
18 correct model, and so whether something's important or
19 not in the beginning of the process becomes sort of
20 irrelevant because you need to start with a complete
21 list, and so that complete list of FEPs needs to
22 include enough resolution to understand what they've
23 considered.

24 Swamp coolers is maybe one example. There
25 are other examples. The selection of transfer

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1 coefficients, some of the chemical characteristics
2 involved in those selections; there's all kinds of
3 levels of detail in doing the biosphere work that an
4 average biosphere scientist would just expect to see.

5 And then if you look at some of the FEPs
6 that are broad on the level of biosphere
7 characteristics or there's another FEP that's called
8 radiation doses, which includes intake and the dose
9 coefficient, that's the entire biosphere calculation.

10 You know, you could have that one FEP
11 represent the entire biosphere, and yet there's other
12 FEPs that are also called primary FEPs that are
13 supposed to be at that -- you would expect they would
14 be at that same level of detail that cover all of the
15 subspects of that intake component.

16 And so this is part of the issue that
17 we're dealing with when we look at the biosphere.
18 You've got overlap of categories, and some things are
19 just so broadly defined that it's hard to tell from
20 the documentation what was all considered underneath
21 that FEP.

22 Does that clarify it?

23 MR. FIRTH: I guess, Pat, if I could just
24 supplement that as in terms of importance, the amount
25 of information that we would need to have something

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1 screened as being unimportant, that could depend on
2 the degree of importance.

3 Things that are obviously less important
4 can be screened with less information and less
5 analyses than there would be for something that might
6 be closer to the threshold.

7 So that's where degree of importance
8 really factors into this process.

9 MR. LA PLANTE: Yeah, you can't screen it
10 if it's not initially identified, and that's the
11 transparency of the process.

12 CHAIRMAN HORNBERGER: Thanks. I really
13 just wanted an example so that I could have something
14 to focus on in my mind.

15 MR. LEE: I think Tim McCartin wants to
16 add a footnote here.

17 MR. McCARTIN: Yeah, Tim McCartin, NRC
18 staff.

19 I guess one quick thing, I mean, not
20 everyone may understand a swamp cooler. It's an
21 evaporative cooler in the house where if you're using
22 contaminated water in the swamp cooler, you obviously
23 are bringing radionuclides into the home, and there
24 could be a potential for some dose.

25 CHAIRMAN HORNBERGER: I thought it was an

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1 air conditioner used in a swamp.

2 (Laughter.)

3 MR. McCARTIN: But the other point that I
4 guess I would like to augment on the auditable part of
5 it is that in my understanding, and please correct me
6 if it's not correct, but it's not so much -- part of
7 it is to have a complete list. The other part is we
8 need to be able to trace the logic behind the DOE, why
9 this was included or why this was not included, and
10 that is very important.

11 An example that was brought up yesterday
12 by someone, the fact that criticality within the waste
13 package was excluded at one point because there were
14 no failed containers within the 10,000 year compliance
15 period, and you can see.

16 Well, it's a very simple case, but I think
17 it makes the point. If that was screened out, well,
18 you know see, well, now they have a case where there
19 are some failed containers within that 10,000 period.
20 Maybe you have to revisit that FEP.

21 And it's the auditability is also this
22 logic flow of what is in and why, and we need a very
23 clear path for all of those things. We may agree that
24 the final list is correct, but for a license
25 application, we need to see how you got there and why,

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1 and that's part of the auditability.

2 MR. LEE: Right, and if I could just pick
3 up on the license application theme, should DOE ever
4 develop and submit a license application for Yucca
5 Mountain, NRC is going to be in the position of having
6 to independently review that license application
7 against the regulation using a review plan, and
8 ultimately we're going to have to sign off in the
9 context of a safety evaluation report that we believe
10 DOE's evaluation of FEPs is comprehensive.

11 So everything they can do now to improve
12 the document or the paper trail, if you will,
13 regarding what was considered and why and its
14 disposition and PA space is going to help us in that
15 goal.

16 CHAIRMAN HORNBERGER: I just want to
17 emphasize there was no implied criticism in that
18 question. All I wanted was an example so I could
19 focus.

20 (Laughter.)

21 MR. LEE: I'm done. I'm going to go drain
22 my swamp cooler.

23 MR. FIRTH: Okay. Bill Dam will talk
24 about multiple barriers.

25 Bill, you may want to come up here in case

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1 there are questions.

2 MR. DAM: I'm Bill Dam, NRC staff.

3 And I wanted to acknowledge Sitakanta
4 Mohanty from the center and Tim McCartin. We worked
5 hard on this issue for the last eight months, and
6 those people have been working on it much longer than
7 I have, but basically we've been trying to understand
8 the DOE approach which has been evolving.

9 And we have a couple of documents that
10 were used to set the preliminary approach. So the
11 actual information in the report wasn't used in terms
12 quantitatively, but displayed basically the approach
13 that was used.

14 The repository safety strategy, Version 4,
15 which was released in December and TSPA-SR released in
16 January were the two primary documents that we used
17 for review of the multiple barriers approach.

18 In the repository safety strategy and also
19 TSPA-SR, they identified four natural barriers, which
20 are, for instance, the surface soils and topography was
21 one barrier; the rock units, unsaturated rock units
22 above the repository; the unsaturated rock units below
23 the repository in the saturated zone. That makes up
24 four natural barriers.

25 And then five engineering components of

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1 the engineering barrier system were also the
2 engineered barriers, and those would include the drift
3 shield, waste package, cladding, draft invert
4 materials.

5 And then in the analysis using the TSPA
6 code, DOE presented simulations of barriers using
7 processes such as neutralization, degradation, and
8 juvenile failures, and in the Q&A I can give some
9 back-up slides to show those examples.

10 What they presented to us were dose curves
11 over long time ranges for various radionuclides.

12 The NRC concerns were developed. We had
13 several meetings with NRC staff and center staff.
14 Some of the meetings were happening in April where
15 experts in different areas of waste package
16 engineering, geology were all discussing different
17 concerns about the approach, and we developed numerous
18 comments that ultimately we combined and put together
19 as 11 official comments that we transmitted to the
20 Department of Energy.

21 And a general overall comment that sort of
22 summarizes those 11 comments might be that
23 documentation was insufficient to understand the
24 approach and results for demonstrating barriers
25 capability.

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1 An example of that is that the dose curves
2 really don't tell us what the characteristics or the
3 capability of the barrier are, how they're behaving,
4 how they're acting. So what we're interested in is
5 not only the information of the radionuclides that
6 might be moving through the barriers and ultimately
7 resulting in a dose downgrading it, but we're very
8 interested in how do those barriers behave and the
9 capability of the barriers to retain radionuclides,
10 for instance uranium or neptunium, let's say. How
11 much is the Calico Hills or unsaturated rocks below
12 the repository containing how much neptunium. Excuse
13 me.

14 So the neptunium, the various other
15 radionuclides, we're interested in all of the
16 radionuclides that are important in the inventory that
17 are in terms of risk information and how the
18 capability of the barriers would be to either prevent
19 or substantially delay the movement of water or
20 radionuclides.

21 DR. GARRICK: Just to make sure I
22 understand, are you saying that there was an analysis
23 and a model presented, and the analytical structure,
24 if you wish, was available, but there was insufficient
25 supporting documentation for that analysis, or are you

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1 saying that there was not an analysis?

2 MR. DAM: There was analysis done. There
3 were graphical results presented in some cases, but
4 not enough documentation to really explain that
5 information.

6
7 DR. GARRICK: You couldn't replicate it.
8 You couldn't replicate it on the basis of what was
9 presented.

10 I'm just trying to clearly understand what
11 was missing here.

12 MR. DAM: Certainly the documentation was
13 insufficient. The real key thing was that the
14 approach that DOE was taking was a preliminary
15 approach that was presented in the RSS-4 and the TSPA-
16 SR. So they needed the flexibility to be able to say,
17 well, they might have different ways of analyzing
18 barrier effectiveness or capabilities, such as
19 neutralization, the different kinds of robustness
20 analysis.

21 So we never got clarity on the process
22 wasn't evolved enough, you know, to really pin down
23 the exact approach that was going to be used.
24 Actually in this process what we've learned is the
25 various approaches that can be used, and DOE still

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1 will becoming up with the final approach to use before
2 the LA.

3 MR. FIRTH: Okay. Bill, if I could add to
4 that, in terms of the definition of what a barrier is
5 in the proposed rule, Part 63, it's talking about
6 delaying or retarding the movement of water
7 radionuclides.

8 DOE analyses were basically presented in
9 terms of effect on dose, and there's not always a one
10 to one correspondence. So there's a little bit more
11 in terms of the information that we needed in terms of
12 the definition of what a barrier is and speaking to
13 its capabilities in that respect that DOE did not
14 provide us.

15 And part of that is they were developing
16 TSPA-SR before they even have a final rule. So it's
17 something that is probably to be anticipated.

18 DR. GARRICK: Yeah, thank you.

19 CHAIRMAN HORNBERGER: But I'm still not
20 quite clear on this. Okay? John asked a very
21 specific question, and I understand his question. His
22 question is: do you mean by that that if you had the
23 computing power here and you had GoldSim that the
24 documentation would not have allowed you to reproduce
25 DOE's process? Is that what you mean by the

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1 documentation is insufficient?

2 MR. DAM: Really what was meant by that
3 statement was more in terms of the documentation
4 supporting their results. I didn't try to look at it
5 in terms of getting the information. I think it's
6 quite possible we could get that information that
7 you're suggesting and do the modeling, but --

8 CHAIRMAN HORNBERGER: No, I'm not
9 suggesting that you want to do the model. I'm just
10 trying to figure out, I mean, what we're --

11 MR. DAM: What we're talking here --

12 CHAIRMAN HORNBERGER: In scientific
13 review, clearly what you would like of a scientific
14 paper is you would like to be able to reproduce the
15 experiments described, for example, on a simplistic
16 level, and I understand that kind of insufficiency in
17 documentation, and I'm just curious as to
18 hypothetically if you had wanted to reproduce what DOE
19 did is by when you say the documentation is
20 insufficient, it would be insufficient hypothetically
21 to allow you to reproduce their results.

22 MR. FIRTH: I guess I would answer yes,
23 and we had an example where we were looking at the
24 performance of the waste package, and that's something
25 that Dave Esh is going to be talking about later.

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1 And as part of our review we tried to see
2 if we could reproduce some of their results, taking
3 what they had documented as part of understanding the
4 process, and it took some back and forth in terms of
5 getting some additional information from the
6 Department of Energy before we came to the conclusion
7 that, yes, we could come close to reproducing the
8 results.

9 There were still some differences due to
10 differences in the approach, but that information was
11 not fully documented in what they had provided in
12 TSPA-SR, but I guess I would also just add in terms of
13 what's presented on the slide is that there's also
14 even with that insufficient documentation, there's
15 also insufficient documentation of the analyses in
16 terms of speaking to the barriers capabilities as
17 well.

18 So it's really two prongs.

19 MR. DAM: And I would follow up on that
20 just saying that what we're interested in is the
21 capability of the barriers. We're interested in what
22 are the properties of the barriers, such as, say, the
23 saturated zone, if there are going to be Kd values,
24 matrix suffusion values. We need to know those
25 parameters and understand how the barriers behave.

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1 DR. GARRICK: Now that's the kind of
2 information that was missing?

3 MR. DAM: I wouldn't say that information
4 was missing, but what's not clear is the information
5 that's, you know -- how credit is going to be taken.
6 For instance, I can show you some curves that compare
7 saturated zone to unsaturated zone, and it appears in
8 these results that the unsaturated zone holds much
9 more important to performance than the saturated zone
10 does.

11 That was a surprise to us. The results
12 may or may not be accurate for future TSPAs depending
13 on the Kd values and the matrix diffusion values that
14 are used for the saturated zone or the unsaturated
15 zone.

16 DR. GARRICK: Yeah, the reason for the
17 question, of course, is that the word "documentation"
18 is a very expansive descriptor, and we just don't know
19 what that means. It would be kind of a dump all
20 problems into that word.

21 MR. DAM: I'd be happy to be more
22 specific.

23 DR. GARRICK: Yeah.

24 MR. DAM: And also we could give some of
25 the actual comments, the 11 comments that we had. We

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1 could give you a few of the actual comments, but I was
2 just trying to give an overall, overarching and
3 general comment.

4 CHAIRMAN HORNBERGER: Milt, you had a
5 question?

6 DR. LEVENSON: Yeah, I have a follow-up
7 question. I understand your discussion about it was
8 insufficient to duplicate it or there were details
9 missing, but I'm concerned by the statement that the
10 documentation was insufficient to even understand the
11 approach. Is that a correct statement?

12 That's a condemnation. That's quite
13 different than not having enough detail.

14 MR. McCARTIN: Could I just -- Tim
15 McCartin, NRC.

16 And let me give you an example along those
17 lines, and it's just there has been a lot of -- DOE
18 has done a fair amount in the degraded barrier
19 analysis and neutralized barrier analysis, and we've
20 seen a lot of curves that impart a lot of information.

21 However, I think what Bill and Jim have
22 talked about is that it is sometimes hard to
23 understand the results, that as the analysts, they
24 know what they did. We don't know what they did.

25 And the best example I can give is one of

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1 the technical exchanges in the last year or so. The
2 neutralized barrier performed better than the degraded
3 barrier. Now, right offhand you just say, "This can't
4 be.

5 CHAIRMAN HORNBERGER: You're really better
6 off without a drip shield, right?

7 (Laughter.)

8 MR. McCARTIN: And it's just the way they
9 did degradation versus the way they did
10 neutralization, and it's that kind of documentation.

11 And you're right, Milt. The documentation
12 wasn't there to allow you to understand why those
13 results came out the way they did. There's a lot of
14 good results there, but I think when you do the
15 degraded and the neutralized barrier analysis there is
16 a very significant documentation to explain exactly
17 what you did there because it has a big impact on
18 those results, and that hasn't been done yet.

19 MR. DAM: One of the things we learned
20 from the technical exchange, and Jim mentioned it,
21 that in the proposed rule the definition of a barrier
22 is material or structure to prevent or substantially
23 delay the movement of radionuclides or whatever. One
24 of the things we learned in previous documentation DOE
25 had discussed the potential for barriers above the

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1 repository.

2 At the technical exchange it appears that
3 the barriers they may select -- the proposed rule says
4 they must have one natural and one -- at least one
5 natural and one engineered barrier system.

6 The presence of water in terms of
7 quantifying the amounts of water that the barriers
8 might prevent or substantially delay movement of water
9 is an area that because we're saying radionuclides or
10 water, water is not something that they wanted to
11 commit to giving us that information in the barriers
12 analysis.

13 So it appears that the barriers that they
14 may come in with will be the ones that are either in
15 the repository engineer barrier system or the rock
16 units below the system, and that's certainly within
17 their mission to do that.

18 Some of the other things, variability in
19 terms of spatial variability, temporal variability
20 where the barriers may change with time, where things
21 are of quite interest to us. It's easy to think about
22 the spatial variability of a natural barrier and how
23 it might change, the heterogeneity of a natural
24 barrier and how that might -- you know, the properties
25 may be very efficient in one area, but not in another

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1 area.

2 And certainly the TSPA, we make sure that
3 the robustness is adequate to describe the complete
4 range of capabilities of the barrier, of the
5 characteristics of the barrier. But that has to be in
6 there.

7 The uncertainty, in terms of the process
8 models, in terms of the conceptual models, all the
9 kinds of things we're seeing in the SSPA document are
10 the things that we're very interested in in terms of
11 the area of performance, and that needs to be
12 continually analyzed and documented.

13 So going on to the resolution path
14 forward, we reached two agreements. I briefly
15 summarized them here. I can provide the actual
16 details if you'd like, but basically one agreement was
17 that they provide the descriptive documentation
18 considering parameter and model uncertainty, and then
19 they would document barrier capabilities, considering
20 the variability that I just mentioned, independence
21 and interdependence of barrier functions.

22 And an example of interdependence might be
23 the effects of the drip shield on above the waste
24 package. So we're interested in how some of these,
25 you know, at the boundaries and how some of these

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1 barriers are behaving along the different
2 intersections.

3 And DOE has agreed to document their
4 approaches in the 2002 TSPA methods and assumptions
5 report and also present -- that's for the approach, as
6 the final approach, and then the actual results will
7 be coming out in any potential license application.

8 And we can go on if you'd like or I can
9 answer more questions, but I do have back-up slides.

10 DR. GARRICK: When you do an agreement
11 like this and you ask for something, such as providing
12 descriptive documentation, do you get highly specific
13 on what you mean by that, or does this come as a
14 result of the discussion and exchange that takes
15 place?

16 MR. FIRTH: Bill, if I could start.

17 MR. DAM: Yeah. Let me just say that I
18 believe we are highly specific, and we do negotiate
19 these in a caucus group, as you know, and then with
20 DOE. So they certainly come back to us, anything they
21 don't understand or any clarification of what we're
22 talking about in all of these. I'd say yes.

23 MR. FIRTH: The basis for the agreements
24 are the comments that NRC has provided to DOE, DOE's
25 responses that they have put in the delta table, and

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1 the discussions during the technical exchange and the
2 meeting summary.

3 So we aren't getting into very, very great
4 levels of detail, but we have expressed our concerns.
5 They're aware of them, and implicit in these
6 agreements is that they are going to be addressing
7 those concerns that we had identified.

8 DR. LEVENSON: I have a follow-up
9 question. By now after some years, there's been lots
10 of these agreements, et cetera. In cases where you've
11 asked for additional documentation, has what you've
12 received been satisfactory or does it require an
13 iteration?

14 MR. FIRTH: Okay. Within performance
15 assessment, we just reached our first agreements in
16 August of this year, but there are examples where from
17 the earlier KTI meetings, that what was provided did
18 not meet what we felt we needed.

19 An example would be in the area of
20 structural deformation and seismicity, and we followed
21 up with additional information needs that came out of
22 what DOE had provided.

23 So there is a possibility that with what
24 DOE provides they will not meet what we feel we need.
25 There is that risk.

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1 DR. LEVENSON: But does that arise from
2 not a clear understanding of what you're asking for in
3 the first place?

4 MR. DAM: Well, like I say, we do
5 negotiate these agreements, and we want to make sure
6 they are quite clear, but there have been several
7 letter reports where we've asked them to provide us
8 rather immediately with a report. One example is
9 Alcove 8, Niche 3 testing for the unsaturated zone.

10 That letter report came in, and we were
11 satisfied with information contained in there. So we
12 do try to get -- the dilemma that we get in is that we
13 can't be prescriptive. We can't say exactly how they
14 have to do a particular approach. We give them that
15 flexibility, but if there's documentation issues that
16 aren't clear, we need to know that from them.

17 DR. LEVENSON: But the concern is there is
18 maybe 300 or more outstanding agreements at the
19 moment. If all of that material comes in, a
20 significant fraction are not satisfactory, then the
21 problem is much, much greater even than might be
22 perceived.

23 So from what you've perceived to date, are
24 you willing to make a guesstimate as to what fraction
25 have required follow-up and what fraction was clear to

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1 both parties in the first place so that there is no
2 follow-up?

3 MR. FIRTH: Okay. I'm going to let Jim
4 Anderson, who is the project manager for issue
5 resolution, start, and then there's probably one thing
6 that I might add after his.

7 MR. ANDERSON: Jim Anderson, NRC.

8 We've received approximately 70 documents
9 from DOE pertaining to the agreements. A great
10 majority of those we have not completed our final
11 review of. I would say probably maybe ten percent of
12 those we've actually reviewed and responded back to
13 DOE.

14 So you're talking probably now in the
15 sevens to eights category we've actually reviewed
16 them. In those there's probably been a mixed bag of
17 some that they needed additional information and
18 others we said the information they provided was
19 adequate.

20 So I think to really address your
21 question, we're too early right now to give you a good
22 response just because the numbers are so low.

23 DR. LEVENSON: Well, of the seven though,
24 what fraction required more information and what were
25 just okay?

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1 MR. ANDERSON: I couldn't give you the
2 numbers off the top of my head, but I'd say probably
3 50-50.

4 CHAIRMAN HORNBERGER: Yeah, but perhaps
5 more importantly, it might be a qualitative part of
6 the answer because it's fine if more information is
7 needed. It's quite another thing if DOE in your
8 estimation has been nonresponsive.

9 Can you give us -- I mean, if you return
10 and say, "Well, it's not quite right. It might need
11 another week or two," that's one thing. If you say,
12 "No, this is totally off the mark. Go back to square
13 one," that's different.

14 Can you give us some feel qualitatively?
15 Do you think DOE is being responsive?

16 MR. ANDERSON: Oh, I definitely believe
17 DOE is being responsive. I think I'm just trying to
18 think back in the documents and the letters we've sent
19 them.

20 I think in some cases the first agreement
21 was a little broader. They responded to that broad
22 concern and our response back to DOE is now a little
23 bit narrower, and I think that's going to happen quite
24 a bit because some of the agreements are a little bit
25 broad.

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1 I really believe it's too early to give
2 you a good sense though on what we're finding. I
3 think once we complete our review of these 70
4 documents coming in, we would have a pretty good view
5 if we're getting what we need and maybe make some
6 adjustments to the agreement saying maybe we need to
7 clarify these.

8 I think the long term or short term,
9 whatever you're looking at, we're hoping to get the
10 integrated issue resolution status report out at some
11 point, and that would also provide some technical
12 bases for the agreements, and I think that will help
13 DOE as well.

14 DR. GARRICK: One of the reasons of the
15 high interest in this, of course, is that we're
16 looking for some sort of a handle on how the rate of
17 convergence here is going to play out and any early
18 information that would indicate a basis for that
19 calculation would be most helpful.

20 Bill, you were trying to get a question
21 in.

22 DR. HINZE: Well, trying to follow up on
23 this discussion, one of the parts of the agreement
24 which I think is extremely important is the schedule,
25 and you haven't discussed that.

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1 We understand that DOE does have
2 limitations in terms of budget and personnel and so
3 forth, but have you had any problems with the schedule
4 that the DOE has come up with? Because certainly
5 there is an interdependence here of these agreements.

6 And so the timing is really quite
7 important. Could you discuss with us a bit your
8 problems with this and your take on how this is coming
9 along?

10 MR. FIRTH: I guess I'll start and then
11 I'm going to have Jim Anderson finish.

12 I mean, in terms of what the agreements
13 give us is it clearly documents the information that
14 we feel we need in order to conduct a review. So as
15 Jim Anderson had mentioned earlier, as DOE provides
16 information, things are going to narrow down.

17 We're no longer asking for new
18 information. In terms of the schedule, we're
19 interested primarily in terms of having the
20 information. The schedule that DOE eventually follows
21 and gets us that information is, I think, of lesser
22 importance from our perspective in terms of making
23 sure we have the information to review any potential
24 license application.

25 Jim.

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1 MR. ANDERSON: I guess I just wanted one
2 clarification. Are you asking for the agreements
3 like, say, that were scheduled in fiscal year '01,
4 what percentage did it miss the mark, or are you
5 looking at -- are you worried about the fiscal year
6 '03, you know, a lot of documents being provided in
7 fiscal year '03?

8 DR. HINZE: I'm worried about both of
9 those aspects. You know, how many are hitting the
10 mark, and also how many are being delayed to a point
11 where it holds up work in other areas where there's an
12 interdependence of the results that you're going to
13 receive from DOE?

14 MR. ANDERSON: I guess regarding the
15 fiscal year '01 documents, I think DOE has managed or
16 DOE has gotten the information to us pretty much on
17 schedule in the majority of the cases. The majority
18 I would guess -- this is off the top of my head -- but
19 at least in 75 percent of the agreements they've
20 responded to it's been on time.

21 Of those slippage ones, it might be only
22 a month or two. So nothing great there, although a
23 recent letter they submitted in July, probably delayed
24 about -- I'm guessing again -- maybe five to ten
25 agreements into fiscal year '02.

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1 So there is some slippage to fiscal year
2 '02. I'm not sure if that answers your question
3 pertaining to that.

4 DR. HINZE: That gives us an idea, right.

5 MR. ANDERSON: Regarding the overall,
6 there's quite a few agreements scheduled in fiscal
7 year '02, probably at least 75.

8 DR. HINZE: Well, let me ask it this way,
9 Jim. Has DOE come to you and said, you know, "We'll
10 have this in fiscal '02," and you say, "No, we need
11 that information now because it's also holding us up
12 on this and some other topics"?

13 MR. ANDERSON: Yeah, there's been a number
14 of discussions, you know, in some areas where the
15 original response back from DOE was, you know, fiscal
16 year '03, and we said, "Well, is there a way you can
17 get us, you know, some of the data in fiscal year
18 '01?"

19 I can remember one instance in the RDTME
20 area where we asked for some of the specific inputs in
21 the seismic area, if they could give it to us earlier,
22 and they have already provided that, and that might be
23 a subject of an Appendix 7 meeting we might have in
24 the future.

25 So I know of a couple of areas that that

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1 has happened.

2 DR. HINZE: Good thank you.

3 DR. GARRICK: Thank you.

4 MR. FIRTH: Okay, and Dave Esh is going to
5 go through those topics under model abstraction.

6 DR. GARRICK: How many more presenters do
7 we have?

8 MR. FIRTH: We have David Esh and Gordon
9 Wittmeyer and Sitakanta Mohanty have one each. So we
10 have three.

11 DR. GARRICK: Okay. We do want to try to
12 get it all in by 12:30 if there's a way we can do
13 that.

14 MR. FIRTH: Okay.

15 MR. ESH: I was going to say I thought we
16 were done.

17 DR. GARRICK: And I'm saying this like
18 it's your fault.

19 (Laughter.)

20 MR. ESH: I'm David Esh. I'm in the
21 Environmental and Performance Assessment Branch, and
22 I'm going to cover what we did in model abstraction
23 for issue resolution.

24 I want to acknowledge the effort by
25 everybody on this. It was an integrated effort. We

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1 had all of the ISIs. We had the TSPA staff, both here
2 and at the center, and especially Stefan Myer and
3 Roland Benke at the center. They helped with this PA
4 effort and model abstraction, and Osualdo Pensado and
5 Dick Codell on the corrosion issues.

6 And what you're going to get here is just
7 the tip of the iceberg. So if you want more than ice
8 cubes, you're going to have to look at the meeting
9 summary and talk to the PA staff.

10 So we can go. Let's -- can we go to that
11 slide 11?

12 I wanted to address a couple of things I
13 heard yesterday from this slide, and then we'll move
14 on. I think Dr. Wymer had during the sufficiency
15 session yesterday -- you had asked about forests and
16 trees and that whole idea, and I think you can look at
17 this slide and see within model abstraction the effort
18 that we did for performance assessment.

19 We went through and generated all of our
20 comments and looked for things that we had issues on,
21 and then we basically went back through and saw if
22 there were common themes. Was there some general type
23 problem or concern that we needed to address?

24 And I think that is reflected in our
25 meeting summary and in our effort. We had some

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1 general concerns that we addressed, and a couple of
2 them went to overall performance objective that you'll
3 hear about.

4 So at least here we tried to do that.
5 Whether that happened throughout, I can't really say.

6 And also, I heard a lot about risk
7 informing, and I would say within model abstraction
8 for performance assessment, we really tried to do
9 that. If you look at the specific comments, for
10 instance, we're heavily weighted in the engineering
11 ISIs. We do have an awful lot of dose, but that's
12 because dose wasn't covered anywhere else. So we had
13 to make sure we put all of our ducks in a row.

14 But we were heavily weighted on
15 engineering ISIs, in particular waste package , and
16 we'll go into a specific example there, and I'd like
17 to highlight it is on general corrosion and not on,
18 say, stress corrosion cracking because we did a lot of
19 our own analyses, and it's difficult to get a
20 significant risk problem just from cracking. There's
21 not enough failed surface area to mobilize the topic
22 you were talking about earlier this morning.

23 You need to be able to get the stuff out
24 before it can transport, and when you just have
25 cracks, it's difficult, really difficult to do that.

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1 So those are just a few points I wanted to cover.

2 The other thing is it's really difficult
3 to risk inform at this stage, and I think Dr. Garrick
4 mentioned that this morning. Maybe he didn't say
5 that, but I'll say that.

6 We have 37 KTI subissues of which 32 of
7 them are open or closed-pending, and I interpret that
8 as somewhat TBD. Maybe some of them are to be
9 determined to a greater extent, some of them to a
10 lesser extent, but there's a lot of information that's
11 going to be coming in that we have to evaluate.

12 And so just because of that you have to be
13 cautious when you're risk informed. I think last year
14 we presented some of the things we do with NPA to try
15 to risk inform. We do various types of analyses, and
16 we present those to our staff, but you can only take
17 that so far.

18 As your information gets better and you
19 get more confidence in it, then you can do a much
20 better job at risk informing I would say.

21 So let's go to that.

22 MR. FIRTH: Go ahead. I'm going to get
23 it.

24 MR. ESH: Okay. Our first concern that we
25 wanted to highlight or I should say probably the top

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1 concern that we would have highlighted was model
2 validation because it stretches across all the model
3 abstractions, but that's covered in overall
4 performance objectives.

5 So we have three here that we highlighted.
6 The first one is uncertainty in corrosion. Then we
7 have the quantity and chemistry of water, contacting
8 the drip shields and waste packages, and then some
9 kind of PA process type things to the model
10 abstraction.

11 Then within this uncertainty and
12 corrosion, what we've attempted to do is highlight the
13 DOE approach here, and basically they have used
14 empirical testing in four main environments to assess
15 the general corrosion patch failure, if you'll have
16 it, of the waste package and drip shield.

17 They use empirical tests in environments
18 that they assert are bounding to generate those
19 corrosion rates. And they stated that the use of the
20 two year data in the performance assessment is
21 conservative because the rates are decreasing with
22 time.

23 And they use an approach called Gaussian
24 variance partitioning to try to represent both
25 uncertainty and variability, with aleatoric

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1 uncertainty and epistemic uncertainty, and it's pretty
2 complicated.

3 There was a question I heard about how
4 many calculations do we duplicate. Well, this waste
5 package corrosion area is an example where myself, I
6 generated a GoldSim model to try to replicate the
7 results of the waste package failure. Dick Codell
8 wrote a Fortran program, and Osualdo Pensado did a
9 MatLab program. So we all used different approaches,
10 but we were all looking at the same problems, seeing
11 if we could get the same result.

12 And I think as Jim Firth mentioned, we had
13 to do a couple iterations with the DOE because from
14 the documentation we didn't get all of the information
15 right the first time. But we conventionally converged
16 that we thought that we were pretty close.

17 So that's an example where we did spend a
18 lot of effort because we thought it was important to
19 duplicate or replicate or at least test that part of
20 the problem.

21 So that's DOE's approach in a nutshell,
22 and our concerns were basically did they appropriately
23 represent the uncertainty in the general corrosion
24 testing into the performance assessment. And I think
25 the examples we have here are specific examples of

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1 where we felt the uncertainty didn't get carried
2 through into the performance assessment.

3 Now, this effort, say, with the
4 uncertainty and corrosion I'll highlight on the next
5 page or on, I guess, two pages from here. It's an
6 integrated effort. I mean, it covers process; it
7 covers uncertainty; it covers performance assessment;
8 it covers environments. So we have a whole group of
9 people who work on this together, and many meetings,
10 many discussions, and on the process, people have to
11 put up with our stupid questions, and that's the way
12 it works.

13 So our concerns were mainly about the
14 measurement techniques that really don't seem to have
15 enough resolution; the presence of silica that
16 confounds the results. To us it appeared that the
17 crevice samples, which are still a weight loss
18 technique; all it does is have a washer on it; appear
19 to have rates that are statistically higher than the
20 non-crevice samples.

21 So we thought, well, you know, how does
22 that represent a performance assessment or is there a
23 problem there. The question is how much higher. Is
24 it experimental bias, you know, the different
25 treatment of the samples that causes it? Is it a real

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1 physical process?

2 We don't really know at this point, and I
3 guess the last two, true variability is undefined when
4 you have these competing processes, and it's the
5 variability that we're interested in performance
6 assessment, in many cases the tail of the
7 distribution.

8 But you can have alternate explanations
9 for the temporal decrease in the rates. So to us
10 these were all uncertainties that we didn't feel were
11 captured in the performance assessment.

12 And I see there are a few more we had. As
13 you can see, we were very specific as to what our
14 concerns were, and hopefully by being specific, that
15 means we'll get them address in one shot and we won't
16 have multiple iterations for these things.

17 So within model abstraction, we tried as
18 much as we could without telling them how to do it; we
19 tried to say very clearly this is our problem and this
20 is what we would like to see you do.

21 DR. GARRICK: When you do this, do you do
22 any kind of aggregated analysis to try to get the
23 sense of what the impact of these things are?

24 MR. ESH: Yeah, I think within all of our
25 modeling results we'll try to build these things in

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1 and see how it changes the analysis. So like both
2 Osualdo and Dick's models that they used to look at
3 waste package failure, they were just the waste
4 package failure part of it.

5 But mine I built on transport, solubility
6 and eventually dose exposure so I could try to see how
7 it influences the dose exposure at the end. And at
8 this stage, these things, they can have a large
9 aggregate impact. So we try to look at the aggregate
10 impact.

11 I guess we have a transparency issue with
12 the Gaussian variance partitioning, but we're
13 converging. It's been a difficult effort, to say the
14 least.

15 So in our resolution path forth, I want to
16 highlight that CLST, container life and source term,
17 KTI, they covered a lot of the process things in their
18 technical exchange, but within all of those technical
19 exchanges, we typically had a performance assessment
20 person there.

21 I mean, I think I was at five of them
22 maybe, covering uncertainty integration type issues,
23 and then within our performance assessment technical
24 exchange, we had a lot of coverage by the process
25 people. So we integrate up and down between the

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1 process and the performance assessment.

2 And CLST covers the process agreements,
3 and then we basically look at implementation,
4 treatment of uncertainty, how you're representing it,
5 et cetera.

6 So we reached agreements, and I invite you
7 to look those over if you want to see more detail,
8 specifically what we were doing, and as I highlighted,
9 all of this we do in a pretty integrated fashion or we
10 attempt to.

11 Our next highlighted issue is in the
12 quantity and chemistry of the water contact and the
13 waste packages and drip shields, and the DOE approach
14 is they say they've used testing and bounded solutions
15 or conservative and bounding, and they evaluate or
16 define the environmental conditions based on a coupled
17 THC model for seepage, and then concentrate it due to
18 evaporation processes.

19 Well, the evaporative processes are both
20 modeled, and they're experiments to support that part
21 of the problem, and in the SR they say, "Well, we can
22 evolve a sodium bicarbonate type brine," I think it
23 is, that has a deliquescence of about 120 C., and
24 therefore that's the bounding solution.

25 Well, if you look at the SSPA, you'll see

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1 that, okay, there's a possibility that you can evolve
2 to a magnesium chloride type system which has a
3 deliquescence point that's about 160 C. instead.

4 And at least our localized corrosion model
5 in the TPA code, it's very sensitive to at what
6 temperature you start having liquid present and high
7 chloride concentrations.

8 And so some of our concerns were that,
9 okay, you're doing this analysis. You're trying to
10 make the assertion of bounding conservative, which we
11 don't like the use of conservatism. We like -- if you
12 had all the information in the world, fine, but
13 sometimes you have to use it, but you've just got to
14 be cautious when you use it, and I think that's when
15 in our final thing we want to highlight one of our
16 agreements was in the area of conservatism.

17 Okay. They didn't demonstrate that, okay,
18 this bicarbonate type brine is bounding. They didn't
19 complete an integrated analysis of uncertainty. We
20 covered that some in the near field technical
21 exchange, but it was mainly in -- we used the THC
22 seepage model to calculate the composition of fluids
23 that may evolve outside of the drift, and then those
24 fluids come into the drift and go through the
25 evaporative processes.

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1 Then the ENFE technical exchange covered
2 what was happening outside of the drift, and we needed
3 to not only address uncertainty there, but then those
4 uncertainties filtered down into the other models with
5 which it connected.

6 And so that's what we addressed. I have
7 a bullet here saying that model propagated very
8 limited uncertainty downstream. We had an issue in
9 this area also about geochemical uncertainty and the
10 fundamental information. We're worried that if you
11 have various groups using different versions as the
12 same thermodynamic database do you truly have
13 validated models or do you have a bunch of calibrated
14 models, and what's the implications for forecasting
15 using those various calibrated models?

16 So that's what we covered, and this is the
17 same as the CLST one. We have ENFE agreements that
18 cover process stuff. We have TSPA agreements that
19 covered more specific items, and we do an integrated
20 process to resolve these.

21 And the last one I'd like to tackle here,
22 the last example was the approach to developing
23 abstractions in parameter value distributions. I
24 guess our concern here was that it seemed like there
25 wasn't anything really systematic or rigorous to how

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1 somebody would create an abstraction, what they would
2 retain, what they wouldn't retain, or how they
3 represent data uncertainty.

4 And the arguments of conservatism were how
5 much simplification you use. Those were typically
6 done locally. So like a guy would say, "Well, I have
7 an uncertainty that I don't have some information
8 about, and I'm going to choose to do this because it's
9 going to make waste package temperatures higher.

10 Well, when you do that, you're not looking
11 at the other parts of the system that it's connected
12 to, water, ingress, all the other things that are
13 connected to the system. So is that conservative?

14 Yeah, it's conservative with respect to
15 temperature, but what does it mean in the system
16 model? Maybe you don't care about temperature.

17 And I think a good example of this local
18 argument problem would be if you were looking at
19 uncertainty and say invert thermal conductivity. The
20 invert thermal conductivity, if you said my metric was
21 drip shield temperature or, say, drift wall
22 temperature, then you looked at, well, okay, I look at
23 the uncertainty in the thermal conductivity invert,
24 and it has little effect on those temperatures. Maybe
25 they only change by two or three C. So I don't care

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1 about it.

2 But if you were doing a system analysis,
3 you would look at, well, what are all the things that
4 this affects, and one of those might be the delta
5 between the invert and the drip shield which would
6 determine the potential for condensate to form.

7 So I think that's what we were trying to
8 get at here. It's a little bit of a nebulous beast,
9 but I think we got our point across what we were
10 worried about, and we have an agreement that covers
11 it.

12 So I don't think I need to say anything
13 about the next slide. You can read it for yourself.

14 I think one of our main concerns also that
15 I want to highlight on the last slide, the last
16 bullet, we acknowledge you have to use abstractions in
17 some of these cases because you just can't feed all of
18 that detail through or make all of those connections.

19 But if you're going to simplify in some
20 way or you're going to use an abstraction, it will
21 show what it is you left out and why it's okay to
22 leave it out or at least talk to these are all the
23 other things in the system that it interacts with and
24 why it's all right to do it the way we did it. You
25 know, present that information and in the data area,

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1 if you're going to represent data uncertainty with the
2 stochastic distribution, maybe show the data on the
3 same thing as the distribution so that somebody, so a
4 PA analyst can look at it and say, "Yeah, you
5 represent data uncertainty appropriately."

6 So those were some of the main tendrils
7 that we captured.

8 That's it.

9 MR. FIRTH: Okay, and moving into -- if
10 there are questions for Dave, you can either ask them
11 now or at the end.

12 DR. GARRICK: Don't run out of gas on me
13 now.

14 DR. WYMER: Well, I can ask a question.

15 DR. GARRICK: No. If you have a question
16 yes, please ask it.

17 DR. WYMER: I'm a little surprised, Dave,
18 I didn't see anything about relative humidity. You
19 talked about deliquescence point, but there is, of
20 course, a water layer from condensation even at lower
21 temperatures.

22 MR. ESH: Sure.

23 DR. WYMER: That didn't show up. Was that
24 just not important relative to the --

25 MR. ESH: It's buried in that quantity and

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1 chemistry of water contact in the drip shields. I
2 mean, it's part of -- to have the deliquescence, it's
3 a function of both the temperature and the relative
4 humidity. So you need a threshold relative humidity.

5 DR. WYMER: Okay.

6 MR. ESH: And you need below a certain
7 temperature. And so it depends on the thermohydrology
8 response which thing would be limiting, but it's built
9 in there.

10 DR. WYMER: Now that you've sorted them
11 out, I just sort of wondered why you didn't.

12 MR. ESH: Yeah, it's built into there, and
13 like I said, there's a lot of detail. This is, you
14 know, the 15 minute show of all we can give you.

15 DR. WYMER: Sure.

16 MR. ESH: Look at all of the details, and
17 if you have any questions, you know, ask us to see
18 what we were doing because there's a lot of details
19 buried in there.

20 DR. WYMER: Thanks.

21 MR. FIRTH: Okay, and we have two more
22 topics that relate to overall performance objective.
23 The first one Gordon Wittmeyer is going to present.

24 MR. WITTMAYER: You've had the 15 minute
25 show, and now I'm going to give you the five minute

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1 show. I'm Gordon Wittmeyer from the center, and I
2 will be discussing one of the methodology issues
3 related to demonstrating the overall performance
4 objective, and that's looking at the stability of
5 results.

6 I want to clarify what we mean in this
7 case. We're really talking about ability to have
8 confidence that the results that are presented, not
9 whether they're right or not, but whether or not they
10 converge. If you made a slight change in the TPA code
11 or TSPA model, would it have a significant effect on
12 the mean dose versus time curve?

13 So we're concerned about convergence and
14 the mean, and two things we're looking at here from
15 DOE is looking at the statistical stability of the
16 plot of mean dose versus time. What we've seen so
17 far, they present a visual comparison, plots for
18 different numbers of realizations.

19 On a plot you might have one 100
20 realization plot between zero and 10,000 years. You
21 might have a 300 realization and a 500 year
22 realization plot, and if you don't see significant
23 differences between those, they would assert that
24 you're seeing convergence to one mean versus time
25 curve.

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