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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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127TH MEETING

ADVISORY COMMITTEE ON NUCLEAR WASTE  
(ACNW)

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WEDNESDAY,

JUNE 20, 2001

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ROCKVILLE, MARYLAND

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The Advisory Committee met in the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, Rockville, Maryland, at 8:30 a.m., Dr. B. John Garrick, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

- B. JOHN GARRICK Chairman
- GEORGE M. HORNBERGER Vice Chairman
- HILTON N. LEVENSON Member
- RAYMOND G. WYMER Member

ACNW STAFF PRESENT:

- JOHN T. LARKINS, Executive Director, ACRS-ACNW
- SHER BAHADUR

1 ACNW STAFF PRESENT (Continued):

2 ANDREW CAMPBELL

3 LYNN DEERING

4 RICHARD MATOR

5 RICHARD SAVIO

6 AMARJIT SINGH

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## P-R-O-C-E-E-D-I-N-G-S

(8:33 a.m.)

1  
2  
3 CHAIRMAN GARRICK: Good morning. Our  
4 meeting will come to order.

5 This is the second day of the 127th  
6 meeting of the Advisory Committee on Nuclear Waste.

7 My name is John Garrick, Chairman of the  
8 ACNW. Other members of the committee are George  
9 Hornberger, Milton Levenson, and Ray Wymer.

10 During today's meeting, the committee will  
11 discuss the following: key technical issues, and in  
12 particular our vertical slice reports; reports of  
13 meetings attended by members and staff; elections of  
14 officers; DOE science and engineering report; and  
15 preparation of reports.

16 Lynn Deering is the Designated Federal  
17 Official for today's initial session, and the meeting  
18 is being conducted in accordance with the provisions  
19 of the Federal Advisory Committee Act.

20 We have received no written comments or  
21 requests for time to make oral statements from members  
22 of the public regarding today's sessions, and should  
23 anyone wish to do so, please make your wishes known to  
24 one of the committee staff, and it is requested that  
25 you use one of the microphones, identify yourself, and

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1 speak clearly.

2 Okay. I think before move into the first  
3 agenda item, which is key technical issues and  
4 vertical slice reports, we need to finish up some of  
5 the planning business yesterday having to do with  
6 future meetings.

7 Lynn, do you want to help us pick up on  
8 that?

9 MS. DEERING: Sure, sure.

10 CHAIRMAN GARRICK: Where are we?

11 MS. DEERING: Tab 2.

12 CHAIRMAN GARRICK: Tab 2.

13 MS. DEERING: And it's listed as number  
14 six, EDO's list of future meeting topics, page 25  
15 through 31.

16 PARTICIPANT: Is that handwritten 25?

17 MS. DEERING: That would be handwritten --  
18 I'm on page 10. It looks like the right page --  
19 handwritten 10.

20 PARTICIPANT: Well, handwritten 10 is the  
21 table.

22 MS. DEERING: That's the table we want to  
23 look at, yeah. We're going to look at the July-August  
24 meetings.

25 CHAIRMAN GARRICK: Okay.

1 MS. DEERING: I guess we started to do  
2 this yesterday, and we had gotten to talking about the  
3 October meeting and came up with, I think, some pretty  
4 good ideas on maybe doing some vertical slice posters.

5 CHAIRMAN GARRICK: We have had some more  
6 thoughts on that.

7 MS. DEERING: Oh, good. Uh-oh.

8 CHAIRMAN GARRICK: You're talking about  
9 the Las Vegas meeting?

10 MS. DEERING: Right.

11 CHAIRMAN GARRICK: Yeah. I think that  
12 maybe what the committee is leaning towards, based on  
13 some of the discussions that took place yesterday is  
14 just as we said earlier, namely, we want to have a  
15 very lively agenda and allow the public to observe the  
16 committee in its natural mode of a regular meeting.

17 And in that regard, we may want to talk a  
18 little bit about the agenda itself some more.

19 And then in addition to that, we thought  
20 that rather than having a round table discussion  
21 format or a public forum meeting in the after hours,  
22 that based on what we heard yesterday and the success  
23 they've had with it, maybe what would be a more  
24 effective approach would be for a less formal  
25 activity, such as an open house, where the public

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1 could talk to the committee members at will and on a  
2 one-on-one basis or any manner they chose and not get  
3 into any kind of a formal setting.

4 So that was --

5 MS. DEERING: Or prepared material.

6 CHAIRMAN GARRICK: Or prepared  
7 presentations or what have you. There's always the  
8 thought that maybe some comment about what the ACNW  
9 is, but I think if they come pretty much directly out  
10 of our meeting, that's probably not going to be  
11 needed.

12 MS. DEERING: We can bring written  
13 material.

14 CHAIRMAN GARRICK: Right, and we can bring  
15 something that documents that.

16 So anyway, why don't the members back me  
17 up here as to whether or not this is kind of what we  
18 agreed to.

19 DR. WYMER: And the most important thing  
20 is the staff --

21 CHAIRMAN GARRICK: Microphone.

22 DR. WYMER: -- each add in for hors  
23 d'oeuvres.

24 MS. DEERING: The staff needs to ante up  
25 for that, huh? Okay. The management. Sounds good.

1 MR. LARKINS: Do you want to have this one  
2 as just a follow-on to the regular meeting?

3 CHAIRMAN GARRICK: I think so.

4 MR. LARKINS: Rather than shifting  
5 locations?

6 MS. DEERING: Oh.

7 CHAIRMAN GARRICK: Well, let's talk about  
8 that. What would be the most appealing?

9 But the idea of a very casual, informal  
10 interaction strikes me, especially given that there's  
11 some evidence that it works very well --

12 DR. WYMER: And invite some of these  
13 people who were on Jit's list.

14 MR. SINGH: They being what?

15 DR. WYMER: But you know --

16 MR. LEVENSON: But specifically the  
17 representatives from the affected units of local  
18 government seems to be a group that --

19 DR. WYMER: To the reception.

20 MR. SINGH: Yeah, they will be the one.  
21 Plus -- I'm sorry.

22 MS. DEERING: We usually coordinate with  
23 them one on one about talking at the regular meeting,  
24 and also if there's some subject matter that they'd  
25 like us to cover. We usually try to in advance

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1 coordinate with those affected units of local  
2 government, the contact people.

3 MR. LEVENSON: We're thinking of something  
4 slightly different, and that is at a very specific  
5 invitation --

6 MR. LARKINS: Microphone.

7 MR. LEVENSON: -- a very specific  
8 invitation. There's going to be a lot of  
9 coordination, a lot of public meetings, but we think  
10 that the affected units of local government are really  
11 probably broadly representative of the public and  
12 maybe get a little different treatment.

13 We specifically contact them and explain  
14 to them what we're doing and ask if they could have a  
15 representative at the meeting to observe how the  
16 committee functions, and then in the open house, we'd  
17 be glad to discuss any comments or views they have on  
18 how we function. So that they're kind of alerted that  
19 this is -- you know, that's not necessarily for the  
20 general public. For the associated units of local  
21 government.

22 MR. LARKINS: If you're talking about like  
23 the county representatives from the different  
24 surrounding counties --

25 MR. LEVENSON: No, no, we're not picking

1 the people. There is an organization legally defined  
2 as affected units of local government.

3 MS. DEERING: That's right.

4 MR. LEVENSON: And we want to use that  
5 list, not go out --

6 MR. LARKINS: I don't know who's on that  
7 list.

8 MS. DEERING: There's ten counties.  
9 There's ten officially affected counties, and there  
10 are --

11 MR. LARKINS: Right, and those are the  
12 people that we usually invite.

13 MS. DEERING: Yes.

14 MR. LARKINS: You're talking about like  
15 from Eureka, Nye and other surrounding counties.

16 MS. DEERING: But only the one year when  
17 we made a very special effort did we actually talk to  
18 them personally and ask them would they want to  
19 participate on a round table and that sort of thing.  
20 Normally we send them a letter.

21 MR. SINGH: No, last year I specifically  
22 from the year before, and I --

23 MS. DEERING: Called them?

24 MR. SINGH: -- called the guys personally  
25 and sent an E-mail, and I also sent them an

1 invitation letter --

2 MS. DEERING: Okay.

3 MR. SINGH: -- that if they'd like to do  
4 that

5 MS. DEERING: And this year we could do  
6 the same, except ask them would they come observe and  
7 then participate in our round house and give us some  
8 feedback.

9 MR. LEVENSON: Yes, and we'd not  
10 necessarily contact the people that we've dealt  
11 with --

12 MS. DEERING: I mean our open house.

13 MR. LEVENSON: -- in the past. There is  
14 an official representative of AUG from each of these  
15 counties, and that's the list we should use.

16 MS. DEERING: Can you give me the name of  
17 those people?

18 MR. SINGH: I mean, I have it.

19 MS. DEERING: I have it. I know. I  
20 understand.

21 DR. WYMER: I think it's important that  
22 they be told that part of this is a very informal  
23 opportunity for one-on-one discussions that they don't  
24 normally have with us, and I think that will make a  
25 difference to their reaction.

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1 MS. DEERING: Okay. We can advertise in  
2 that way, too

3 MR. LEVENSON: But I think the letter to  
4 the UG people needs to be -- put the whole thing in  
5 context that the informal sessions are not to discuss  
6 particular technical issues which are really the staff  
7 responsibilities. It's to discuss the functions and  
8 how the ACNW works, as well.

9 MS. DEERING: Right. It's a good idea.  
10 I think it's a great idea.

11 MR. LARKINS: I'll just give you a quick  
12 reaction.

13 CHAIRMAN GARRICK: I can see what that  
14 reaction is by the body language.

15 (Laughter.)

16 DR. HORNBERGER: He's trying to figure out  
17 how to couch this so it won't be --

18 CHAIRMAN GARRICK: We've got you figured.

19 MR. LARKINS: I feel as though it will  
20 probably be some of the same individuals who have  
21 attended these meetings over a couple of years, and  
22 the affected units of government, the local and county  
23 representatives and the affected state and Indian  
24 tribe representatives will most likely have the same  
25 type of representation that they've had in the past.

1                   And with that, I think most of these  
2 individuals have a fairly good working understanding  
3 of what the NRC's role and responsibility is as they  
4 do with the ACNW's role and responsibility is.

5                   And it's unclear to me what we expect to  
6 accomplish in these informal discussions. It sounds  
7 more like chit-chat as opposed to anything specific,  
8 and I guess I think in effective community or when I  
9 think about the strategic goal of enhancing public  
10 confidence, the objective is to provide some  
11 information as to what it is you're doing and what it  
12 is you hope to accomplish.

13                   I see you could do something like this.  
14 I'm not sure of the value, but it seems to me like  
15 what you might want to consider doing is provide some  
16 overview of what your activities are and why you're  
17 doing those things, in addition to the social  
18 exchange.

19                   CHAIRMAN GARRICK: Well, I think you're  
20 probably right if it weren't for the fact that we're  
21 sort of considering the working sessions as the  
22 preamble to the open house. That is to say during the  
23 working session we would think that the question would  
24 be answered as to what we're all about and what we do.

25                   And in order to enhance that, maybe we

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1 expand the opening remarks a bit to acknowledge that  
2 the meeting is taking place at that particular  
3 location, and part of the reason for doing that is  
4 thus and thus, and lead into a discussion, a short  
5 discussion of what ACNW is all about.

6 But I still think that the concept of  
7 letting them observe us, asking questions and  
8 following up issues and getting into technical  
9 discussions would serve more to indicate to the  
10 observer and the layman what we're all about than  
11 maybe us up there making briefings and presentations  
12 on what we're all about.

13 MR. LARKINS: Except -- and I agree with  
14 what you said. I think that's reasonable. I think  
15 the technical exchange that you have during the normal  
16 meetings with the staff, the department and others is  
17 good, and it shows it's an example of the role of the  
18 committee, but it's just a fraction of what you do.

19 And usually at those meetings in Nevada,  
20 we haven't gotten into the types of issues that we  
21 have here. So in order to orchestrate this the way  
22 you're proposing, I think you would have to have a  
23 good agenda.

24 CHAIRMAN GARRICK: That's exactly correct.

25 MR. LARKINS: You'd have to have an agenda

1       which --

2                   DR. WYMER:  Yeah, we talked about it.

3                   MR. LARKINS:  And we talked about those.

4                   CHAIRMAN GARRICK:  We talked about that,  
5       and we've got some live button topics.

6                   MR. LARKINS:  Okay, but I also think that  
7       you should give the broad overview of what your plans  
8       are, where you're going and why.

9                   CHAIRMAN GARRICK:  and I think that that's  
10       a good idea, and I think that ought to be done by the  
11       Chairman in the opening remarks and have some extended  
12       opening remarks.  I think it will be an effective way  
13       to do it.

14                   MR. LEVENSON:  John, we could also make  
15       available a good way, a little more extensive overview  
16       than what you might want to do in the opening remarks,  
17       is provide a handout -- as a handout a set of the  
18       letters we've written to the Commission sine we last  
19       met in Nevada.  This is what we've done since we last  
20       talked to you.

21                   CHAIRMAN GARRICK:  Including the letter  
22       about our trip to Nevada.

23                   MR. LEVENSON:  Yeah, right.

24                   MR. LARKINS:  And maybe our action plan.

25                   CHAIRMAN GARRICK:  And maybe our action

1 plan.

2 DR. HORNBERGER: Jit already has some  
3 ideas.

4 MR. SINGH: George and I talked about it  
5 yesterday after our discussions. What we have planned  
6 to do is, you know, the NUREG 1472, which we publish  
7 all of the letters for one year, go back and have  
8 those publications available for the last 12 months,  
9 how many letters we have written, and maybe we'll take  
10 some important issues which we have discussed, DEIS  
11 and these letters we have written on the public  
12 outreach. So make them available. Also the 2001 task  
13 action plan.

14 CHAIRMAN GARRICK: I don't know whether  
15 it's appropriate, but a good assignment to the staff,  
16 it seems to me would be a summary of the issues that  
17 have been addressed in the intervening period that are  
18 specific to the nature of the discussions we had out  
19 there, you know, because we did follow up some  
20 specifics.

21 We followed up in our meeting with the  
22 Commission in recommending that they consider even  
23 having a meeting out there, and we followed up with  
24 issues of talking about transportation and considering  
25 whether we ought to give greater emphasis to

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1 transportation in the form of a working group session.

2 The fact that some of these things haven't  
3 come to fruition yet is not so much important as the  
4 fact that we recognize and acknowledge their input.  
5 So that could even provide a greater focus if we had  
6 a highlight of the issues that we know are of great  
7 interest to the Nevadans and can point to them in the  
8 letters or whatever or summarize them.

9 DR. WYMER: Well, Lynn prepares that table  
10 annually that points out what we're written and then  
11 what the reaction was and whether or not it made any  
12 difference to anybody.

13 MR. LARKINS: Yeah, that's part of our  
14 assessment of the activity.

15 CHAIRMAN GARRICK: Yeah, but I think  
16 something that says as a headline Nevada --

17 MR. LARKINS: You want it a little  
18 different.

19 CHAIRMAN GARRICK: Right. Issues raised  
20 at our last Nevada meeting or something such as that.

21 DR. WYMER: I think it's important to tell  
22 them that we do have an impact so that they're not  
23 wasting their time talking to us.

24 MS. DEERING: I agree with Ray because  
25 that's one of the things that seems invisible was we

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1 may have said it, but did anybody care or listen or  
2 pick up on our ideas? And --

3 MR. LARKINS: By the way, there is a thing  
4 in Inside NRC. I think it's Inside NRC or one of the  
5 McGraw-Hill publications this past week which talks  
6 about the self-assessment and the ACNW's role and how  
7 they're perceived in the agency and by stakeholders.  
8 If you haven't seen it, I'll get you a copy.

9 CHAIRMAN GARRICK: No, I haven't seen it.

10 MS. DEERING: I still think we should  
11 publish the EDO response with our letters in those  
12 blue NUREGS.

13 CHAIRMAN GARRICK: Yeah, I agree, but I  
14 think that we need a summary.

15 MS. DEERING: Yeah, that's no problem.  
16 We'll do that.

17 CHAIRMAN GARRICK: That's Nevada specific.

18 MS. DEERING: Absolutely. We can handle  
19 that.

20 MR. LARKINS: Can I ask what are the hot  
21 button issues here you're thinking about?

22 DR. HORNBERGER: A West Valley follow-up.

23 (Laughter.)

24 MR. LARKINS: Entombment?

25 CHAIRMAN GARRICK: Transportation, and we

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1 should, while we're on this subject, and we're taking  
2 more time than we have, but let's do it and get it  
3 resolved. Let's summarize what we think ought to be  
4 on that agenda again.

5 DR. HORNBERGER: I think one of the things  
6 that I had seen that Lynn had on the agenda would be  
7 good and that's all the work on fluid inclusions.

8 CHAIRMAN GARRICK: Yes.

9 DR. HORNBERGER: Because we have people  
10 from the University of Nevada who contribute to that.

11 DR. WYMER: Corrosion. We think corrosion  
12 is a good issue.

13 CHAIRMAN GARRICK: Fluid inclusions,  
14 corrosion, transportation.

15 MS. DEERING: YMRP.

16 CHAIRMAN GARRICK: YMRP.

17 MS. DEERING: They're offering that for  
18 October.

19 CHAIRMAN GARRICK: Yeah, yeah.

20 MR. LARKINS: That would be good. So  
21 we'll have to have the staff come in for that.

22 CHAIRMAN GARRICK: Yeah. You know, I  
23 don't know. It might even be -- and I just throw this  
24 out for discussion -- appropriate to have people like  
25 Bret Janet participate in our open house, given their

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1 experience and their interest and their initiative in  
2 this whole area as NRC staff people.

3 MS. DEERING: I mean, it's worth asking.  
4 They could probably get credit for it because they  
5 have a certain number of items they want to meet with  
6 the ACNW on every year for their own management  
7 operations plan. They could count it as an ACNW  
8 interaction.

9 MR. LARKINS: They probably can get double  
10 credit.

11 MS. DEERING: Right. That's what I mean.

12 CHAIRMAN GARRICK: Okay.

13 MS. DEERING: Some good ideas. I'm glad  
14 you've been thinking.

15 CHAIRMAN GARRICK: Yeah, yeah.

16 MR. LARKINS: Well, it's good because now  
17 we can start planning ahead. If you want the staff to  
18 be there, we have to give them some lead time also and  
19 others.

20 DR. HORNBERGER: Well, let's see. Are  
21 there any other things we could talk about?

22 MS. DEERING: Don't we have a list  
23 somewhere?

24 DR. HORNBERGER: Yeah, I thought we did.

25 MS. DEERING: Where is the list of meeting

1 topics, potential meeting topics? Is it in the  
2 notebook?

3 MR. SINGH: Yes, in the notebook.

4 DR. HORNBERGER: Oh, I know where you're  
5 thinking of. You're thinking of igneous activity.

6 CHAIRMAN GARRICK: Oh, yes, igneous  
7 activity would be.

8 MS. DEERING: Oh, you know, Bill Hinze is  
9 there now, and he called in in distress.

10 CHAIRMAN GARRICK: Oh, really?

11 MS. DEERING: It seems that they postponed  
12 it by a day, and we knew nothing of it. So Bill is  
13 going to go to the NWTRB meeting for us today.

14 MR. SINGH: Lynn, it's page 2 of the  
15 follow-up items.

16 MS. DEERING: Okay. Thanks, Jit.

17 MR. SINGH: For future activities, that's  
18 what we have. Agenda items.

19 MS. DEERING: Good.

20 DR. HORNBERGER: You want to add igneous  
21 activity onto that.

22 CHAIRMAN GARRICK: Well, I mean, it's a  
23 thought. It depends upon how this plays out, right?

24 MS. DEERING: It depends, yeah.

25 DR. HORNBERGER: But it would be -- I

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1 think it would be really good to have something in  
2 Nevada because it is -- now, Lynn, I don't know if you  
3 checked your E-mail, but Charles sent us another E-  
4 mail yesterday, again, suggesting that he would -- he  
5 said if we have any discussion in January, he'd like  
6 to just attend.

7 MS. DEERING: January?

8 DR. HORNBERGER: Or in July. Sorry. But  
9 he also suggests that at some point that we think  
10 about engaging Emanuel De Tourney (phonetic) as a  
11 consultant because I guess they've had some  
12 discussions, and I take it De Tourney has gotten  
13 really intrigued with the whole problem.

14 MS. DEERING: Maybe for October then?

15 DR. HORNBERGER: That's what I was  
16 wondering.

17 MS. DEERING: That would be very  
18 interesting, i think.

19 MR. LARKINS: Is Charles still consulting  
20 for M&O?

21 MS. DEERING: Yes.

22 DR. HORNBERGER: Yeah, but he could still  
23 attend, right?

24 MR. LARKINS: Yeah.

25 MS. DEERING: Could he attend like in the

1 sen of an invited expert where we'd pay his travel?  
2 Is that what you -- I don't know what he's thinking,  
3 but I'll check it out.

4 CHAIRMAN GARRICK: If he's working for the  
5 department or M&O, they can pay it. They have plenty  
6 of money.

7 MS. DEERING: And bill Hinze cannot attend  
8 in July, George.

9 DR. HORNBERGER: Who was it yesterday that  
10 said, "Oh, money is no problem"?

11 (Laughter.)

12 MR. LARKINS: Plus, it will be the  
13 beginning of the fiscal year. So they will just have  
14 gotten their budget, hopefully.

15 MS. DEERING: George, Bill can't come in  
16 July.

17 DR. WYMER: Congress won't have passed it  
18 by then.

19 MR. CAMPBELL: But in terms of a conflict  
20 of interest issue, maybe a way to resolve that is to  
21 bring somebody in as an invited expert.

22 CHAIRMAN GARRICK: I think that's  
23 outrageous. I really think this agency is in bad  
24 shape.

25 MR. LARKINS: It's not the agency. It's

1 federal law.

2 CHAIRMAN GARRICK: Well, it's nonsense  
3 that we can't respectfully and professionally hire  
4 people in short notice to do jobs that are important  
5 and in the interest of the public, and that we go  
6 through this and through this, and we never get -- you  
7 know, we're only successful in one out of many, and I  
8 think it is something that we need to keep pounding on  
9 to do something about.

10 Other agencies don't have this problem.  
11 The DOE does not have this problem, and I don't --

12 MR. LARKINS: But the DOE is higher than  
13 everybody. DOE has a different role.

14 CHAIRMAN GARRICK: Well, it's all in --

15 MR. LARKINS: We can always have -- I go  
16 through this with General Counsel all the day every  
17 day just about over conflict issues for members and  
18 the things that they can talk about and they can't.  
19 I mean it's a very tight box that they have us in in  
20 terms of the conflict of interest rules and  
21 regulations.

22 CHAIRMAN GARRICK: It's too bad.

23 MR. LARKINS: It is.

24 CHAIRMAN GARRICK: It's too bad because it  
25 really does handicap our --

1 MR. LARKINS: I mean, because you hire  
2 people as experts and you want them to be able to talk  
3 about their expertise.

4 CHAIRMAN GARRICK: Right.

5 MR. LARKINS: But because of conflict of  
6 interest concerns, they can't talk about the work that  
7 they've done.

8 MS. DEERING: Can we move on? There's  
9 also the site visit in October.

10 CHAIRMAN GARRICK: Yeah.

11 MS. DEERING: We have on a piece of paper  
12 a collection of ideas from last month, and we can  
13 review it quickly. He just went to make copies of it.  
14 We forgot about it, because I know Carol is interested  
15 in helping us.

16 MS. HANLON: Also I've taken the topics --

17 MS. DEERING: You'd better come up to a  
18 mic.

19 CHAIRMAN GARRICK: Here's a microphone.

20 MS. HANLON: Can I sit right here?

21 CHAIRMAN GARRICK: Sure.

22 MS. HANLON: I won't drop my papers and  
23 they'll think I'm a klutz.

24 MS. DEERING: Carol, mic.

25 CHAIRMAN GARRICK: Announce who you are.

1 MS. HANLON: Carol Hanlon, DOE.

2 I didn't know we were on the record.

3 Sorry.

4 I have taken the items that you have  
5 mentioned for inclusion on the agenda. In October I  
6 have fluid inclusion, corrosion. I was going to  
7 include in that microbially induced corrosion --

8 CHAIRMAN GARRICK: Great.

9 MS. HANLON: -- and have Martha Kohler come  
10 from Lawrence Livermore or her person to talk about  
11 that.

12 You had also discussed the staffing Yucca  
13 Mountain; review plan and igneous activity in  
14 volcanism.

15 I was wondering since you would be out  
16 there and as a timely opportunity if you would also  
17 like something on TSPA or maybe you'd like to cover  
18 that during the summer. You know, Dr. Garrick and  
19 you, George, you all had mentioned the flow and the  
20 evenness and transparency of the process, and then  
21 we'll have the supplementary science and performance  
22 analyses also.

23 So I don't know if that's something you  
24 might think about. We have all of those people out  
25 there. So I'm just throwing it out.

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1 DR. HORNBERGER: Yeah, right. No, that's  
2 a --

3 CHAIRMAN GARRICK: No, that's a good idea.

4 DR. HORNBERGER: I think it's a good idea  
5 if we can get it on the schedule.

6 CHAIRMAN GARRICK: But you haven't  
7 mentioned transportation.

8 MS. HERON: I have not actually because  
9 basically until I think the site has been recommended,  
10 we would believe that it is not opportune to go  
11 forward with it. We really don't have a site, and  
12 that makes it difficult for us to talk in detail about  
13 the transportation.

14 There may be something we can say, and I  
15 can certainly look into that, but until the site is  
16 recommended, there's a limit in how far we can go into  
17 looking at the transportation.

18 DR. HORNBERGER: Is their Chlorine 36  
19 anything new?

20 MS. HERON: I think not, but I can look  
21 into that. Did you want a status of the SR  
22 components, what's going forward for the end of the  
23 fiscal year or the beginning of the next fiscal year?

24 CHAIRMAN GARRICK: Yeah. Yeah, that's a  
25 good idea.

1                   MR. LEVENSON: I guess I'm a little  
2 confused by your comment on transportation. We're  
3 spending all of this money on the geology of the  
4 transport, the incredible details. We don't know  
5 whether it's an approved site or not. Why can't the  
6 same preliminary studies -- in fact, they should have  
7 been done in transportation.

8                   MS. HERON: Well, I think they were done,  
9 and some information was included in DEIS, but some  
10 information, I think, will be carried forward into the  
11 FEIS, and I know Wendy spoke to you to the extent that  
12 she could, and it remains that until we've selected a  
13 site, recommended a site not as big.

14                  DR. HORNBERGER: How about doing this  
15 obliquely and saying, all right, the WIPP site has had  
16 to face these issues. Let's have a little  
17 presentation on issues faced by WIPP and how they have  
18 approached them and what some of the problems were.  
19 In other words, do it as a potential lessons learned  
20 for Yucca Mountain.

21                  MS. DEERING: Interesting.

22                  CHAIRMAN GARRICK: And invite Inez Triaz  
23 to do it.

24                  DR. HORNBERGER: Yeah. Well, I mean, we'd  
25 have to get somebody who --

1 MR. LEVENSON: Or Bob Neill in from the  
2 NEED.

3 DR. HORNBERGER: Or both.

4 MS. DEERING: EEG.

5 CHAIRMAN GARRICK: Yeah, except he's not  
6 there anymore.

7 DR. HORNBERGER: I know, but he's the  
8 author of their report on transportation.

9 CHAIRMAN GARRICK: Right, right.

10 DR. HORNBERGER: We could do both maybe,  
11 get both of them.

12 CHAIRMAN GARRICK: Yeah.

13 MS. HERON: And I can also inquire on the  
14 people that are handling the preliminary things that  
15 we've done to see what we can say.

16 CHAIRMAN GARRICK: Yeah. Let me push the  
17 transportation issue just a little further. Suppose  
18 we focused on a specific issue associated with it, and  
19 that is the issue of transportation accidents. Surely  
20 there's a tremendous amount of information on  
21 transportation accidents.

22 I think one of the things that the public  
23 would really benefit from is realizing how much this  
24 particular area has been studied in the past and the  
25 kinds of accidents that have occurred, the kinds of

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1 success that they've had, et cetera.

2 So rather than talking about routs and  
3 things that require the making of decisions, talk  
4 about transportation in the context of safety and by  
5 which the complement being in the context of  
6 accidents.

7 Is that a possible --

8 DR. WYMER: There's another side to that  
9 coin. It's also true that by far the greatest number  
10 of accidents, potential for accidents is in  
11 transportation, and that's --

12 CHAIRMAN GARRICK: Yeah, but the thing  
13 that's not understood is what that means in terms of  
14 the radiation consequences.

15 DR. WYMER: Yeah, the consequences.

16 CHAIRMAN GARRICK: And there's a  
17 tremendous gap of understanding between the statistics  
18 that indicate the frequency with which accidents occur  
19 on the highways and, given an accident, the frequency  
20 with which a radiation problem has resulted.

21 You know, if there could be some education  
22 benefit from sort of a summary on that point, it could  
23 perhaps be very useful in better informing the public.

24 DR. WYMER: Well, that's true. The deaths  
25 from trauma far exceed the deaths from radiation.

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1                   CHAIRMAN GARRICK: I think all of the  
2 agencies involved have done a terrible job of the  
3 whole issue of transportation safety as it relates to  
4 radiation. We know there's accidents and there's a  
5 lot of them, but what the public doesn't have a very  
6 good information base on is so what. What do those  
7 accidents mean in terms of a radiation threat?

8                   And I think anything we could do to begin  
9 to illuminate that issue, and I don't know why there  
10 is an apprehension to do that, especially given that  
11 the Nevada people any time we've been there, that's  
12 the one thing they want to talk about as much, if not  
13 more, than any other single thing.

14                  DR. WYMER: Of course, one of the things  
15 they hit on, they're one level more sophisticated than  
16 that. They're saying we're not so much worried about  
17 the accidents as we are about the economic impact from  
18 one way or another.

19                  MR. LEVENSON: There's another aspect to  
20 transportation, and that is that using the industry-  
21 wide statistics doesn't really make a lot of sense for  
22 a completely controlled and revised system. WIPP has  
23 explored that in great detail and set up their  
24 transportation system to avoid most of the things  
25 which are causes of accidents by studying the

1 statistics on changing the working rules for drivers,  
2 changing where they can even pull off the road and  
3 stop. So that the public I don't think understands  
4 that they have not even -- the trucks hauling these  
5 kinds of things aren't even subject to the same  
6 statistics as normal trucking industry is.

7 The accident rate is very substantially  
8 less, and I think, you know, we've done our own  
9 program a disservice by not informing people of these  
10 things.

11 That, again, could be something we could  
12 get presented by the WIPP people because they've done  
13 that in great detail.

14 DR. HORNBERGER: Is anyone following up on  
15 John's? It would strike me that somebody must have  
16 done a review paper of some kind on accidents,  
17 transportation accidents involving radioactive waste  
18 because you know, worldwide there's a fair amount of  
19 experience, and somebody must have put this all  
20 together and not just the statistics, but the  
21 statistics sort of on a cold statistics basis probably  
22 wouldn't be tremendously interesting, but it would be  
23 interesting if it were used to put the effects of  
24 accidents that have occurred into context.

25 CHAIRMAN GARRICK: Yeah, well, that's

1 right. Just don't sell anything. Just present what  
2 is known.

3 There used to be a very aggressive and  
4 active program of transportation at Sandia, for  
5 example. Now, I don't know what is going on now.  
6 When they were doing the cask tests, the tests on the  
7 fuel cask and what have you many years ago, and they  
8 were very impressive, very impressive, and I observed  
9 some of those.

10 And it's impressive to watch an 18-wheel  
11 rig with a cask on it be hit by a train going 70 miles  
12 an hour, and everything is destroyed, except there's  
13 no radiation leakage. Now, that's an impressive event  
14 that somehow we have not communicated well.

15 And they had a lot of other tests, too,  
16 and I suspect maybe some of them didn't go as well as  
17 the three or four that I observed, but these were very  
18 expensive and very elaborate tests and done many years  
19 ago. So I don't understand why there isn't, as George  
20 says, some sort of compendium or assimilation of this  
21 information in a compact form.

22 MS. HERON: Well, let me look into it and  
23 see.

24 MR. BAHADUR: If I may be allowed to add  
25 a few things here.

1 CHAIRMAN GARRICK: Yeah.

2 MR. BAHADUR: In my previous life, which  
3 is where I am right now --

4 DR. WYMER: You're in your previous life  
5 now?

6 (Laughter.)

7 MR. BAHADUR: As the Chief of the  
8 Engineering Research Applications Branch, there is a  
9 program on the dry cask storage. I t has a number of  
10 elements in it, and one of the elements is the package  
11 performance study, and that's a dry cask with the  
12 scenario that they would be taken from various nuclear  
13 plants onto either Yucca Mountain or decentralized  
14 storage.

15 The work that you are mentioning at Sandia  
16 is the work that they're doing right now as a  
17 continuation that we call Phase 2, and in the Phase 2,  
18 the idea is to get a cask from the industry. If the  
19 industry volunteers, if a particular vendor volunteers  
20 their cash, we'll take that or else we'll ask DOE to  
21 facilitate getting us a cask.

22 And then break (phonetic) that cask under  
23 various situations. Of course, the cask would not  
24 break hopefully, but test the cask in the similar  
25 accident conditions.

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1           The test are the fire angle thing  
2 (phonetic) test, the impact either on the truck rig or  
3 the railroad or whatever, and the object of this  
4 particular study is to collect information and then  
5 see whether the cask would perform the way the models  
6 have estimated their performance.

7           It's a three-year problem. It's, I think,  
8 \$2.5 million right now, and we're seeking more funding  
9 from EPRI, DOE, and other countries.

10           I don't know whether that would suffice  
11 the concern that the committee is raising right now,  
12 but that's a step in that direction. Maybe in the  
13 future we can ask visitor staff to come and give us a  
14 briefing.

15           CHAIRMAN GARRICK: Well, it could almost  
16 be done generically. It could almost be done here's  
17 a kind of status report on what is known about  
18 transportation accidents involving radioactive waste,  
19 including spent fuel, and something like that, I  
20 think, by an authoritative, impressive speaker would  
21 be very, very useful.

22           If it were presented by somebody who was  
23 not an authority and not an impressive speaker, it  
24 wouldn't be impressive. And I think that's the other  
25 thing we have to worry about in dealing with the

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1 public.

2 MR. LARKINS: Yeah, I'm not sure if we  
3 have any of those.

4 CHAIRMAN GARRICK: I'm more interested in  
5 them being an authority than an impressive speaker.

6 Yeah, go ahead.

7 MR. SINGH: Last year the Spent Fuel  
8 Project Office had this meeting last year in Nevada,  
9 and I attended that. They had a gentleman from  
10 Lawrence Livermore who did the basic what they planned  
11 to do, what Sher just said, Phase 2 part of it and the  
12 reexamination of the cask, and that's what the spent  
13 fuel project is doing.

14 I think they were supposed to have another  
15 meeting on the same issue on the transportation, and  
16 there was a gentleman from the -- I think it was from  
17 the Navy. He also came. He gave all the statistics,  
18 how much fuel they have moved and what's the -- you  
19 know, all of the -- well, everything.

20 And then thirdly, there was a lady named  
21 Janice, I think, if I remember her first name, and her  
22 company handles all of the casks in terms of shipment  
23 from overseas and here, and I think she came here and  
24 briefed the committee last year.

25 CHAIRMAN GARRICK: Yeah, she did.

1 MR. SINGH: And she has a lot of  
2 statistics on this issue also, transportation. We can  
3 invite her.

4 CHAIRMAN GARRICK: Well, I think that if  
5 there is an opportunity for the committee to hear from  
6 somebody to give a kind of a white paper on this  
7 subject, it would be great.

8 MS. DEERING: And, John, one other thing.  
9 Tammy Bloomer, who's on the NMSS Outreach Program,  
10 just told me that they finished up one of their --  
11 what was it, a workshop?

12 MS. BLOOMER: It was a public meeting.

13 MS. DEERING: A public meeting on this  
14 very subject of the status of transportation, casks,  
15 accidents, consequences, and all of that. So let me  
16 get some more information from them to follow up to  
17 see how that could feed into what we put together.

18 CHAIRMAN GARRICK: All right, all right.

19 MR. LARKINS: Well, it sounds like you can  
20 put together a pretty full agenda.

21 CHAIRMAN GARRICK: Well, I'll stop being  
22 an annoyance on this issue if --

23 DR. HORNBERGER: No, I doubt it.

24 (Laughter.)

25 CHAIRMAN GARRICK: But it is one of the

1 frustrations I've had in this committee, is the fact  
2 that I have a feeling we're holding back for some  
3 reason in telling the story about transportation  
4 safety, and I don't understand that when people are  
5 asking for it.

6 MS. DEERING: I'm afraid one of the  
7 reasons is because, as I understand it, NRC --  
8 transportation has absolutely nothing to do with NRC's  
9 licensing decision about Yucca Mountain, zero.

10 CHAIRMAN GARRICK: Well, except from the  
11 standpoint of the shipping containers.

12 MS. DEERING: Yeah, but that's kind of  
13 done through a different avenue.

14 CHAIRMAN GARRICK: Well, from a risk  
15 informed perspective, it shouldn't be.

16 MS. DEERING: I know, I know.

17 CHAIRMAN GARRICK: You know? That's  
18 another thing. This is a systems problem and a very  
19 important component of the system is the shipping  
20 container.

21 MS. DEERING: And if it's true, I don't  
22 know that the NRC staff has made that perfectly clear  
23 because we still are sort of hanging on the line like  
24 what is NRC's role. How does it play in? You know,  
25 when are we going to get the risk assessment for

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1 transportation? When will NRC review that?

2 Well, if they're not going to and there  
3 isn't one and it's part of the EIS, then I think it's  
4 time to start telling the public.

5 CHAIRMAN GARRICK: Yeah, yeah.

6 MR. LARKINS: I suggest we put together an  
7 agenda for this meeting and present it next month and  
8 we go through it in detail and try to finalize it so  
9 that we can make the necessary contacts.

10 CHAIRMAN GARRICK: I think what we'd like  
11 to know is the subject, the scope of the subject and  
12 the presenter.

13 MR. LEVENSON: John, on the issue of  
14 vulcanism, I think we need to point out that there's  
15 really two separate things that we need presentations  
16 on. One is the long term and the effect on the  
17 repository, but the other was the point raised  
18 yesterday in the very near term, the ash fallout  
19 problem, because we've not heard anything about that.  
20 I haven't until yesterday.

21 CHAIRMAN GARRICK: Yes.

22 MR. LEVENSON: So we need to know --

23 DR. HORNBERGER: You mean the pre-closure  
24 issue?

25 MR. LEVENSON: Yeah.

1 MS. DEERING: That's where all of the risk  
2 comes from.

3 MR. LEVENSON: If it's a significant  
4 percentage of the risk, I mean, I have trouble  
5 personally seeing how it fits there, but if it's been  
6 identified, we've got to know about it, where it came  
7 from.

8 I assume you don't think it's credible.

9 DR. HORNBERGER: Well, no, I think it's  
10 credible, but I think that what they're talking about  
11 are design issues to make sure that your roof truss is  
12 big enough to withstand --

13 MR. CAMPBELL: Right. How enough load  
14 capacity to support an ask layer of such-and-such a  
15 thickness.

16 DR. HORNBERGER: I don't think it's  
17 particularly interesting is all.

18 MR. LEVENSON: Well, I think you'll find  
19 when you get into safety grade equipment, if somebody  
20 has a background of two inches of dust settling over  
21 your whole facility, you've maybe doubled or tripled  
22 the cost of it because people are going to go make gas  
23 tight windows and it's not a simple thing of roof  
24 trusses.

25 DR. HORNBERGER: I was being overly

1       simplistic. I agree with that.

2                   I guess my point, however, is -- and I  
3 recognize the importance that you point out -- and  
4 that is that in the end it affects the cost of your  
5 facility. I just don't sense that there's a good  
6 technical issue for us to glom onto as the ACNW. I  
7 don't know what it is we're going to feed to NRC as  
8 advice.

9                   I mean if we were advising DOE on how they  
10 might respond to these concerns, that would be  
11 different. That's just my view.

12                   MR. LEVENSON: I agree. It's not a major  
13 issue, but it was flagged for something that we're  
14 supposed to be looking at. We ought to know where it  
15 comes from.

16                   CHAIRMAN GARRICK: We'd better move along.

17                   MR. LARKINS: We need to cover the July  
18 meeting. So if it's related to July.

19                   MR. SINGH: I just want to make -- did I  
20 understand correctly when you said you want to have  
21 this meeting October with these people at the hotel or  
22 you want the same place I mentioned yesterday?

23                   CHAIRMAN GARRICK: Well, I think that  
24 ought to be subject to review. You know, whatever we  
25 think works the best.

1 MR. LARKINS: I think sine you're talking  
2 about an informal one-on-one type session it's better  
3 just to transition from our regular meeting to this  
4 type of activity in the same location.

5 MR. SINGH: Okay. Now, I need to know  
6 that because I made a reservation, you know, at the  
7 difference place. So I need to know that if you guys  
8 have it.

9 MR. LARKINS: So I don't think it's  
10 necessary to move to another -- I don't see any -- as  
11 a matter of fact, I see some disadvantages.

12 CHAIRMAN GARRICK: Maybe Sally will let us  
13 use her ranch.

14 MR. LARKINS: Do you want to cover July?

15 MS. DEERING: Yes. July, greater than  
16 Class C is on. We have the vertical slice discussion,  
17 which has been ongoing for the last year.

18 MR. CAMPBELL: Can I say something about  
19 GPCC?

20 MS. DEERING: Sure.

21 MR. CAMPBELL: I got a call from Rick  
22 Hulce the other day who had contacted me earlier about  
23 what's DOE going to do with greater than Class C waste  
24 and also the specific issue of these orphan sealed  
25 sources that they're responsible for.

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1                   Unfortunately I said, "Well, you're going  
2 to have to call Howard," and of course, Howard is out  
3 this week.

4                   So I need to get back to Rick and find out  
5 specifically, but they are interested in coming in and  
6 giving a presentation on issues associated with GTCC  
7 in the DOE sphere. So Rick is working for them,  
8 and --

9                   DR. HORNBERGER: What is it that we want  
10 to get out of this?

11                  MR. LARKINS: I think this came up when we  
12 were talking about the entombment option and you know,  
13 what was the logic of --

14                  MR. CAMPBELL: Well, GTCC is an issue  
15 outside just --

16                  MR. LARKINS: No, I understand that, but  
17 that was sort of the driver to an extent for this  
18 discussion, and it wasn't addressed in the -- to any  
19 extent, in any entombment letter.

20                  But, I mean, if you want to expand it.

21                  MR. CAMPBELL: Well, it is an issue to the  
22 Commission right now as well. So it's up to you guys  
23 as well. If you feel you've dealt with it and you're  
24 not interested, then I'll get back to Rick and say --

25                  DR. HORNBERGER: That wasn't my point. I

1 didn't mean to prejudge that we've covered it and are  
2 not interested in it. My question is: what is it  
3 that we want to do with it?

4 Okay. Say it's an issue for the  
5 Commission. What kind of advice does the Commission  
6 need from us?

7 I mean we could just have it just because  
8 for general interest it might be okay for us to have  
9 a briefing. I was just asking if we had a deeper  
10 purpose here.

11 MR. CAMPBELL: I don't know if it's on the  
12 BLAHA -- well, it's not the BLAHA list anymore, but --

13 DR. WYMER: Well, it's right at the center  
14 of decommissioning.

15 MR. LARKINS: Yeah, I thought we were  
16 looking at it -- the committee was looking at it in  
17 terms as a part of the decommissioning options, and  
18 making some kind of recommendation that it made more  
19 sense to have some kind of leave it there, you know,  
20 for the same 40, 60-year time that we have form  
21 entombment or, you k now, some other things.

22 DR. WYMER: Yeah, it ties in with the 60-  
23 year limit.

24 MR. LARKINS: Right, and that's what I  
25 thought the issue was that the committee was

1 addressing, but it's broader than that then I don't --

2 DR. HORNBERGER: Well, I mean, we've had  
3 a long series of discussions last time on GTCC and  
4 managed to cut every reference to it out of both  
5 letters that we wrote.

6 MR. LARKINS: Yeah. I thought you were  
7 deferring that.

8 DR. HORNBERGER: And that's my question.  
9 So are we saying that what we want to do is come back  
10 and hit GTCC head on and discuss the issues associated  
11 with it and what the issues are for NRC and what our  
12 advice would be to the Commission as to how to handle  
13 that and interact with DOE?

14 Then it's sort of a major contention.

15 DR. WYMER: I view it as important.

16 MR. LARKINS: Yeah. It has come up in  
17 discussions between some of the members and the  
18 Commissioners.

19 DR. HORNBERGER: Okay. So then we should  
20 make sure that we get the right individuals to cover  
21 the material that we need to prepare a letter.

22 MR. CAMPBELL: And what I told Rick,  
23 because he indicated they would be prepared or that he  
24 would have somebody prepared to talk about these  
25 sealed sources, and I said, well, that's good, but

1 what's really more important to the committee is what  
2 are DOE's plans with respect to greater than Class C.  
3 It is their responsibility, and it is -- you know,  
4 it's a waste form that exists even today that is just  
5 basically in storage.

6 DR. HORNBERGER: Right.

7 MR. CAMPBELL: And it's not clear that it  
8 would ultimately go to the repository. That might be  
9 one option, to a geologic repository, but there are  
10 other options that they're considering.

11 DR. WYMER: I think it would be worthwhile  
12 and interesting to hear the industry point of view.  
13 Specifically what I'm interested in is whether or not  
14 there's a feeling in industry that greater than Class  
15 C in enough cases to be worthwhile, that the concerns  
16 go away with times in excess of 60 years. I'd like to  
17 know what sort of calculations have been done.

18 It may not be as large a problem as we  
19 thought because of the amount.

20 DR. HORNBERGER: Yeah. It might be nice  
21 to approach it that way, to actually pose that as a  
22 question, and the real key is how long a time beyond  
23 60 years are we talking about because if that's  
24 10,000, that's pretty long, but if it's 300 --

25 DR. WYMER: Three hundred is maybe

1 practical, yeah.

2 MR. CAMPBELL: There is an issue if it's  
3 just activation products.

4 DR. WYMER: That's the point.

5 MR. CAMPBELL: And if most of the stuff is  
6 just activation products, that may be a reasonable  
7 approach. I think another key question that needs to  
8 be addressed are what kind of long-lived radionuclides  
9 are in the various things that make up GTCC as opposed  
10 to the shorter lived activation products which can be,  
11 you know, stored for a period of time and reactivity  
12 goes way down.

13 DR. WYMER: No. It has important economic  
14 implications because that helps you decide what you  
15 have to send off site and what you can keep on site.

16 MR. CAMPBELL: Right.

17 DR. WYMER: So it's a big, important  
18 issue.

19 DR. HORNBERGER: I guess what I was  
20 suggesting, Ray, is that if we could somehow frame the  
21 issue just as you've said --

22 DR. WYMER: And that's the way I see the  
23 issue.

24 DR. HORNBERGER: Yeah, rather than just  
25 going all over creation on it.

1 DR. WYMER: Yeah, I think that's the  
2 important issue. That's the important aspect of it.

3 MR. CAMPBELL: Okay. So can you give me  
4 a sentence or two that I can then parlay into  
5 questions back --

6 DR. WYMER: I'll give you a sentence.  
7 Twenty years of hard labor.

8 (Laughter.)

9 DR. HORNBERGER: Starting tomorrow with  
10 the orientation.

11 DR. WYMER: Yeah, we could talk a little  
12 bit about that, Andy.

13 MS. DEERING: Okay. We also have the  
14 research plan for radionuclide transport as part of  
15 our review of the research. I guess this is a  
16 starting point. Andy, is that right?

17 MR. CAMPBELL: Yeah, this is a commitment  
18 that was made in the EDO response to the most recent  
19 ACNW letter on research, in which they made a  
20 commitment to come in and brief the committee on this  
21 plan, and the committee received a briefing on the  
22 draft plan back in November from Bill Ott. So this  
23 should be the completed plan.

24 DR. WYMER: I think one of the issues  
25 there is this whole business of using Kds as a

1 surrogate for a whole bunch of things that are going  
2 on. In the transport, we truly do not understand the  
3 fundamental processes, and therefore, you can't have  
4 any confidence in predictive difficulty.

5 MR. CAMPBELL: Actually, I'm glad you  
6 mentioned that. A significant amount of work is being  
7 done in that group right now in the area of going  
8 beyond Kds. They have a specific project going on  
9 through --

10 DR. WYMER: Who does? Center?

11 MR. CAMPBELL: No, this is up in Research.  
12 Bill Ott.

13 MS. DEERING: What is beyond Kds?

14 MR. CAMPBELL: It's a surface complexation  
15 model. There's a national project that they're  
16 involved in. There's USGS work, and there's Sandia  
17 work, all involved in that.

18 DR. WYMER: That's good because it's  
19 needed.

20 MS. DEERING: Okay. So is Dick Savio  
21 going to be handling that?

22 MR. LARKINS: Dick Savio is going to, in  
23 Andy's absence, have been asked to develop a template  
24 of everything that we're going to do in terms of our  
25 research report for the coming year and to come up

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1 with a list of what the issues are, the types of  
2 meetings, the schedules, what types of questions we  
3 might be addressing, and then to provide that to  
4 George to look at and coordinate and then we'll see  
5 where we go from there.

6 DR. HORNBERGER: Could we make a request  
7 one last time? I think that Research will probably be  
8 cooperative, and that is to give us a list of active  
9 projects, the amount of funding for the active  
10 projects, and you know, who, what, why, and where and  
11 how much. Okay?

12 MS. DEERING: Sher, can you get that for  
13 us?

14 (Laughter.)

15 MR. LARKINS: Before you leave Research?

16 MS. DEERING: Yeah, before you leave  
17 Research.

18 DR. HORNBERGER: But I mean, I actually  
19 think that the research people will cooperate with us  
20 and get us that. The problem they always have is  
21 breaking it out into the chunks that we're interested  
22 in.

23 CHAIRMAN GARRICK: Now, you're talking  
24 about things that are classified as research by  
25 budget?

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1 DR. HORNBERGER: Okay. So there are two  
2 issues, and what I'd first talk about is RES, which is  
3 by budget classified as research. I would also ask  
4 that we make the same request from NMSS for work done  
5 at the Center, and I have little faith that we'll get  
6 anything from that request, but I would like to make  
7 the research, see the request made formally and with  
8 the full intent that --

9 MR. LARKINS: We have an opportunity.  
10 We're meeting with the Director of NMSS and the  
11 Deputy. So we can formally make that request.

12 MR. BAHADUR: So I assume that I'm going  
13 to take this request verbally back to Research?

14 DR. HORNBERGER: Do you want something  
15 written?

16 CHAIRMAN GARRICK: This is your former  
17 life, isn't it?

18 DR. HORNBERGER: This is your real  
19 previous life.

20 MR. BAHADUR: Yes, and I wish it would be.

21 (Laughter.)

22 MR. BAHADUR: I think it would be a good  
23 idea when the staff comes in October and gives you a  
24 full briefing on the radionuclide transport program,  
25 which really has evolved from a pure waste management

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1 program into a more generic radionuclide transport  
2 that could be applied not just to waste management,  
3 but also to decommissioning and other such issues.

4 At that time perhaps it will be better for  
5 the committee to understand the extent of various  
6 projects and how they fit into the program, and maybe  
7 at that time we can ask staff members to provide us  
8 the money allocated for each project.

9 I'm not sure how the information on the  
10 money works for the committee because in the past, I  
11 remember when I was looking after this branch and a  
12 similar request came from the committee, it was  
13 difficult for the management of Research to provide  
14 the funding in the public arena. So maybe we can ask  
15 them as a special information.

16 but that's something for the committee to  
17 think about.

18 DR. HORNBERGER: I don't understand why  
19 it's difficult to provide in a public arena because my  
20 guess is that that is all truly public information;  
21 that as a citizen, if I filed an FOIA request, you  
22 would have to give it to me.

23 MR. BAHADUR: Yes, and I didn't mean it to  
24 turn into a debate, but the FOIA does provide a  
25 vehicle for you to get information which is not

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1 normally easily available in the public arena.

2 MR. LARKINS: You can get FY 2001 current  
3 budget year. You can get FY 2002 because that  
4 essentially is going through even though it's not  
5 final, but budget projections beyond that are all pre-  
6 decisional.

7 DR. HORNBERGER: But that isn't what I  
8 wanted. I just wanted --

9 MR. BAHADUR: For the current year?

10 DR. HORNBERGER: Yeah.

11 MR. BAHADUR: Oh, yeah, the current year  
12 is available in the public arena. That can be -- I  
13 misunderstood. You asked for the proposed budget for  
14 these activities.

15 DR. HORNBERGER: No.

16 MR. BAHADUR: Okay.

17 DR. HORNBERGER: I mean, the proposed  
18 budget, I think, might be interesting for me to know  
19 off line or something, but I grant you that we don't  
20 want to discuss in public.

21 MR. BAHADUR: Yeah, the present funding  
22 level is public information that can be shared, I'm  
23 sure.

24 MR. CAMPBELL: All of this information is  
25 in the existing current year ops. plan. That would be

1 the best vehicle for seeing who's doing what, who's  
2 the researchers, and where it fits into the overall  
3 structure of the program.

4 DR. HORNBERGER: I guess what I'm asking  
5 is not for me to have to learn Adams to do this, but  
6 for somebody to pull this together in a proper  
7 integral form for --

8 MS. DEERING: Dick will do that for you.

9 DR. HORNBERGER: Good.

10 MR. LARKINS: So we're going to do this  
11 next month, the radionuclide transport research plan?

12 MS. DEERING: That sounds like it's on for  
13 next month.

14 PARTICIPANT: The research plan is for  
15 next month.

16 MR. LARKINS: Okay. The igneous activity,  
17 are we going to do that next month also?

18 MS. DEERING: Well, George, we need to  
19 decide. Do we want a status report of what happened  
20 at the Tech Exchange, and then from there decide if we  
21 want to go more in depth into some particular topic  
22 and have De Marsale or not De Marsale --

23 DR. HORNBERGER: De Tourney.

24 MS. DEERING: -- De Tourney come, et  
25 cetera.

1 I mean, do you want to go ahead in July  
2 and have a status by John Trapp?

3 DR. HORNBERGER: My recollection in  
4 chatting with you, Lynn, is that John was just going  
5 to come in and basically just give us a status report,  
6 much more than a full technical in-depth meeting.

7 MS. DEERING: Yes. For example, what  
8 issues became close pending today and tomorrow and  
9 what issues remain a potential problem or open or what  
10 have you for SR. They're going to give us a couple of  
11 technical examples, I think, of some issues that they  
12 are asking for more information and their basis to ask  
13 for that information.

14 And then from there we could decide where  
15 to go. Does that sound good?

16 DR. HORNBERGER: Yeah.

17 MS. DEERING: So it's on. It's on.  
18 They're ready. they said they'll do it.

19 DR. HORNBERGER: Okay. I think that's  
20 fine, and I think you're right. I think that we will  
21 have to make a decision probably fairly quickly, if  
22 not today, immediately after our July meeting on  
23 whether we want to do something in Las Vegas.

24 MS. DEERING: Yes, yes, we will.

25 DR. HORNBERGER: Okay.

1 MS. HERON: Did you want a DOE perspective  
2 on that?

3 DR. HORNBERGER: Un-huh.

4 MS. DEERING: In July?

5 DR. HORNBERGER: Not in July. Okay?  
6 Let's do that -- in fact, let's keep it on the list  
7 for October, and if we get a DOE perspective, then it  
8 would make sense that we get an NRC perspective, and  
9 so I think that would be very good to have at the  
10 meeting.

11 MS. DEERING: October.

12 DR. HORNBERGER: In October.

13 DR. WYMER: A big agenda.

14 DR. HORNBERGER: It is a big agenda. I  
15 know.

16 MS. DEERING: Well, we'll have to trim it  
17 somehow.

18 DR. WYMER: And it's truncated because of  
19 a trip to Envirocare.

20 MR. LEVENSON: Utah comes first, I think.

21 DR. WYMER: Yeah, TRIPSI (phonetic).

22 MR. LEVENSON: The overall trip is  
23 expanded because of Utah. It doesn't cut into the  
24 Nevada, does it?

25 DR. WYMER: An extra day. It's an added

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1 day.

2 MR. LEVENSON: I think it's a Monday.

3 MS. DEERING: We'll try to put together  
4 something reasonable, and if there's stuff that has to  
5 go off , we'll coordinate with you. Okay?

6 MR. LEVENSON: Yes.

7 MS. DEERING: Okay. The other topic --  
8 can we move on? -- is Andy and I were to put together  
9 a scoping document on a potential working group  
10 related to research, potentially to take place in  
11 November at the Center, and that was the one we were  
12 preparing to prepare.

13 And I think now that Dick is going to be  
14 helping out, Dick and I will have to coordinate a  
15 little bit on that, but we have made no progress.

16 MR. LARKINS: And whatever Andy has, if he  
17 could get together with Dick to get them started.

18 MS. DEERING: And I just wanted to refresh  
19 our memories. Where I was coming from on this  
20 originally, this is how I got involved regrettably,  
21 but --

22 (Laughter.)

23 MS. DEERING: -- it was the comment about,  
24 you know, more in a TSPA context of trying to tease  
25 out from the staff answers to specific questions we

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1 might ask that helped us and then give us risk  
2 insights related to the different KTI areas.

3 And it relates to research absolutely, but  
4 it also relates to issue resolution and licensing, and  
5 it was in that context that we might structure a type  
6 of meeting with the Center in November.

7 MR. LARKINS: And I still think that's  
8 important to do because I think in terms if we're  
9 going -- one of the things that we've been talking  
10 about was maybe identifying any anticipatory or  
11 confirmatory work that RES should be doing or NMSS  
12 should be doing at the Center.

13 And so I think that would be an important  
14 part of the discussion.

15 MS. DEERING: Okay, but that's where I  
16 come in, with Dick. the rest is Dick's.

17 MR. LARKINS: Risk and uncertainty.

18 DR. HORNBERGER: I think that that is  
19 important, and I would like to see us do that when we  
20 visit the Center because, in part, I have so little  
21 faith that we are going to be able to get solid  
22 information out of NMSS on what is going on at the  
23 Center and how much effort is being expended. We can  
24 at least get a feel when we go there.

25 I also like the idea that somebody

1 mentioned yesterday of trying to get somebody from the  
2 Rogers Commission, and on the waste side, whether it's  
3 Jane Long or actually I think John Ahern would be  
4 really good if we could get John.

5 MR. LARKINS: Or Bob Budnitz also.

6 DR. HORNBERGER: Bob Budnitz is on there,  
7 too.

8 MR. LARKINS: Providing comments relating  
9 to the non-reactor.

10 DR. HORNBERGER: Right. So if we could  
11 get one of those folks to --

12 MS. DEERING: Where's Dick?

13 DR. HORNBERGER: -- come to the Center.

14 MS. DEERING: Are you going to let Dick  
15 know?

16 MR. LARKINS: He was here earlier.

17 DR. HORNBERGER: So at any rate, I think  
18 that that would be good, too.

19 MS. DEERING: Okay.

20 MR. LARKINS: So Long, Ahern or Bob.

21 DR. HORNBERGER: Yeah, or I don't recall  
22 who else was on it, and I don't know who would be  
23 best. I know John Ahern has broad interests, and so  
24 does Bob Budnitz, and both of those would be very good  
25 and outspoken on what needs to be done.

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1 MR. LARKINS: Do you want to tie this in  
2 with the trip? I mean invite them to --

3 DR. HORNBERGER: I would think that it  
4 would be worthwhile to invite them to the Center and  
5 ask whoever we get to do a presentation on the Rogers  
6 Commission and --

7 MR. LARKINS: Is it the Rogers Committee?

8 DR. HORNBERGER: Committee.

9 MR. LARKINS: Yeah.

10 CHAIRMAN GARRICK: Just call it the expert  
11 panel.

12 MR. LARKINS: Expert panel, and you should  
13 be getting copies of that report.

14 MS. DEERING: Okay.

15 MR. SINGH: Excuse me. I talked to Jack  
16 Sorrenson, and he says on the Web site there is no  
17 hard copy. So if you've got one, then I can make one.

18 MR. LARKINS: We'll get you a copy.

19 MR. SINGH: Okay.

20 MS. DEERING: As far as I know, nobody has  
21 coordinated with the Center yet on this.

22 MR. LARKINS: No, we haven't because we  
23 just --

24 MS. DEERING: Dropped the ball.

25 MR. LARKINS: We've been in preliminary

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1 discussions. Well, I guess between you and Andy,  
2 there's been some plan for a plan.

3 DR. HORNBERGER: It was you and Andy that  
4 dropped the ball.

5 MS. DEERING: It was Andy.

6 (Laughter.)

7 DR. HORNBERGER: It was Andy who dropped  
8 the ball. Okay.

9 What's your view, Andy?

10 (Laughter.)

11 MR. CAMPBELL: Not on my watch.

12 MS. DEERING: I don't know. We haven't  
13 coordinated with Budhi Sager and company.

14 MR. LARKINS: We need to go through NMSS  
15 first.

16 MS. DEERING: Yeah.

17 MR. CAMPBELL: Yes.

18 MR. LARKINS: Okay. There is another  
19 activity for July which isn't on here, and that's the  
20 Part 63 update, Lynn.

21 MS. DEERING: Yeah. Is that on, John?

22 MR. LARKINS: We're going to try to bring  
23 it on tomorrow --

24 MS. DEERING: Okay. That's another item.

25 MR. LARKINS: -- for July.

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1 MS. DEERING: That's a big agenda.

2 MR. LARKINS: And I think, Carol, did you  
3 have something else to suggest?

4 MS. HANLON: What I'm hoping is that we  
5 can talk to you about path forward for remaining  
6 activities over the summer and so forth. I may or may  
7 not be able to have a schedule at that point for you,  
8 but then we were looking forward to August when we had  
9 promised you a pre-closer discussion if you're still  
10 interested.

11 MS. DEERING: In August? Sure, we're  
12 interested, aren't we?

13 DR. HORNBERGER: Yes. Maybe we could  
14 bring in a discussion of actual --

15 (Laughter.)

16 DR. HORNBERGER: I actually wasn't being  
17 totally flip. I was thinking it would be a good way  
18 to address the issue you raised. It would be a good  
19 timing.

20 MR. LEVENSON: Well, I'd just have a  
21 couple of very simple questions, George, and that is:  
22 are there completely different assumptions relative to  
23 vulcanism that are being used in the near term and the  
24 long term? Because that would be bad.

25 DR. HORNBERGER: Yeah.

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1 MR. LEVENSON: I'm surprised given the  
2 frequency of the vulcanism in the repository study  
3 that it's such a major issue in the short term.

4 DR. HORNBERGER: Yeah, and I think that  
5 the reason that I mention it in the context of August,  
6 I think it would be fair to warn the DOE presenter on  
7 pre-closure that we heard a briefing from NRC, and  
8 this issue on ash came up, and that we're interested  
9 in the DOE perspective on it.

10 MR. LARKINS: I think on the pre-closure  
11 issue, Carol, one of the things that would be  
12 interesting would be to hear how DOE is treating  
13 system structures and components important to safety  
14 and the methodology that's being used in a risk  
15 informed approach.

16 CHAIRMAN GARRICK: I'm not getting the  
17 feeling there's any risk informed approach, Ray.

18 Is that it? Okay. It should be about  
19 8:40 now.

20 (Laughter.)

21 DR. WYMER: Set the clock back. They do  
22 it in Congress all the time.

23 CHAIRMAN GARRICK: All right. This is  
24 also, I think, your item to lead us through, Lynn, is  
25 this vertical slice discussion.

1 MS. DEERING: Yes, sir. That's at Tab 9.

2 I think the discussion kind of spills over  
3 into the letter writing session. We don't have to  
4 make a hard, you know, category difference. Some of  
5 what we talked about yesterday on Andy's and Ray's  
6 paper is very relevant to what we want to talk about  
7 today because they have some insights that we're going  
8 to want to borrow, right?

9 And I don't know how you want to do this,  
10 George, John, whatever, but we have to talk more about  
11 that paper, too, right?

12 CHAIRMAN GARRICK: Well, maybe we start  
13 with that.

14 MS. DEERING: We could, unless we run the  
15 risk of never finishing on that.

16 CHAIRMAN GARRICK: Well, it is a big topic  
17 because all tied up in it is its own separate letter.

18 MS. DEERING: Yeah.

19 CHAIRMAN GARRICK: So maybe we can discuss  
20 it in the context of the letter writing session.

21 MS. DEERING: Okay.

22 DR. WYMER: That really makes more sense,  
23 John.

24 CHAIRMAN GARRICK: Yeah, yeah, and not  
25 spend a whole lot of time on it here.

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1 MS. DEERING: Okay.

2 CHAIRMAN GARRICK: Because all of the rest  
3 of the vertical slices have got a long ways to go to  
4 catch up to where you are.

5 DR. WYMER: Well, we've done two things on  
6 that. You know, one is we redid the recommendations  
7 in the letter, and they're still in the work in  
8 progress, and the other is pulled conclusions out of  
9 the attached report that could be considered for  
10 inclusion in the letter as specific chemistry topics.  
11 Some or all of those could be. Some of them could be  
12 -- there's 15 of them -- some of them could be  
13 combined to reduce the total number of specific  
14 chemistry related recommendations or observations or  
15 conclusions.

16 But that's what's going on.

17 MR. CAMPBELL: We're not going to  
18 necessarily end up with 15 specific things.

19 DR. WYMER: No.

20 MR. CAMPBELL: The letter will pull the  
21 key ones out of that that are appropriate.

22 DR. WYMER: The corrosion ones could be  
23 combined into a single one, for example, and there are  
24 others that could be combined.

25 CHAIRMAN GARRICK: Right. Okay.

1 MR. CAMPBELL: What I envision is a one,  
2 two, three, four or maybe a couple more specific  
3 issues, you know, one related to the corrosion area  
4 that I can think of off the top of my head.

5 DR. WYMER: Transport.

6 MR. CAMPBELL: One related to the impact  
7 of chemistry, one related to the near field chemistry,  
8 and one related to transport.

9 DR. WYMER: Yeah, that would pretty  
10 well --

11 CHAIRMAN GARRICK: I think some sort of an  
12 aggregation of the conclusions suggest those that you  
13 just mentioned.

14 MR. CAMPBELL: Yeah.

15 DR. WYMER: Yeah.

16 MR. CAMPBELL: Those are broadly the  
17 topical areas we looked at, and there were some  
18 specifics within those topical areas.

19 DR. WYMER: Well, they tied it to KTIs  
20 very neatly.

21 CHAIRMAN GARRICK: Right, yes.

22 DR. WYMER: So, yeah. So we'll bring  
23 those 15 into four or five at the most.

24 CHAIRMAN GARRICK: Okay, and so let's  
25 defer that discussion until the letter writing

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1 session.

2 MR. LEVENSON: Is it your intent that each  
3 of these vertical slices have its own individual  
4 letter?

5 CHAIRMAN GARRICK: No.

6 MR. LEVENSON: Okay.

7 CHAIRMAN GARRICK: Right now the only  
8 exception that's under serious consideration is the  
9 chemistry.

10 MS. DEERING: What we need from each  
11 vertical slice would be for the single letter, would  
12 be a -- George and I were thinking maybe individual  
13 sections on each vertical slice that described a  
14 little bit about your approach and your method, which  
15 may vary from slice to slice, and then a little bit  
16 about some of the insights that you got from your  
17 review.

18 And that's iffy. It depends on what we  
19 get, but that's one idea right now how we would  
20 include the individuality of each vertical slice, but  
21 most of what we need is to strip out from what you've  
22 done something important that we can have for our main  
23 letter. If I had to say, that's really what I want.

24 CHAIRMAN GARRICK: Yeah, I think that's  
25 right.

1 MR. CAMPBELL: And that's exactly what  
2 needs to be done, is to extract out of that some key  
3 over arching issues that are identified in the report,  
4 as opposed to a bunch of specific issues that are  
5 already dealt with.

6 DR. WYMER: That can be done very, very  
7 generally and quite briefly, I think. In the  
8 chemistry case, it can be done quite tersely. You  
9 don't need to identify everything out there. Point  
10 out the chemistry issues.

11 CHAIRMAN GARRICK: Well, okay. In view of  
12 that, why don't we proceed to get a progress report on  
13 each of these. We can go right down the list in our  
14 agenda here, starting with the saturated zone flow.

15 DR. HORNBERGER: That'll be short. There  
16 has been no progress.

17 (Laughter.)

18 MR. CAMPBELL: John and I don't feel that  
19 bad then.

20 MS. DEERING: But we were way ahead to  
21 begin with.

22 CHAIRMAN GARRICK: Well, you did make a  
23 presentation last time, and you had a series of  
24 exhibits, and it was reasonably optimistic at that  
25 time.

1 DR. HORNBERGER: No, I do think that we  
2 know where things are going and what needs to be done,  
3 but quite literally since our last meeting, I have not  
4 had the time to do anything on it.

5 CHAIRMAN GARRICK: Okay. What is your  
6 schedule?

7 DR. HORNBERGER: We want to have, and this  
8 is a schedule for everybody, but our aim remains the  
9 same, and that is we would like to get a complete  
10 draft, and it may be rough, but a complete draft by  
11 July.

12 CHAIRMAN GARRICK: By the July meeting?

13 DR. HORNBERGER: By the July meeting.  
14 Now, we're not going to finalize it, but we want to  
15 have a complete draft that we can discuss and make  
16 sure that we have the main messages agreed on, so that  
17 we can go away from the July meeting with a clear  
18 indication of what needs to be done to get the letter  
19 into final shape.

20 Is that fair, Lynn?

21 MS. DEERING: That's fair.

22 DR. HORNBERGER: So that's where the  
23 saturated zone has to be. We need to --

24 MS. DEERING: Now, how do we get there?  
25 I guess the way we get there would be if, say, the

1 saturated zone and TSPA, say those were the two that  
2 we need to do some additional work on before we can  
3 complete a draft total letter. We would do it, I  
4 guess, over the E-mail.

5 Any observations that you might make in  
6 your particular area, if you could pass them along to  
7 me and share with each other, I could start funneling  
8 them into this letter. Would that be reasonable?

9 DR. HORNBERGER: yes.

10 MS. DEERING: Don't even worry about the  
11 template per se. That's a guide. You don't have to  
12 answer every question, but if there are some things on  
13 here that jump out that you might have uncovered.

14 You know, one thing that comes to mind  
15 that I'm not sure. We will have to discuss with Ray  
16 and Andy, but I'm not sure if one of your  
17 recommendations was hinting at the fact that you  
18 weren't so sure that the stuff was using the TPA code  
19 enough in terms of relying on it to bolster their  
20 arguments and their case.

21 I mean you encouraged them to use it, but  
22 I wasn't sure if implicit in that was because we're a  
23 little concerned that it's not being utilized fully.  
24 If that were true --

25 DR. WYMER: That wasn't really right.

1 What we really said was there are differences between  
2 the TSPA and the TPA that need to be resolved; that  
3 the NRC code and the DOE code have substantial  
4 differences in parts, in the chemistry area, and they  
5 need to be resolved and explained.

6 MS. DEERING: Okay. Because --

7 MR. CAMPBELL: That's in the main report,  
8 but I think what piqued your interest, Lynn, was the  
9 observation/recommendation in the overall cover  
10 letter.

11 MS. DEERING: Yes, in the overall letter.

12 MR. CAMPBELL: And maybe that needs to be  
13 made a little clearer because I think we all felt that  
14 the use of TPA is essential and needs to continue to  
15 occur, and it is occurring, and maybe that needs to be  
16 brought out for --

17 MS. DEERING: For your satisfaction, you  
18 felt like they were gathering their own risk insights  
19 and their own confirmatory information to support  
20 their arguments/agreements with DOE, et cetera?

21 Because what I'm getting at is I'm not  
22 totally convinced through the little bits of research  
23 I've done if, in fact, it's being used consistently,  
24 and maybe it doesn't need to be across the different  
25 KTI areas.

1                   Some people say, "Yeah, we go to the PA  
2 people and we ask them, but they don't always do  
3 something quantitative."

4                   DR. WYMER:     Oh, I don't think it's  
5 coordinated right down to the gnat's eyebrow at all.  
6 I think that's too complex. That's more than we can  
7 expect from the resources they've got to put on it,  
8 but it seems to be adequate.

9                   MS. DEERING:    Okay. Well, I was just  
10 wondering how much we could develop that into an  
11 overall comment, and I appreciate your clarification  
12 on that, but it doesn't mean that we might not  
13 discover that elsewhere as a possible --

14                  DR. WYMER:     You'll discover the same  
15 thing, that there are unevennesses and things that  
16 don't quite butt ends.

17                  MS. DEERING:   Well, you know, the age old  
18 problem of like the more technically inclined KTI  
19 people, and I issue -- what are they? -- integrated  
20 subissue leads and the PAs, the so-called PA people,  
21 this longstanding issue of how we work together and  
22 how when you want to characterize something at a  
23 process level, how to your satisfaction or not,  
24 whether the PA people abstract that into something to  
25 your satisfaction, you know.

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1 And that, I think, remains a concern.

2 DR. HORNBERGER: A concern in what way?  
3 I mean, this is something that always comes up. So,  
4 for example, when I look at Ray's and Andy's  
5 conclusion that, well, TSP uses Kds and we chemists  
6 know that that can't possibly be right.

7 You'll always get that from chemists, and  
8 to tell you the truth, I've never been able to  
9 understand from chemists exactly this isn't an  
10 adequate use in TPA.

11 So that you always have the process level  
12 people want to go farther and farther down in the  
13 processes, and in fact, if you talk to the real  
14 chemists, okay, they want to go to ab initio  
15 calculations and not deal with things leaving like  
16 surface complexation.

17 So you can always go farther and farther  
18 down in this chain, and so there always will be that  
19 tension between systems performance people and the  
20 line scientists. That's not unhealthy. It's a good  
21 tension.

22 MS. DEERING: As long as everybody is  
23 happy in the end.

24 CHAIRMAN GARRICK: No, as long as we get  
25 something done.

1 MS. DEERING: And we stand behind the  
2 results.

3 CHAIRMAN GARRICK: As long as you don't  
4 get frozen, right?

5 MS. DEERING: What if they wouldn't stand  
6 behind the result? What if the TPA, the abstracted  
7 TPA was all -- the technical people were saying, "Do  
8 you know what? If I'm asked, I'm not going to defend  
9 that because I don't buy it. I don't think it was  
10 represented fairly. I don't think my data was used  
11 correctly, if at all, and in the end, I'm not signing  
12 the dotted line. You can forget me."

13 DR. WYMER: Well, that concern has been  
14 put to rest by these detailed KTI meetings that people  
15 have, and there's a pretty good detailed discussion of  
16 the technical issues and the disagreements. So a lot  
17 of that has been ironed out, maybe not all of it for  
18 sure, but an awful lot of that has been smoothed out,  
19 and nobody is likely to stand up on their hind legs  
20 and say, "I deny the whole thing."

21 MR. LEVENSON: I'm not sure of that, Ray,  
22 because there's the input. I absolutely agree with  
23 you on the input. The KTIs haven't resolved much of  
24 anything about the abstraction.

25 MR. CAMPBELL: Well, the abstractions are

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1 dealt with in the context of the TSPA, I, KTI, and  
2 that as you know, the Tech Exchange has yet to occur  
3 on that, but there is a lot of interaction that's gone  
4 on both among the staff and the process level people  
5 and the SPA people as well as between NRC and DOE on  
6 that.

7 So to a degree there's tension between the  
8 PA group and the process level groups. It's like the  
9 tension that exists between scientists and engineers.  
10 I mean, it's always going to be there because you have  
11 different perspectives and different ways of viewing  
12 the world and different approaches to doing things.

13 DR. WYMER: That's right.

14 MR. CAMPBELL: And, frankly, I think it's  
15 as you point out, a good tension because it forces  
16 people to think about what they're doing.

17 MS. DEERING: Okay. So it's not an issue.

18 DR. HORNBERGER: No, no. I mean, I  
19 understand your issue, but to a certain extent, we  
20 have to have faith, and one of the things that we have  
21 to observe is whether or not, like the Technical  
22 Exchanges, whether it is working, whether we are  
23 working to resolve any serious issues.

24 And if we come up with any evidence that  
25 something like the scenario that you just painted

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1 might come to pass, that would be a flag for us to  
2 raise.

3 MS. DEERING: And I see that at a  
4 different level than just what we see at the KTI  
5 exchanges. I'm almost thinking more back at the shop  
6 at home in NRC's world. If there are issues that you  
7 would like to raise as a KTI person, say, but you  
8 don't know their risk significance, you think they're  
9 issues because you're working in that field and  
10 everything is an issue to you.

11 DR. HORNBERGER: Right.

12 MS. DEERING: And say you go to the PA  
13 person and you want some assistance with helping to  
14 sort out its risk significance. I'm not sure that's  
15 being done, you know, even before it gets to the  
16 table.

17 I don't know how many of those issues that  
18 go to the table at these Tech Exchanges have been  
19 filtered for their risk significance. Is that fair?

20 DR. WYMER: We don't know that either.

21 MS. DEERING: Right, and is that something  
22 to probe a little bit in our review?

23 CHAIRMAN GARRICK: Yes. I think that's a  
24 very good integrator.

25 MS. DEERING: I have tried to ask some

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1 questions in the SAT zone (phonetic) along those  
2 lines.

3 MR. CAMPBELL: What do you use as your  
4 measure for risk significance? Because I'm coming  
5 away from the feeling that TSPA in and of itself  
6 should not be the only measure of risk significance  
7 because there are conclusions in TSPA that you look at  
8 and you say, "Huh?" And that's the truth.

9 I mean we looked at things that come out  
10 of the TSPA analysis, and you scratch your head, and  
11 you say, "I don't understand that."

12 CHAIRMAN GARRICK: Yeah, but, Andy,  
13 wouldn't you use the TSPA as the framework within  
14 which you address that, you know? It's perfectly all  
15 right for you to say that, but it seems as though what  
16 you're saying is that you have some problems with the  
17 way they're handling certain chemical issues and the  
18 way they're finding their way into the TSPA.

19 But what else is there?

20 DR. WYMER: But the TSPA process itself is  
21 a reasonable process. It's just that the input is  
22 sometimes questionable.

23 CHAIRMAN GARRICK: Yeah.

24 MR. CAMPBELL: And sometimes the  
25 conceptualizations will constrain what TSPA can tell

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1 you about the more realistic performance that --

2 CHAIRMAN GARRICK: See, if we don't have  
3 something that we can anchor ourselves to as a measure  
4 of relevance, we could never tie this thing together,  
5 and that's presumably what the TSPA is supposed to do.

6 What has the chemical issue got to do with  
7 risk? We've got to keep asking that question.

8 DR. WYMER: Well, one of the root things  
9 that keeps coming up is this whole issue of  
10 conservatism.

11 CHAIRMAN GARRICK: Yeah, now, and --

12 MS. DEERING: And how NRC handles that is  
13 my question with their TPA code.

14 CHAIRMAN GARRICK: Right.

15 MS. DEERING: I understand what DOE does,  
16 and its adequacy is not necessarily what we're going  
17 to comment on, but the extent to which NRC has its  
18 tools and is able to take a look at the TSPA and make  
19 a decision itself about how to either model it  
20 differently or take a different angle on it  
21 quantitatively, something to give them a measure of  
22 confidence that what's being presented is acceptable.

23 DR. WYMER: Well, I think those issues  
24 that are identified that they're both addressing are  
25 resolved through the process. It's the things that

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1 the TPA maybe will address like secondary phase  
2 formation that have not been addressed by the TSPA.  
3 It's these thing that are sort of outside the box that  
4 are the festering issues.

5 CHAIRMAN GARRICK: Yeah, but I think still  
6 that in order for them to have meaning, you've got to  
7 discuss them in reference to the TSPA.

8 DR. WYMER: Or the TPA, and they are  
9 discussed in that context. The TPA addressed them.  
10 The TSPA hasn't, but will.

11 CHAIRMAN GARRICK: Because that's the only  
12 place we have where we're measuring adequacy.

13 DR. WYMER: That's right. That's our  
14 tool.

15 CHAIRMAN GARRICK: Where we're measuring  
16 performance.

17 MR. CAMPBELL: I just was talking to Tae  
18 Ahn briefly, and Tae has reminded me that as they went  
19 into these Tech Exchanges, they were using input and  
20 understandings developed from the TPA code to help  
21 them decide what are the most significant issues in  
22 terms of risk.

23 MS. DEERING: And that, I think, right  
24 there is what I wanted to place some emphasis on.

25 MR. CAMPBELL: And I'm not questioning

1 that, questioning specific results that you see  
2 sometimes coming out of TSPA that make you scratch  
3 your head and say --

4 CHAIRMAN GARRICK: Oh, yes, and that's  
5 legitimate, and I've got a whole bunch of them.

6 MS. DEERING: I'm curious how we know that  
7 though. I mean, Tae knows that because they got to  
8 caucus, and they know what they did to go in preparing  
9 for that meeting. How does this committee in its  
10 oversight capacity know that that happened and was  
11 done across all of the KTI areas?

12 That's what I want to be able to say, that  
13 we can with confidence say they're doing that. Now,  
14 how do we do that?

15 MR. CAMPBELL: Well, I think Ray and I  
16 feel that in our interactions in this working group  
17 meeting that we had with the staff, you know, gave us  
18 some level of confidence, you know.

19 DR. WYMER: In this particular area --

20 MR. CAMPBELL: Not just interacting with  
21 them, but reviewing the IRSRs and reviewing the  
22 agreements and so on.

23 MR. AHN: The other area that you can take  
24 a look at is the Tech Exchange agreement. That's  
25 based --

1 MR. CAMPBELL: The information is there.

2 MS. DEERING: Does it cite use on the TPA?

3 MR. AHN: Well, the agreement was made  
4 based on the TPA exercises. Otherwise you would have  
5 had numerous issues. We could not have handled all.

6 Not only TPA, but there is another  
7 criteria called future event process screening. It's  
8 entirely based on the probability of ten to the minus  
9 eight. You screened out there first. Then you  
10 consider impact on the dose.

11 DR. WYMER: They don't cite the TPA, Lynn,  
12 but it's just reflected --

13 MR. AHN: I don't think we cited it.

14 DR. WYMER: -- in the questions that are  
15 raised.

16 MS. DEERING: And you learn that by  
17 talking in depth with the staff and gathering your  
18 information.

19 DR. WYMER: And looking at these documents  
20 that are produced as a result of the Tech Exchanges,  
21 yeah.

22 MS. DEERING: Because I wanted to know to  
23 what extent the NRC actually documents, say, in a  
24 sufficiency review. Like we have a comment that we're  
25 going to make, and here's our comment, and here's our

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1 basis for that comment.

2 We've used our own TPA code, and we did  
3 this, you know, without going into too much detail,  
4 getting the point across that we've done some  
5 independent analysis to support this comment, and I'd  
6 like to see that.

7 DR. WYMER: That's more implicit than  
8 directly stated, I think. I think it's sort of  
9 understood that that's where it comes from.

10 MS. DEERING: Well, okay. But that then  
11 kind of makes it invisible to the world.

12 DR. WYMER: There's no reason why it can't  
13 be said, you know, but I have not seen it said in our  
14 areas. But it's understood that that's the way it's  
15 done.

16 MR. CAMPBELL: Well, I'm coming at this  
17 from the perspective of the committee over the last  
18 several years has gotten various briefings on  
19 importance and sensitivity and having looked through  
20 those as TPA has evolved, it's been pretty clear that  
21 the issues that kind of rise to the top, not all of  
22 them, but certainly the major issues that rise to the  
23 top within the context of the KTIs are reflected in  
24 the results to a degree in TPA.

25 I think one of the concerns that we had is

1 that TPA and TSP are very, very different beasts.

2 CHAIRMAN GARRICK: Yeah, and one of the  
3 challenges --

4 MR. CAMPBELL: And there are going to be  
5 differences between those codes. TPA is much simpler  
6 and easier to run and, in my mind, an easier to  
7 understand code. TSPA is a monster code, and those  
8 differences, I think, may potentially become important  
9 at some point in the whole process.

10 DR. WYMER: I think so, too.

11 CHAIRMAN GARRICK: And one of the real  
12 problems is, at least in my exercise to try to begin  
13 to get my arms around this whole issue of performance  
14 assessment for Yucca Mountain is that unless you have  
15 some sense of the TSPA, it's very difficult to attack  
16 the TPA in terms of its ability to be a useful tool  
17 for reviewing and checking the TSPA.

18 And there's so much to do to develop some  
19 grasp of the real issues in the TSPA that it's a long  
20 ways to get to the TPA in terms of its utility,  
21 usefulness as a tool for evaluating it. That's a real  
22 challenge.

23 DR. WYMER: Well, I don't think so. In  
24 the chemistry areas it has not been necessarily true.  
25 There are certain obvious conclusions and conceptual

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1 ideas and models that are used in the TSPA that lead  
2 to results that can clearly be challenged by the TPA,  
3 and there's no real problem there.

4 CHAIRMAN GARRICK: No, but what I'm saying  
5 is that you can't reach much of a judgment on the TPA  
6 until you understand the TSPA because the only reason  
7 for the TPA is the TSPA.

8 DR. WYMER: Yeah, and that's our vertical  
9 slice exercise, is to take a few of these and really  
10 dig in, in my understanding.

11 CHAIRMAN GARRICK: Yeah, right, right.

12 MS. DEERING: And with confidence remark  
13 on what we feel is the capability of their tools and  
14 code and their use of those --

15 DR. WYMER: That's how we understand the  
16 TSPA --

17 MS. DEERING: -- in a consistent --

18 DR. WYMER: -- is by these vertical slices  
19 in a few of its parts.

20 CHAIRMAN GARRICK: Yeah. Well, one of the  
21 things, you know, you have to really be alert or you  
22 get sidetracked, and I've been sidetracked several  
23 times in my review of the TSPA documents. For  
24 example, I got very interested in tracking to some  
25 extent what has been identified in the TSPA as a

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1 conservatism, and you know, just to give you --  
2 there's general things, like they talk about  
3 uncertainties in abstraction inputs were accommodated  
4 in general by using bounding values and building  
5 conservatisms into the model.

6 The localized corrosion model is an  
7 example of the conservative analysis included in TSPA.  
8 There's a lot of very specific issues that they say  
9 are conservative, such as the way they handle the  
10 release of the GAP (phonetic) inventory, and that's  
11 conservatively assumed to be instantaneous when the  
12 cladding is perforated, and thus independent of any  
13 tearing or other phenomena associated with the  
14 cladding integrity.

15 They talk about the unzipping phenomena  
16 and a dry model and a wet model, and they, on the one  
17 hand, say they don't think the wet conditions apply,  
18 but it's the only condition that's modeled. And on a  
19 wet model, a wet environmental model is included and  
20 it conservatively assumes exposure to the fuel matrix  
21 and bounds diffusive releases of radionuclides through  
22 the -- this is just to give you a sense.

23 The commercial spent nuclear fuel  
24 degradation model is a bounding one, and it goes on  
25 and on. As far as the in package chemistry, they say

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1 that to address thermokinetic uncertainties where  
2 possible, conservative reaction parameters have been  
3 assumed, and with respect to cladding degradation,  
4 ranges of uncertainties have been established and  
5 conservatism was used in developing the analysis.

6 And the more conservative analysis used on  
7 PWR fuel was assumed to apply to BWR fuel where the  
8 problem is very much different and very less likely to  
9 violate, and so it goes on and on.

10 So I see an enormous problem here of  
11 establishing some sort of continuity of analysis  
12 through the model that allows one to develop  
13 confidence that we have any idea of what the risk is  
14 because they've started out -- this is not a risk  
15 assessment. I have concluded that, that the TSPA is  
16 not a risk assessment. It's a compliance analysis,  
17 and it's very bounded and conservative driven in some  
18 areas, that even though some other areas don't appear  
19 to be so conservative.

20 But the truth is we don't know what the  
21 risk is at Yucca Mountain in any realistic fashion.  
22 We don't know that.

23 DR. WYMER: But the question is do we have  
24 to.

25 CHAIRMAN GARRICK: Well, we may not. We

1 may not, and that might be --

2 MS. DEERING: Way to go, Ray.

3 CHAIRMAN GARRICK: That might be the  
4 saving aspect of this, but when you start talking  
5 about trying to evaluation this from a risk informed  
6 perspective, you quickly run into some very serious  
7 problems.

8 DR. WYMER: Well, we certainly do in the  
9 chemistry area.

10 CHAIRMAN GARRICK: Right, right.

11 DR. WYMER: But we don't know that it  
12 matters.

13 MS. DEERING: Can I ask a question? Given  
14 that is a problem, we see a TSPA being presented to  
15 the NRC that has a lot of assumptions, many of which  
16 appear conservative, but there's not a lot of  
17 quantitative uncertainty, quantification of  
18 uncertainty. It's dealt with unevenly,  
19 inconsistently, et cetera.

20 But this is what, say, our regulatory  
21 agency has. Now, what they do with that now becomes  
22 our problem. That in itself is not our problem.

23 but it seems to me then does NRC, its  
24 approach to get back to DOE in the terms of  
25 sufficiency comments and eventually an LA review, do

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1 they have the capability and process in place that's  
2 going to help them deal and comment accordingly when  
3 presented with something like this?

4 DR. WYMER: They have TPA.

5 MS. DEERING: And don't you think we have  
6 to --

7 DR. WYMER: That gives them confidence in  
8 the results.

9 MS. DEERING: Okay. So tracing that  
10 through, then we have to look at, it seems to me, our  
11 worst case in our -- say our worst case in writing  
12 this letter would be, in my opinion, we find major  
13 inadequacies with DOE's TSPA, et cetera, and further  
14 we find that NRC's process did not capture that.  
15 Wouldn't you agree that would be a worst case  
16 situation?

17 MR. LEVENSON: Let me say that in the one  
18 that we did, it starts very much the same, but I  
19 wouldn't make that final statement because it's my  
20 perception that the staff recognizes that the input,  
21 the use of the TPA and the KTI resolution, et cetera,  
22 has fairly well clarified input data.

23 The staff is not at all comfortable with  
24 what's been done with that data. That's why this  
25 whole new effort is underway, and that's why I would

1 end up saying that I think the staff --

2 DR. HORNBERGER: Ray, what's the whole new  
3 effort? I'm sorry.

4 MR. LEVENSON: Oh, these integrated --

5 DR. HORNBERGER: Oh, okay. Subissues.

6 MR. LEVENSON: -- things that follow the  
7 KTIs, various things. But that is because the staff  
8 has recognized that there are problems with the TSPAs.  
9 You come out with conclusions which don't make sense.

10 And if you look at the fact that we've  
11 agreed on the input data, but there's something wrong  
12 with the output, then there's something wrong with the  
13 model, and so where I come from is saying, you know,  
14 I know people maybe never expected me to say this, but  
15 I think the staff has done a good job to date on this  
16 part of it, and especially by recognizing that there's  
17 a hell of a lot more work for them to do.

18 I don't --

19 MS. DEERING: Good.

20 MR. LEVENSON: We can't evaluate that  
21 because that's future work.

22 MS. DEERING: And it's not our job. I  
23 mean, I think --

24 MR. LEVENSON: The important thing is the  
25 staff has recognized --

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1 MS. DEERING: -- what you said is -- yeah,  
2 that becomes the endpoint. Isn't that where we get  
3 off? We stop there. We say the staff caught -- they  
4 have a process capability, tools they --

5 CHAIRMAN GARRICK: Yeah, the only problem  
6 I'm having is that we keep talking about -- and I'm  
7 taking a risk informed approach -- and yet the efforts  
8 don't seem to be moving in the direction at all in  
9 establishing what the risk is.

10 DR. WYMER: You're right about that.

11 CHAIRMAN GARRICK: They are bounding the  
12 risk.

13 DR. WYMER: In spades.

14 CHAIRMAN GARRICK: They are bounding the  
15 risk, and if that's, you know, what's acceptable  
16 and --

17 DR. HORNBERGER: Are they bounding?

18 DR. WYMER: Not in all places they're not.

19 CHAIRMAN GARRICK: Well, that's even a  
20 question in some areas. That's correct.

21 MR. LEVENSON: Well, there are two  
22 definitions of the word "bounding." It means leaping  
23 away from where you are.

24 (Laughter.)

25 MS. DEERING: But can safety still be

1 demonstrated?

2 DR. HORNBERGER: In unknown directions.

3 MS. DEERING: Say that you weren't  
4 satisfied that an RAPB approach was being used on  
5 either side. Could -- I'm wondering in the end could  
6 you still say, however, even using the partial hybrid  
7 of a bounding type/slash realistic/whatever else  
8 analysis is being used, we still say we feel there's  
9 a confidence.

10 CHAIRMAN GARRICK: Well, I guess my point  
11 is from a physics model standpoint, if we're really  
12 going to do this license using bounding analysis, we  
13 could sure as heck come up with a simpler model than  
14 the TSPA, in my opinion. That is --

15 PARTICIPANT: Would that model be the TPA?

16 CHAIRMAN GARRICK: It might be the TPA.

17 MS. DEERING: Which is what is probably  
18 intended to be.

19 CHAIRMAN GARRICK: I mean, we seem to have  
20 this facade that we are, indeed, assessing what the  
21 realistic performance assessment is, when in fact on  
22 close examination and given the long line of  
23 assumptions and the what appears to be on first look  
24 extreme conservatism associated with those  
25 assumptions, we certainly have backed away from trying

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1 to establish a reference as to what the safety margin  
2 is.

3 We have no idea what the safety margin is.  
4 We just --

5 MR. CAMPBELL: We think it's large, but we  
6 don't know what that number is.

7 CHAIRMAN GARRICK: We think it's large,  
8 and we think that it does -- and that's okay to say,  
9 well, we have established that it's below the limit  
10 line, if you wish, and that is well within the  
11 requirements of the standard, et cetera. You know,  
12 that's one way to do it, but it's --

13 DR. HORNBERGER: Does this mean that we  
14 should be advocating multiple lines of evidence and  
15 not just the TSPA?

16 MR. LEVENSON: John, do you think the  
17 problem is that with no pre-screening sort of, as an  
18 attempt to include everything, whether it's relevant  
19 or not, the model has become so incredibly complex  
20 that it no longer really is a risk assessment because  
21 it doesn't differentiate between important and not  
22 important. In trying to handle everything, it's just  
23 so complex you can't follow it.

24 DR. HORNBERGER: I'm not sure I buy that.

25 MR. LEVENSON: No, I'm asking the

1 question.

2 DR. HORNBERGER: Are you saying that  
3 complexity necessarily is bad?

4 MR. LEVENSON: No, no, no, no, but it  
5 makes things more and more and more complex.  
6 Eventually that outruns your ability to really model  
7 it properly.

8 DR. HORNBERGER: I don't follow that.

9 MR. CAMPBELL: I'm not sure I agree with  
10 that. I mean, look at what's happening in climate  
11 models, is they're becoming incredibly complex, and  
12 they have enormous data requirements, but they're  
13 becoming much better.

14 MR. LEVENSON: That may be. I'm not sure  
15 we can say the same -- we can't say the same s --

16 MR. CAMPBELL: I mean better at being able  
17 to predict what's going on.

18 MS. DEERING: But if you don't have the  
19 data to support it, then you're in trouble.

20 DR. WYMER: Well, what you're saying, I  
21 think, Milt, leads to the question of where does  
22 judgment -- at what level does judgment enter the  
23 picture because if you're not going to model it, then  
24 you've got to make a judgment about it, and then --

25 MR. LEVENSON: Well, or you do an

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1 iterative thing. You start out, and if it indicates  
2 that this is not very important, maybe you remove it  
3 from the model in order to make it --

4 DR. WYMER: Oh, well, you might back off.

5 MR. LEVENSON: Yeah, but you have to go in  
6 first.

7 DR. WYMER: Well, that may be, but --

8 MR. LEVENSON: Maybe.

9 MS. DEERING: Before you can bound it, you  
10 have to understand it. Maybe.

11 MR. LEVENSON: The real problem is, you  
12 know, if each of the four of us has looked at one very  
13 thin, narrow piece, and each of us comes away with  
14 saying TSPA gives you an unbelievable answer that's  
15 relevant in parts --

16 DR. WYMER: In parts.

17 MR. LEVENSON: -- how believable is TSPA?

18 CHAIRMAN GARRICK: Well, if you're  
19 convinced that it does, indeed, give you a bound or a  
20 conservative result, then of course --

21 DR. WYMER: You're okay.

22 CHAIRMAN GARRICK: -- it serves a useful  
23 purpose in terms of compliance. It does not serve a  
24 very useful purpose in terms of understanding what the  
25 safety is.

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1 DR. WYMER: And it really is not a risk  
2 informed document.

3 CHAIRMAN GARRICK: Yeah, and I have a  
4 little problem with that because (a) it seems to be  
5 against the policy that's being preached, and (b) it's  
6 irresponsible from a cost standpoint.

7 MR. LEVENSON: I think that's a key item.  
8 I mean, the objective is to make sure it's safe, but  
9 if it's safe by a factor of ten to the fourth and that  
10 costs --

11 CHAIRMAN GARRICK: Yeah.

12 MR. LEVENSON: -- it's not only the money.  
13 You do many things which introduce their own risks.  
14 We've been through this many times. So that it isn't  
15 necessarily conservative to seriously over estimate  
16 the consequence by orders of magnitude.

17 I think I like your word, "irresponsible."

18 DR. WYMER: You know, I really do think we  
19 could capture an awful lot of what we're saying here  
20 by a carefully written letter on conservatism. I  
21 think an awful lot of this -- you wouldn't have to go  
22 into many details at all.

23 DR. WYMER: I have to say one thing, that  
24 they have tried to collect the important conservatisms  
25 in a specific section of the TSPA, and they have

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1 identified what they believe to be the six or seven  
2 most principal important contributors to conservatism.

3           They are things like seepage through the  
4 drip shield is assumed to always fall on a waste  
5 package. Seepage is assumed to wet the drip shield  
6 and waste package uniformly. Diffusion is maximized  
7 because diffusive transport is always possible through  
8 stress corrosion cracks and because the waste package  
9 in contact with the invert is in contact with the  
10 invert, and so on and so on and so on.

11           Release of radionuclides through advective  
12 transport is assumed to be independent of the location  
13 of breaches on the waste package. Evaporation within  
14 and on the waste package is ignored. Diffusion  
15 coefficient is based on the bounding abstraction, et  
16 cetera, et cetera.

17           They have attempted to collect the high  
18 level conservatisms of the model and lay them out.  
19 Now, they have not been as clear and as explicit with  
20 respect to areas where they might not be conservative,  
21 where they may be --

22           DR. WYMER: Well, and the use of the  
23 conservatisms and --

24           MS. DEERING: The optimisms.

25           DR. WYMER: -- how they are used and what

1 results they lead to are not understood either.  
2 Sometimes these things that they call conservative  
3 lead to ridiculous results.

4 CHAIRMAN GARRICK: right.

5 DR. WYMER: That hasn't really been  
6 compared at all.

7 DR. WYMER: Yeah, one of the --

8 DR. HORNBERGER: Can you give me an  
9 example of ridiculous result?

10 DR. WYMER: Well, the question of crevice  
11 versus patch corrosion, and the business of the voice  
12 package full of water instead of -- and mixing like  
13 it's a stirred tank.

14 DR. HORNBERGER: Okay. So that you're  
15 saying is an unreasonable assumption. What's the  
16 unreasonable result?

17 DR. WYMER: And it does not lead to  
18 credible results.

19 DR. HORNBERGER: But what's the  
20 unreasonable result?

21 DR. WYMER: It has to do with the fact  
22 that you may, in fact, get more severe corrosion by  
23 assuming a more realistic case. It's not conservative  
24 to say that you have the physical situation they say  
25 it is.

1 CHAIRMAN GARRICK: Well, another example  
2 early on, George, was in the old models they did not  
3 take any credit for cladding. It was a reactor guy  
4 that came along from the outside of the program and  
5 said, "Look, you guys. You're missing something here  
6 that's critically important."

7 And it is critically important.

8 DR. HORNBERGER: I mean, I understand how  
9 some of these assumptions can get made, you know, for  
10 conservatism. What I was asking was Ray said this  
11 leads to ridiculous results. Okay? I was questioning  
12 the ridiculous results, not the ridiculous  
13 assumptions.

14 And I don't know what the ridiculous  
15 results are.

16 MR. CAMPBELL: The predominance of  
17 diffusion as a release mechanism at Yucca Mountain.

18 DR. WYMER: Is that a result?

19 MR. CAMPBELL: I find that very, as a  
20 person who studied diffusion for a fair bit of my  
21 graduate career in saturated environments, mind you,  
22 I find that fairly incredible.

23 DR. HORNBERGER: But, again, is that a  
24 result or is that an assumption?

25 DR. WYMER: A result.

1 MR. CAMPBELL: It's a result. If you look  
2 at the outputs, diffusion is dominating the releases.

3 CHAIRMAN GARRICK: It doesn't make any  
4 sense.

5 MR. CAMPBELL: And you get a lot of  
6 diffusive releases even where -- I mean basically you  
7 don't need flowing water to release radionuclides from  
8 Yucca Mountain, and I find that an incredible result.

9 CHAIRMAN GARRICK: That's a ridiculous  
10 result, yeah.

11 MR. CAMPBELL: And in my opinion, and we  
12 mentioned this in the report, and I think the general  
13 feeling of the subcommittee was that it may lead the  
14 public and the decision makers to perceive that the  
15 potential dose from Yucca Mountain, if the waste  
16 packages fail, if and when they fail, is potentially  
17 much higher than it actually is.

18 DR. WYMER: Now, that's sort of beyond our  
19 area of responsibility.

20 MR. CAMPBELL: And that's a conclusion,  
21 but that's, you know, Andy Campbell's personal  
22 opinion, but it looks like we've got a system  
23 dominated by diffusive release at present.

24 DR. HORNBERGER: But I mean, so, for  
25 example, I could then argue --

1 MR. CAMPBELL: That doesn't make a lot of  
2 sense.

3 DR. HORNBERGER: I could argue that,  
4 again, as John was saying, that what I want to do is  
5 make sure that I have really bounded this, and I'm far  
6 away from an actual dose, and therefore, if what  
7 you're saying is that there's no way that it can be  
8 release anywhere near this fast and I'm DOE and I then  
9 calculate that the risks are -- even so, the  
10 calculated doses are quite small. Why isn't this good  
11 news to the regulator?

12 I mean, okay, it's a ridiculous result  
13 from the standpoint of physics, but if, in fact,  
14 you're taking the point of view that what I want to do  
15 is found these calculated doses far away from anything  
16 that somebody could envision.

17 DR. WYMER: One of the problems we have is  
18 that we have nested bounding conditions.

19 DR. HORNBERGER: I understand that.

20 DR. WYMER: You know, and we have bounds  
21 within bounds within bounds, and we don't know how  
22 they interrelated.

23 DR. HORNBERGER: No, as you know, I've  
24 been on board for a long time advocating that as close  
25 to a realistic analysis as possible should be done

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1 because the closer you can get to how you think the  
2 performance actually is, you're giving the regulator,  
3 the decision maker the real information that they need  
4 to make a credible decision or a decision that's based  
5 on the best science. So I agree with all of that.

6 But if that's not the approach being  
7 taken, then somebody would argue that, well, fine. So  
8 what you're saying is that the releases are going to  
9 be much, much less than we've calculated.

10 MS. DEERING: Maybe all that translates  
11 into then is that becomes a need to be identified for  
12 performance confirmation. If it is, in fact, the  
13 purpose of performance confirmation to have a more  
14 realistic understanding of your system, you know, the  
15 understanding of processes, if that was a goal. Would  
16 that be --

17 CHAIRMAN GARRICK: Well, I guess my  
18 problem with this, Lynn, is if the strategy is to  
19 bound the safety, then they don't need to go through  
20 all of this paraphernalia and infrastructure of Monte  
21 Carlo analysis and sampling and abstraction that takes  
22 up hundreds and thousands of pages of material to make  
23 it look like they have nice probability distributions,  
24 and that these represent somehow the truth, when in  
25 fact they're not the truth. They're not even close to

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1 the truth.

2 You know, then they could have -- rather  
3 than doing this in 10,000 pages, they could have done  
4 it in 200 pages.

5 DR. WYMER: But they didn't, and we're  
6 stuck with what they've got.

7 CHAIRMAN GARRICK: Well, I know that we're  
8 stuck with what they have, but I think it's important  
9 for this committee to be in a position to say to the  
10 Commission that we're not practicing what we're  
11 preaching with respect to the licensing of this  
12 facility in taking a risk informed approach.

13 DR. WYMER: Exactly. I think that's the  
14 key point right there.

15 MS. DEERING: Okay, but can they still  
16 make a comment? Can the NRC still make a judgment  
17 about safety based on that way of doing it?

18 DR. WYMER: Oh, sure.

19 MS. DEERING: Because that becomes the  
20 most important pressing need.

21 CHAIRMAN GARRICK: But then my other hat  
22 comes on and says, "Boy, this is terribly  
23 irresponsible from a design standpoint," as the  
24 Europeans have been saying for a long time. You know,  
25 we're really not doing the public a very good service

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1 here. We're certainly not putting any emphasis on the  
2 word in their strategic plan that says enable the  
3 society to employ the technology safely.

4 We're ignoring the enabling aspect of it  
5 because we're making it so expensive and so complete  
6 and so much like there's a real problem here when  
7 there may not be a problem nearly as much as we're  
8 suggesting, that you know, we're --

9 DR. WYMER: That's outside our scope.

10 CHAIRMAN GARRICK: That's outside, but  
11 it's inside somebody's scope.

12 DR. WYMER: Well, that's for sure.

13 CHAIRMAN GARRICK: And I can't, you know,  
14 just sit by the side and let us analyze ourselves into  
15 a state of paralysis here without somehow raising the  
16 issue.

17 MR. LEVENSON: Also I'd like to answer  
18 George's question. George, that is if I look at  
19 something in detail and I track it through, and I  
20 think if I use Ray's word, it's ridiculous, but the  
21 consequence of that one review is that it's so over  
22 estimated, it's very conservative from a regulator's  
23 standpoint. So what?

24 The so what is if they didn't follow a  
25 rational process to arrive at that on that one item,

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1 how do I know that the others, all of the other items  
2 are okay?

3 I feel that there's an irrational process  
4 that led to that.

5 MR. CAMPBELL: I'm not sure it is an  
6 irrational process. It is a process that's been  
7 accepted in the industry for a long time, is to bound  
8 issues in terms of a safety compliance.

9 MR. LEVENSON: Oh, yeah. That's  
10 completely different though than what's being done,  
11 what we're talking about.

12 MR. CAMPBELL: Right.

13 MR. LEVENSON: I mean, the idea that the  
14 instant a stress corrosion crack penetrates the wall  
15 of the vessel, 50 percent of the surface of the vessel  
16 disappears, but at the same time it stays full of  
17 water, I don't consider that industry practice. I  
18 consider that close to irrational.

19 MR. CAMPBELL: Well, I would agree with  
20 you that there are some significant inconsistencies  
21 between --

22 CHAIRMAN GARRICK: Yeah, and also another  
23 simple example is that they're assuming that they get  
24 containment from Alloy 22. They get all of this  
25 containment for 10,000-plus years, and they get zero

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1 containment from everything else as far as the waste  
2 package is concerned.

3 MR. CAMPBELL: Well, the cladding plays a  
4 role in that.

5 CHAIRMAN GARRICK: Well, except for the  
6 cladding, but as far as the steel container and the  
7 rest of the waste package design, they're saying that  
8 fails at the instant that it's exposed, and these are  
9 just -- from an engineering standpoint, these are just  
10 inconceivable and irrational assumptions.

11 DR. WYMER: Well, let me take a devil's  
12 advocate answer to Milt here. I think whether or not  
13 you can have confidence in the results depends on the  
14 complexity of the situation that's being addressed.  
15 Certainly the chemistry area in my view is the most  
16 complex of all the issues in the repository, and  
17 therefore, it's more likely to be subject to these  
18 kind of criticisms.

19 But the other parts of it are much more --  
20 a lot of them are much more straightforward, and you  
21 can have some confidence that what you see is what you  
22 get, but what else is there?

23 MR. LEVENSON: Well, I would submit that  
24 the chemistry might be completely unimportant if  
25 there's no water there.

1 DR. WYMER: I'll agree with that, unless  
2 you --

3 MR. LEVENSON: And from what we've looked  
4 at in the water issue, I could hardly -- I certainly  
5 am not convinced.

6 CHAIRMAN GARRICK: And the geology is not  
7 important because we can't characterize it.

8 MR. LEVENSON: Right.

9 DR. WYMER: If a volcano erupts, you've  
10 got so dry chemistry.

11 MR. LARKINS: Well, to bring things back  
12 to full circle, I think it's important that the  
13 committee focus be on, you know, what the staff has  
14 done or what DOE has done in ETSPA or in staff's TPA  
15 model seems reasonable and provides results which are  
16 maybe not --

17 CHAIRMAN GARRICK: Yeah. Well, we can do  
18 that, but I think that this has been very healthy  
19 ventilation of some concerns and even some anxieties.  
20 I think we need to do that.

21 There's no question that we can --

22 MR. LARKINS: It may be that you want to  
23 capture some of these points though as things that  
24 should be, you know, followed on as either  
25 confirmatory work or whatever in terms of --

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1 CHAIRMAN GARRICK: Yeah.

2 DR. WYMER: Sure. That will follow from  
3 some of these.

4 CHAIRMAN GARRICK: And I think it's very  
5 important for us to not carry the illusion that  
6 there's anything close to a PRA philosophy being  
7 practiced here with respect to the PA, the performance  
8 assessment, even though you'll hear people claim that  
9 there is.

10 MR. LARKINS: I think the most important  
11 thing is going to be for the committee to say whether  
12 you think the PA provides incredible results that the  
13 Commission can base a decision on, and if not, you  
14 know, why not, and if you really challenge the  
15 validity of some of the models and things that are  
16 included in here, you know, if they're serious, if  
17 they have an impact on the bottom line, then I think  
18 that will raise issues with credibility not only for  
19 the Commission, but also for the public.

20 CHAIRMAN GARRICK: Yeah, yeah.

21 MS. DEERING: Do you really think it's  
22 this committee's job to remark on whether the DOE's  
23 analysis is credible or not?

24 MR. LARKINS: Or whether the staff's  
25 assessment of the DOE's analysis --

1 MS. DEERING: Why don't we just do the LA  
2 review, too, then?

3 MR. LARKINS: No. I think it's important.  
4 I think one of the things if I were chairman that I  
5 would expect my senior advisory committee to tell me  
6 is whether the staff's assessment of the DOE's --

7 MS. DEERING: That's what I would say,  
8 too.

9 MR. LARKINS: -- and their programs --

10 MS. DEERING: That's different though.

11 MR. LARKINS: -- their models --

12 MS. DEERING: That's different.

13 MR. LARKINS: -- their PA is credible.

14 MS. DEERING: Different.

15 CHAIRMAN GARRICK: Where I have the  
16 problem with that, Lynn, is that I don't know how you  
17 can reach a judgment on what the staff can do unless  
18 you understand what it is that they're reviewing. I  
19 don't know how you can do that.

20 MS. DEERING: I think you have to -- yeah,  
21 that you understand it, but I don't know if you're  
22 going to be able to make a --

23 CHAIRMAN GARRICK: I mean if you want to  
24 say, "Let's do an independent analysis," then just  
25 rely on that independent analysis as performed by the

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1 TAP. Sure, you could do that, but that isn't the way  
2 the review is --

3 MS. DEERING: Well, do you think we  
4 understand the TSPA?

5 CHAIRMAN GARRICK: No, not yet, but we're  
6 getting closer.

7 MS. DEERING: Do you think we can get  
8 there in time to make our sufficiency review?

9 DR. WYMER: We can on some parts of it.

10 MR. LARKINS: But what we said was we're  
11 going to do an audit. The last letter we revised the  
12 Commission's expectations from this committee, was  
13 that the committee was going to perform an audit  
14 function and provide some --

15 MS. DEERING: To be realistic about  
16 what --

17 MR. LARKINS: -- level of confidence,  
18 yeah.

19 MS. DEERING: -- we can do given our --

20 MR. LARKINS: I've written a letter on the  
21 TPA code basically saying you pretty much endorse what  
22 staff was doing.

23 CHAIRMAN GARRICK: Yeah.

24 MS. DEERING: Right, and we have to tie  
25 that into what we're doing here, too. We've already

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1 kind of blessed the TPA code, but how one uses it in  
2 the sufficiency review is what I'm looking, I think,  
3 to comment on now. Did they, in fact, take that code  
4 and use it in a supportive role to make defensible  
5 comments on sufficiency, regardless of what those  
6 comments are?

7 MR. LARKINS: I don't know because we  
8 never got a briefing on the guidance --

9 MS. DEERING: Sufficiency.

10 MR. LARKINS: -- sufficiency guidance as  
11 to --

12 MS. DEERING: See, we're missing some  
13 pieces.

14 MR. LARKINS: -- as to how the -- what are  
15 the pieces to staff's decision making process? We  
16 haven't gotten that.

17 CHAIRMAN GARRICK: Okay. Well, I think  
18 we've heard a kind of a review of the saturated flow  
19 and the total system performance assessment. We  
20 haven't said much about the thermal effects on flow,  
21 vertical slice.

22 MR. MAJOR: I've put a copy of the  
23 vertical slice release as far as Milt and I have  
24 gotten to date. It's in that same section --

25 CHAIRMAN GARRICK: Right.

1 MR. MAJOR: -- of your notebook. Just I  
2 think one of the things you're going to see, I tried  
3 to get to -- Milt and I tried to get to some larger  
4 issues. We went through and kind of filled out the  
5 questionnaire, and we tried to say, "Well, what are  
6 some of the larger issues that we're coming across?"

7 And a lot of those are some of the things  
8 that we've just discussed here this morning. So, you  
9 know, we have a concern about conservatism. We have  
10 concerns about internal conflicts in the model or one  
11 module is predicting water runs out and another module  
12 is predicting it runs in kind of thing.

13 You know, we have concerns over the next  
14 stage going from the KTI process in that direction.

15 CHAIRMAN GARRICK: Are you still chasing  
16 a water drop through the system?

17 MR. MAJOR: That was the model that we  
18 used to talk to the staff at the Center. And then  
19 there are some smaller issues, too, that came up, but  
20 I see just reading Andy's and Ray's list of concerns,  
21 you know, J-13, boy, is it really representative? We  
22 could come out with some concerns over precipitation  
23 of minerals and fractures. That may not be an over  
24 arching issue.

25 And I guess we're trying to come up with

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1 solutions, too. I mean, if we're going to point out  
2 the concerns to the Commission, I guess we ought to  
3 have some sort of recommendations as to how to satisfy  
4 them.

5 MR. LARKINS: But are you going to be able  
6 to say that the way it's being handled is reasonable?

7 MR. MAJOR: Overall I think --

8 MR. LEVENSON: Or a rational approach?

9 MR. MAJOR: Overall I think that is the  
10 conclusion at least to date.

11 DR. WYMER: The staff approach for  
12 reviewing it is a reasonable approach in my opinion.

13 MR. LEVENSON: On the water issue, you  
14 know, what I was saying earlier, that I think an  
15 important part of our being able to say that the staff  
16 is handling it properly is the staff's recognition  
17 that the KTI, resolution of all the KTIs isn't the  
18 answer. They've got to get into -- and part of the  
19 reason is that that preliminary look is finding  
20 significant discrepancies in the abstractions and in  
21 going from the KTI information into the model, and the  
22 staff is expanding their look at that.

23 And so from my standpoint as an audit, I  
24 find no fault with the staff on this issue. I think  
25 they're going ahead now.

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1                   Eventually, John's words, you have to  
2 understand, but that's down the road someplace.  
3 There's been recognition of the fact that they've got  
4 their work cut out for them. I think they're moving  
5 in the right direction

6                   DR. WYMER: The TPA is an indispensable  
7 tool for doing this.

8                   MR. LEVENSON: Well, one of the things, of  
9 course, is that particularly in the water area, TPA  
10 gives you significantly different results in some  
11 cases than the TSPA, and then that's something to  
12 focus on and say why is that different, and when they  
13 start digging, they find that there's some problems  
14 with the abstractions.

15                   So from the standpoint of auditing what  
16 the staff is doing --

17                   CHAIRMAN GARRICK: Well, we've tried to  
18 focus --

19                   MR. LEVENSON: -- you know, I find no  
20 problem with it.

21                   CHAIRMAN GARRICK: -- on the TSPA, I've  
22 tried to focus on the abstraction process, and it's  
23 very difficult. It's very difficult to nail down  
24 analytically what that abstraction process is.

25                   You know, I like to be able to see

1 analytically what's going on

2 MR. LARKINS: And that goes back to a  
3 point that this committee raised a year and a half ago  
4 about these analyses should be transparent.

5 CHAIRMAN GARRICK: Yes.

6 MR. LARKINS: And that may be a comment  
7 that you might want to include in here.

8 CHAIRMAN GARRICK: Right, right.

9 Well, okay. I think we've kind of got a  
10 sense of where we all are on our four vertical slices.

11 MR. LEVENSON: Let me just respond to  
12 John. He said, you know, maybe it isn't transparent.  
13 I'm not sure it's even opaque because you get some  
14 light through an opaqueness.

15 CHAIRMAN GARRICK: Right.

16 MR. LARKINS: My comment was there are  
17 about four or five items that the committee raised in  
18 a letter, and Lynn has them, I think somewhere.

19 CHAIRMAN GARRICK: Yeah.

20 MR. LARKINS: And those may be the types  
21 of things you want to comment on in addition to the  
22 general consensus.

23 MS. DEERING: I think it's important to  
24 use the VA comments at least as a -- at least refer to  
25 them to our satisfaction so that we can explain to

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1 somebody who asks that we felt there was progress or  
2 no progress in those areas, and most of them were TSP  
3 related.

4 MR. LARKINS: provide some continuity.

5 MS. DEERING: Yeah.

6 CHAIRMAN GARRICK: And we also wrote a  
7 letter where we said some favorable things about the  
8 TPA.

9 MS. DEERING: The TPA code.

10 CHAIRMAN GARRICK: Based on the last  
11 meeting at San Antonio, right?

12 MS. DEERING: Yes.

13 MR. LARKINS: That's not to say you can't  
14 change your mind.

15 DR. HORNBERGER: That can be repealed?

16 CHAIRMAN GARRICK: Yes.

17 (Laughter.)

18 MR. CAMPBELL: Milt, are you speaking of  
19 the TSPA and the PMRs and AMRs or are you speaking of  
20 the NRC staff process when you say it's difficult to  
21 even get light through it? Your comments were more  
22 oriented towards the TSPA, I thought. I wanted to  
23 make sure that I understood that.

24 MS. DEERING: Good question.

25 MR. LEVENSON: Well, historically it has

1 to apply to both since in trying to follow what went  
2 through in the KTI process we weren't allowed to  
3 attend caucuses. It's hard to say it's transparent.

4 CHAIRMAN GARRICK: All right. I think a  
5 break is scheduled now, is it not?

6 MR. LARKINS: Can I ask one other question  
7 since I've got to step out for a while?

8 MS. DEERING: No.

9 MR. LARKINS: Lynn, is it clear now how  
10 you are going to integrate this into a single package  
11 in July for the July meeting, to have a rough draft?

12 MS. DEERING: How should I say this?

13 (Laughter.)

14 DR. WYMER: I think one word would do it.

15 MS. DEERING: How about two words?

16 CHAIRMAN GARRICK: Well, we'll have to  
17 communicate it, but given that the vertical slices or  
18 drafts are not going to be available until the July  
19 meeting.

20 MR. LARKINS: Well, the problem is -- Lynn  
21 and I have talked about this a little bit -- she's  
22 going to need some lead time in order to get a clean  
23 draft done for -- yeah, I've read that.

24 MS. DEERING: It's a good start.

25 MR. LARKINS: It's a start.

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1 MS. DEERING: Is this approximately --  
2 this is the context, George, right? I mean, have you  
3 read this?

4 DR. HORNBERGER: Yeah.

5 MS. DEERING: Is this going to give us a  
6 framework to work from?

7 CHAIRMAN GARRICK: Sure.

8 MS. DEERING: Okay.

9 DR. HORNBERGER: Absolutely. I thought it  
10 was great.

11 MS. DEERING: Thank you.

12 MR. LARKINS: No, I'm just -- it is a  
13 great start. Well, we gave the presentation to the  
14 Commission.

15 MS. DEERING: The substance isn't there.

16 MR. LARKINS: We outlined how the  
17 committee was going to provide its comments, and I  
18 think we need to go back to see what we committed to  
19 in the Commission meeting to make sure that's captured  
20 in here.

21 CHAIRMAN GARRICK: Right, right.

22 MR. LARKINS: And that's my concern.

23 MS. DEERING: Well, I'm comfortable with  
24 that. I feel like I've traced what we said. You  
25 know, all along we've been --

1 MR. LARKINS: All right. If you're  
2 comfortable, fine.

3 MS. DEERING: We developed viewgraphs  
4 based on a written, ongoing -- we kept current every  
5 month. Here's where we stand on the vertical slice,  
6 and as we modified our approach, and I feel like this  
7 letter reflects that history.

8 MR. LARKINS: Okay.

9 MS. DEERING: But that's the least of our  
10 problems.

11 MR. LARKINS: I just want to know that you  
12 feel comfortable in putting this together in July.

13 MS. DEERING: I'm not. I'm not. I'm  
14 concerned about having insights that we can defend and  
15 that aren't just, you know, shots in the dark kind of  
16 thing.

17 CHAIRMAN GARRICK: Yeah, I'm concerned  
18 about doing justice to the tremendous amount of work  
19 that's been done and with the extreme limited  
20 resources and our inability to get a consultant in the  
21 TSPA arena, this puts an additional burden on us to  
22 deal with this mammoth project, and it is a mammoth  
23 project.

24 MS. DEERING: It is.

25 CHAIRMAN GARRICK: And that's -- you know,

1 I don't want to over -- I think we need to do justice  
2 to the tremendous amount of work that's been done.

3 MR. LARKINS: Sure. And there's still a  
4 tremendous amount of work yet to be done, and that's  
5 why I was just trying to get a level of warmth.

6 DR. HORNBERGER: Well, a tremendous amount  
7 of work to be done, but not for sufficiency review.  
8 I mean, there can't be a tremendous amount of work to  
9 be done on sufficiency review yet. These have to be  
10 done by the end of August.

11 MR. LARKINS: I agree. I agree, but I've  
12 seen the various parts that have been generated, and  
13 I think we're getting there on the chemistry, on --

14 DR. HORNBERGER: Oh, you're talking about  
15 us.

16 MS. DEERING: Us, yeah.

17 DR. HORNBERGER: Oh, I thought you were  
18 talking about staff. Oh, yeah, we have a tremendous  
19 amount of work to do.

20 (Laughter.)

21 DR. HORNBERGER: I misunderstood you,  
22 John.

23 MS. DEERING: Well, but we could pare that  
24 down a little bit as we've been doing before and  
25 continue to modify. I realistically, we have a

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1 tremendous amount of work to do, but it still has to  
2 be a realistic amount of work to do, right?

3 DR. HORNBERGER: Yeah, I agree, and I  
4 think that that's what we're talking about. So when  
5 we look at TSPA in the long run, John may be  
6 absolutely correct that we have to understand fully  
7 and implicitly everything that's going on in TSPA, but  
8 if we set that as a goal for ourselves by next month  
9 or July --

10 MS. DEERING: We can't do it. We can't do  
11 it.

12 DR. HORNBERGER: -- it's impossible.

13 MS. DEERING: Good.

14 DR. HORNBERGER: And we know we can't do  
15 it.

16 MS. DEERING: That's what I need to  
17 understand.

18 DR. HORNBERGER: So we have to back off,  
19 and to a certain extent rely on reports that --

20 CHAIRMAN GARRICK: Having said that --

21 DR. HORNBERGER: -- and what the review  
22 of TPA did.

23 MS. DEERING: Yeah, and we --

24 MR. LEVENSON: Is this TSPA required for  
25 site suitability? I mean go back to the question I

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1 raised yesterday. It says, I think, in the law the  
2 site should be characterized in the waste form  
3 proposed. It doesn't say the waste form has to have  
4 been identified. Just proposed.

5 CHAIRMAN GARRICK: Well, we made a  
6 decision to take TSPA as one of our vertical slices.  
7 So --

8 MR. LEVENSON: Yeah, but that's a  
9 different thing.

10 MS. DEERING: Jim, could you comment on  
11 that because it's interesting. I'd like to hear the  
12 staff's perspective of why they're using it for  
13 sufficiency.

14 MR. FIRTH: Well, I mean, in terms of  
15 sufficiency comments, we're focused on at depth site  
16 characterization and the waste form proposal. So I  
17 mean, that's what our focus is.

18 One way of thinking of it in terms of the  
19 TSPA is an application of at depth site  
20 characterization in waste form analyses. What's we're  
21 underway doing now is trying to resolve our KTI  
22 subissues, which includes TSPAI, which under that you  
23 have all of the integrated subissues, which was talked  
24 about earlier by the committee, as well as like  
25 overall performance objective, like there are certain

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1 things there that we're looking at in terms of  
2 methodology that we're trying to resolve, and by doing  
3 that, any of the comments or questions that we have  
4 for DOE, and a number of these arise from our review  
5 of the TSPA SR, that we're trying to get answers to  
6 those or to have DOE either make revisions or identify  
7 when that work will be done.

8 So in the grand scheme of things, we're  
9 trying to get to closure in terms of having our  
10 comments and questions answered with respect to TSPA  
11 methodology. Now all of those things are necessarily  
12 relevant to what we would say in any sufficiency  
13 comments.

14 DR. WYMER: Yeah, there are several kinds  
15 of tools you could use. That's the one you chose,  
16 TSPA.

17 MS. DEERING: Yeah. So really it goes  
18 back to that issue of them -- the ongoing issue  
19 resolution activities and the sufficiency being a  
20 piece of that and not being an endpoint in itself, but  
21 as they move on through issue resolution, they can  
22 borrow from the framework they're already using and to  
23 support their comments, and the same with us.

24 This is not an endpoint, but it is a  
25 little interim point where we're going to make a

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1 report to the Commission.

2 MR. LARKINS: Let me ask a quick question.  
3 Issue resolution then is a necessary step for  
4 sufficiency? In other words, to have everything  
5 categorized as closed, pending, or some other state in  
6 order to make comments?

7 MR. FIRTH: No, our comments do not need  
8 to have everything as one status or another.  
9 Basically the requirement that we have is to provide  
10 comments on the sufficiency of at depth site  
11 characterization analyses in the waste form proposal.  
12 That by itself is independent of what the status of  
13 our subissues are. And I guess I'll leave it there.

14 MR. LARKINS: No, the only reason I asked  
15 the question was because I thought at one point you  
16 wanted to have a road map which says, "Okay. We  
17 either have enough information or we've identified  
18 what information is needed in order to support the  
19 license application."

20 But that's not part of the sufficiency  
21 finding.

22 MR. FIRTH: Well, sufficiency --

23 DR. HORNBERGER: We were just recalling  
24 the "Gong Show," John.

25 (Laughter.)

1 DR. HORNBERGER: Did you ever see that?

2 MR. FIRTH: I guess I'd just say that in  
3 terms of sufficiency, what we're interested in is what  
4 would be available for a license application. So that  
5 reflects what's there and what will be there if things  
6 are not there right now.

7 And, I mean, we're focused on trying to  
8 get the information we need for if DOE were to submit  
9 a license application, that we would have enough there  
10 to conduct a review.

11 MR. LEVENSON: Well, isn't the problem  
12 that you're carrying on two things simultaneously?  
13 You're trying to assure that the license application  
14 will include everything it needs, and that's somewhat  
15 different than the site suitability requirements, and  
16 you're carrying forward both of them at the same time,  
17 and we're getting mixed up as to which is relevant to  
18 which, aren't we, here?

19 The committee is getting mixed up.

20 MR. FIRTH: Yeah, I mean, there are two  
21 different things in terms of how to look at things.  
22 I mean, you have the same body of information that  
23 sort of feeds both things, and there is a slightly  
24 different focus that needs to be applied for each of  
25 those objectives because there are certain things that

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1 -- and some areas are like in the TSPA area that don't  
2 have the same relevance for what our sufficiency  
3 comments might need to be, as opposed to what we would  
4 eventually have to evaluate if we were reviewing a  
5 license application.

6 CHAIRMAN GARRICK: Okay. Let's take a 15  
7 minute break.

8 (Whereupon, at 10:48 a.m., the above-  
9 entitled matter recessed for a break followed by  
10 lunch, to reconvene at 1:00 p.m., the same day.)  
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A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

(1:02 p.m.)

CHAIRMAN GARRICK: We will come to order.

And would you please introduce yourself and whomever else is going to participate.

MS. HANLON: I certainly will. Can you hear me all right? Is this coming through all right?

I'm Carol Hanlon. I'm with the Department of Energy of Yucca Mountain Site Characterization Office. I have with me today Kathryn Knapp, who played an instrumental major part in the process of developing this document.

As well, we're lucky to be hooked up with VTEL to the Las Vegas site. Can you all hear us back there?

LAS VEGAS GROUP: Yes, we can.

MS. HANLON: Okay. And I see Cayce Prince, Dan Kane, who is in charge of the core team leadership; Patrick Rowe, again a very important member of that. And is Candy with you?

MR. KANE: She will be here shortly we're anticipating, but she's not here yet, Carol.

MS. HANLON: Okay. Great. And these people are with us today to answer any questions that you may have on the technical details of the document.

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1           So I'm pleased to be here today to  
2 introduce and discuss with you the science and  
3 engineering report and our site recommendation  
4 process.

5           In terms of my presentation, I'd like to  
6 discuss with you some of the background to where we  
7 find ourselves with regard to the Yucca Mountain  
8 Science and Engineering Report; also to introduce that  
9 report; to talk about the site recommendation process  
10 itself and the steps forward; and a brief summary.

11           And in that introduction we've segmented  
12 it and broken it into portions. After I introduce the  
13 science and engineering report and provide additional  
14 information on the site recommendation process,  
15 Kathryn will provide some technical details and  
16 highlights which we hope will help you to focus your  
17 review and augment your understanding.

18           And then in the third portion we'll move  
19 on to any questions you may have, and of course, for  
20 that we have Dan, Patrick, Candy, Kathryn and Cayce  
21 available for questions.

22           As I think you're aware on May -- on May  
23 4th of this year the department announced its  
24 initiation of considering Yucca Mountain for possible  
25 recommendation to the President for development as a

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1 geologic repository. And in doing so we initiated the  
2 public comment period.

3 We issued Yucca Mountain Science and  
4 Engineering Report, and we issued the Supplemental  
5 Draft Environmental Impact Statement.

6 Last month Jane Summerson and, I believe,  
7 Joe Ziegler were here to discuss the draft supplement  
8 with you and talk about that and that's process  
9 forward.

10 So following the May 4th meeting or as  
11 part of the May 4th initiation, we met with the  
12 affected units of local government in Las Vegas. We  
13 conducted a meeting there to explain the site  
14 consideration process and introduce the documents,  
15 including the Science and Engineering Report as well  
16 as a Supplemental Draft EIS.

17 And on the following Monday, a Federal  
18 Register notice was issued to initiate the site  
19 consideration process and to announce to the public  
20 the availability of the engineering report. This  
21 notice discussed the process to be followed later this  
22 summer for release of additional information and  
23 scheduling of the public hearings that are required by  
24 the act.

25 The release of this additional information

1 will include the supplementary science and performance  
2 analyses document that we've mentioned before  
3 sometimes during our meeting, as well as a preliminary  
4 Site Suitability Evaluation. That's the evaluation  
5 that will be done by the department against its own  
6 siting guidelines proposed, 963, 10 CFR 963.

7 At that time -- I can't read from the  
8 glare so I'm turning around here a bit -- a little  
9 awkward.

10 So at that time we'll also give  
11 notifications of the dates, the locations and the  
12 times for public hearing on the possible  
13 recommendation, and we will also at that time when the  
14 Site Suitability Evaluation is released indicate the  
15 notification of the date for the end of the public  
16 comment period on considering the recommendation.

17 That's a little bit of information. We  
18 tried to have a broad distribution of the science and  
19 engineering document, so we mailed out -- we provided  
20 over 5,700 copies of the report itself to more than  
21 464 parties, and those parties include groups such as  
22 yourself, Technical Review Board, the NRC Commission  
23 and staff, Congress, groups such as every public  
24 affected units of government, State of Nevada and so  
25 forth.

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1           So it did have a broad distribution. On  
2 that initial Friday, initial review copies of the  
3 documents were provided to the ACMW to initiate your  
4 review, and later on we provided you with additional  
5 copies on May 23rd, I believe. A little late,  
6 but. . . .

7           So in terms of the Yucca Mountain Science  
8 and Engineering Report itself, it has a rather  
9 specific purpose, and that is primarily to address  
10 several of the requirements of the Nuclear Waste  
11 Policy Act directly.

12           In addition, to provide technical  
13 information to aid the public and interested parties  
14 in presenting comments on the draft -- excuse me -- on  
15 the data underlying the department's consideration of  
16 Yucca Mountain for possible recommendation to the  
17 President for further development.

18           Also, provides technical information  
19 supporting the analyses, which are contained in the  
20 supplement to the draft environmental impact  
21 statements.

22           And it provides information to be  
23 considered along with other information as we develop  
24 the preliminary site suitability evaluation.

25           Specific requirements of a Nuclear Waste

1 Policy Act are contained in Section 114(a)(1)(A), (B),  
2 and (C), and are really three specific requirements  
3 that must be addressed, and they require inclusion of  
4 a specific technical information as part of the basis  
5 for any site recommendation.

6 The first is a description of the proposed  
7 repository, including preliminary engineering  
8 specifications for the facility.

9 The second is a description of the waste  
10 form or packaging proposed for use at such repository,  
11 as well as an explanation of the relationship between  
12 the waste form and the geologic medium of the site.

13 The third is the discussion of the data  
14 obtained in site characterization activities relating  
15 to the safety of the site, and the Yucca Mountain  
16 Science and Engineering Report addresses this  
17 information.

18 The report presents a summary of  
19 information. It has no new specific information  
20 that's not contained in other references. So it is a  
21 summary document, and it is a summary of information  
22 and data which has been collected by the department in  
23 field and laboratory studies over more than 20 years  
24 studying and characterizing Yucca Mountain as a  
25 potential repository site.

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1           During this time, as you're well aware,  
2           the department has performed detailed site  
3           investigations on geology, hydrology, chemistry,  
4           climate and so forth, other characteristics of the  
5           site.

6           The Department has developed a preliminary  
7           design for the potential repository and for the waste  
8           packages to be emplaced, and the result of these  
9           scientific investigations and the preliminary design  
10          have been analyzed to asses possible future  
11          performance of the potential repository in a geologic  
12          setting of the site.

13          I think you're quite aware with the number  
14          of the references which provide the basis for the  
15          summary treatment presented in the sites and  
16          engineering report. I know that you have reviewed a  
17          number of them as you've gone through your vertical  
18          slice analyses, and as well I know that you've been  
19          involved in -- thank you for your participation in --  
20          the technical exchanges in the key technical issues.

21          So those types of references are the  
22          Analysis and Modeling Reports, AMRs, Process Modeling  
23          Reports, PMRs. The system description document, the  
24          total system performance assessment, SR, Rev. 0, TSPA  
25          SR, Rev. 0.

1                   There are pre-closure safety evaluation,  
2 the Yucca Mountain site description and the repository  
3 safety strategy.

4                   For the Yucca Mountain Science and  
5 Engineering Report there are 655 references in total.

6                   DR. HORNBERGER: You've read them all?

7                   (Laughter.)

8                   MS. HANLON: Twice. No, I can't lie to  
9 you. I haven't quite got through every one. But I'm  
10 told they have great --

11                   (Laughter.)

12                   MS. HANLON: And as enhancements over  
13 earlier documents you may have been briefed on or  
14 seen, Yucca Mountain Science and Engineering Report  
15 discusses a possible range or operating modes  
16 including a range of temperatures.

17                   It also discusses future studies and  
18 evaluations to address uncertainty and to improve  
19 understanding of the future performance of a potential  
20 repository, and those basically capture -- that  
21 information will be assured in the first -- in  
22 upcoming supplementary science and performance  
23 analysis documents.

24                   So just in terms of the contents, we have  
25 an executive summary, which captures the contents of

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1 the document itself.

2 Section 1, the introduction, which has  
3 some background and previews the other contents.

4 Section 2, description of the potential  
5 repository.

6 Section 3, description of the waste form  
7 and package.

8 Section 4, discussion of data relating to  
9 post-closure safety of the site.

10 And finally, five is a description of the  
11 pre-closure safety assessment.

12 So just in summary, a bit repetitive  
13 perhaps, we addressed -- the Yucca Mountain Science  
14 and Engineering Report does address the requirements  
15 of Section 114 of the act in terms of (a) (1) (A), (B),  
16 and (C); presents results of over 20 years of detailed  
17 science investigations and design development;  
18 presents the technical information supporting the  
19 analyses and supplemental to EIS; and will relay  
20 hopefully the public and interested parties in  
21 providing their comments to the department on  
22 technical information underlying our consideration of  
23 a possible site recommendation.

24 The Yucca Mountain Science and Engineering  
25 Report, as well as all of its supporting references,

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1 are presently available for public information in the  
2 Yucca Mountain Science Center. So we can field any  
3 requests or any questions at the Science Center. As  
4 well they're available on the Internet at this  
5 address, for you who are more interested in the  
6 computer.

7 In terms of the site recommendation  
8 process itself, hopefully in the near future I will be  
9 able to provide you additional details on the exact  
10 timing and scheduling. I know that's of interest to  
11 you. You've been involved in this process since  
12 you've done your vertical slices and planned your  
13 involvement. I'm sure you'll be interested in  
14 previewing both the suitability evaluation and being  
15 aware of and perhaps participating in the hearings.

16 So I will look forward to being able to  
17 give you that more detailed information as soon as  
18 possible.

19 But in terms of that, later this summer,  
20 DOE will issue additional technical information that  
21 the Secretary may consider, including the results of  
22 ongoing sensitivity studies and uncertainty analyses  
23 that are captured in the supplementary science and  
24 performance analysis document.

25 That has two volumes. The first volume is

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1 the scientific basis and analyses, which has the  
2 additional information, and the second volume, which  
3 captures the performance analyses.

4 Also, later this summer, DOE will release  
5 the preliminary site suitability evaluation on the  
6 suitability of the Yucca Mountain site against our  
7 proposed guidelines, proposed 10 CFR, Part 963, and  
8 when that preliminary site suitability evaluation is  
9 released, the department will announce dates, times  
10 and locations for public hearings, as well as the date  
11 for the end of the public comment period for our  
12 consideration.

13 CHAIRMAN GARRICK: Now, how is the  
14 performance analysis volume handled in respect to the  
15 TSPA?

16 Is that going to be part of the TSPA?

17 MS. HANLON: No. It's basically a  
18 supplementary document. It augments the TSPA. It  
19 speaks to a range of operating modes that were  
20 addressed in the science and engineering report, and  
21 that we will be considering in the site suitability.

22 So it provides additional information on  
23 unquantified uncertainties, range of temperatures and  
24 so forth, and the analysis of those that will be used  
25 in our suitability evaluation.

1 CHAIRMAN GARRICK: Is all of this going to  
2 be summarized again in an updated version of the  
3 engineering and science report?

4 MS. HANLON: It will. And I'll give you  
5 the process for that later, but just to answer you  
6 now, yes, it will. And it will also be captured in  
7 the suitability evaluation coming up later this  
8 summer.

9 And when that document is ready, it will  
10 be made available to you so that you can look at that  
11 document also, and I would anticipate that that's one  
12 of the things that you would like a briefing on.

13 Can you see this all right?

14 The schematic is I wanted to give a little  
15 bit of clarity on the two public processes that we  
16 have going on this summer. The first began on May  
17 11th, and that was the comment period for the  
18 supplemental draft EIS. It began on May 11th.

19 We had three public hearings, one at  
20 Amagossa Valley, one in Las Vegas, and one in Pahrump.  
21 You can see the dates for those: May 31st, June  
22 6th -- excuse me -- June 5th, and June 7th.

23 The initial comment period was for 45  
24 days. It ended up being 46 days because it ended  
25 originally on a Sunday, and it was to be concluded on

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1 June 25th. It has been extended 11 days in response  
2 to requests, and it will now end on July 6th.

3 So that's the period that is ongoing now,  
4 where they're considering public comments on the  
5 supplemental draft EIS only.

6 Now, also beginning at that time, the site  
7 recommendation comment period began on May 4th, and  
8 that's a comment period that goes throughout the  
9 summer. The first part of that document, as we said,  
10 the first part of that portion was really the Yucca  
11 Mountain Science and Engineering Report released on  
12 May 4th. It will continue later this summer when we  
13 release the preliminary site suitability report,  
14 becomes available for review.

15 And those are intended to help the public  
16 prepare their comments on potential site  
17 recommendation, not as a specific documents up here as  
18 the EIS, which have a specific document process for  
19 comment themselves.

20 So after the hearings that are held in the  
21 vicinity of site to receive comments and the close of  
22 the comment period, we will consider all public  
23 comments as we move forward and we finalize the Yucca  
24 Mountain Science and Engineering Report and do the  
25 final preliminary -- excuse me -- the final site

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1 suitability evaluation.

2 It will be factored into the consideration  
3 of whether the Secretary decides to recommend the site  
4 to the President for further development.

5 So for your future reference, this is  
6 basically the steps and site recommendation process.  
7 We've completed the first two, releasing the science  
8 and engineering report, as well as issuing the  
9 supplemental draft EIS.

10 In the near future we will close the  
11 public comment period on the draft EIS, and those  
12 comments will be considered as they prepare the final  
13 EIS.

14 We're completing the additional technical  
15 work on lower temperature operating environments and  
16 unquantified uncertainty. That will be, again, as I  
17 mentioned, contained in the supplementary science and  
18 performance analysis.

19 We will release the preliminary site  
20 suitability evaluation and announce hearings and the  
21 closing date for the public comment period.

22 Following close of the site  
23 recommendation, public comment period, comments will  
24 be considered by the Secretary as part of the basis  
25 for any recommendation decision.

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1                   We will receive Nuclear Regulatory  
2 Commission's sufficiency comments. The Secretary will  
3 make his decision on the site recommendation, and if  
4 recommended, the Secretary will then notify the  
5 governor and the legislature of the State of Nevada.

6                   No sooner -- if recommended, no sooner  
7 than 30 days after the governor's notification, the  
8 site recommendation would be submitted to the  
9 President.

10                   And supporting -- this is the current  
11 document information concept that we have for  
12 supporting information that would support the  
13 Secretary's consideration and recommendation. Here we  
14 are in this process in the May and June time frame,  
15 where we have a science and engineering report and the  
16 DEIS supplement comment periods we've previously  
17 discussed. Later, we will have a preliminary site  
18 suitability evaluation.

19                   Now, in the fall as we move forward toward  
20 any site recommendation, we would revise the science  
21 and engineering report based on the public comments.  
22 We would also develop a final site suitability  
23 evaluation report, again based on the comments.

24                   We'd have the final site -- the final  
25 environmental impact statements. We will have NRC

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1 sufficiency comments. There will be a summary  
2 document, a comment summary document, which identifies  
3 the comments we've received and indexes them and has  
4 a summary response. We will have any characterization  
5 impacts reports that the Nevada state may wish to  
6 provide, and other information such as the total site  
7 lag times, TSLCC, total --

8 MS. KNAPP: Total system life cycle costs.

9 MS. HANLON: Thank you.

10 That total system life cycle costs.  
11 That's a good reason why I never do acronyms.

12 So all of those will be factored into the  
13 Secretary's decision and will be accompanied by the  
14 comprehensive and short statement of the basis for  
15 recommendation.

16 CHAIRMAN GARRICK: Just to help me  
17 understand the process a little bit, which of those  
18 are required by law?

19 I don't know anywhere where a science and  
20 engineering report is called out in the Nuclear Waste  
21 Policy Act, specifically.

22 MS. HANLON: Right. This is how we  
23 decided to bundle the information so that it's more  
24 accessible for you and it's in packages that can be  
25 treated. Basically, the one that is specifically

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1 required by law are the NRC's sufficiency comment.

2 And then the other information to support  
3 the Secretary's decision we have just decided to  
4 bundle into the Yucca Mountain Science and Engineering  
5 Report, which is the technical aspects; the  
6 suitability evaluation, which is as I said our  
7 evaluation against 963; the comment summary documents,  
8 where we want to show that we have evaluated and given  
9 consideration to comments we've received.

10 And in terms of this, we are specifically  
11 required to get comments from and address the comments  
12 from states and governors. We are also going to  
13 address and consider all the comments we received from  
14 public and the other parties, but these two are  
15 basically the ones called out in the act, Dr. Garrick,  
16 and these other things are bidding and packaging.

17 CHAIRMAN GARRICK: I realize that a lot of  
18 the science and engineering report is drawn from other  
19 reports, especially the performance assessment. But  
20 is there a reason that the performance assessment  
21 itself is not a part of this bundle?

22 MS. HANLON: It should have been on there,  
23 and sometimes we show it on earlier. It is -- it  
24 certainly supports site suitability evaluation report  
25 and the science and engineering report, as does the

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1 supplementary science and performance. So those have  
2 been our easier ones. Just for the ease of reading,  
3 I didn't include them here.

4 CHAIRMAN GARRICK: Okay. So this is  
5 pretty much somewhat an arbitrary decision as to the  
6 documentation that the Secretary would consider.

7 MS. HANLON: Right, and that's why we just  
8 call it --

9 CHAIRMAN GARRICK: It's not previously  
10 defined.

11 MS. HANLON: No.

12 CHAIRMAN GARRICK: Okay.

13 MS. HANLON: So that's why I'm referring  
14 it to the proposed document concept for site  
15 recommendation, and previously I think in a number of  
16 presentations, probably even Jane's last month, you've  
17 seen the pyramid, and that pyramid has a number of  
18 documents at the bottom, such as the AMRs, PMRs, the  
19 system descriptions document, TSPA and so forth. And  
20 that leads up later to these particular documents and  
21 into a finding as the basis for recommendation and the  
22 recommendation.

23 So this is just a little bit different way  
24 of organizing that information, hopefully for clarity  
25 for you.

1 CHAIRMAN GARRICK: Okay. Thank you.

2 MS. HANLON: So we realize there's a great  
3 deal of information that we're putting out this  
4 summer, and it was our hope that by making this large  
5 amount of information available in stages we could  
6 provide the public with -- and interested parties --  
7 both ample time to review the material and formulate  
8 their comments, and open and hopefully more  
9 transparent look into the recommendation process  
10 itself.

11 So in summary, with the process,  
12 additional documents will be available through the  
13 summer. We will conduct hearings in the vicinity of  
14 the site to receive comments on the possible  
15 recommendation, and there will be multiple points for  
16 your involvement, and I will let you know as soon as  
17 I can on the timing and the schedule.

18 May I answer any questions?

19 CHAIRMAN GARRICK: Probably.

20 Ray, you got any questions?

21 DR. WYMER: No, I don't. I thought it was  
22 all very clear -- transparent.

23 (Laughter.)

24 MS. HANLON: Or at least vaguely opaque?

25 CHAIRMAN GARRICK: Milt?

1 MR. LEVENSON: Not on this.

2 CHAIRMAN GARRICK: George?

3 DR. HORNBERGER: Carol, I have a question  
4 -- clarification. On one of your slides, Slide 20,  
5 you say you're going to complete additional work on  
6 unquantified uncertainties. I've never been clear on  
7 what unquantified uncertainties are. Could you  
8 enlighten me?

9 MS. HANLON: Well, I'll give it a shot.  
10 Kathryn can probably help me if I'm not being entirely  
11 clear.

12 As you're aware, unquantified  
13 uncertainties were one of the areas that the Technical  
14 Review Board was concerned about. And I think that  
15 may have been in the vein of where we have used a  
16 conservative approach to bounding rather than a  
17 specific and realistic numbers.

18 So basically in addressing that, it will  
19 be an attempt to get more realistic information and  
20 new information to go forward.

21 Kathryn, do you have anything to add on  
22 that?

23 MS. KNAPP: Right. The science and  
24 engineering report, and it might have even been in a  
25 TSBA that was talked about earlier, there was actually

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1 a process where they went through and looked at what  
2 we consider the more key uncertainties and then come  
3 up with sensitivity studies, and additional valuations  
4 that could better quantify those key uncertainties.  
5 And that is also a part of what's been pulled into the  
6 supplemental performance assessment.

7 DR. HORNBERGER: So this really is a  
8 direct response to the TRB's request for better  
9 representation of realism?

10 MS. KNAPP: Right.

11 DR. HORNBERGER: Okay.

12 MS. HANLON: In developing the Volume 1,  
13 we attempted to address four areas that the Board was  
14 interested in, not only the unquantified uncertainty  
15 and new information, but as well the lower operating  
16 temperatures.

17 DR. HORNBERGER: Right.

18 MS. HANLON: That information is in Volume  
19 1.

20 MS. KNAPP: Of the SSPA.

21 MS. HANLON: SSPA.

22 DR. HORNBERGER: Okay.

23 MS. HANLON: Both under size and  
24 performance analysis.

25 CHAIRMAN GARRICK: Now, aside from the

1 NRC, is there anybody else reviewing the engineering  
2 and science?

3 Are there actions required on the part of  
4 the report from any other body?

5 MS. HANLON: No, and essentially there's  
6 not an action required on the part of the NRC either.

7 CHAIRMAN GARRICK: Right.

8 MS. HANLON: Because we view this, and  
9 it's quite true, that there is no new information here  
10 that hasn't been made available somewhere else through  
11 the last 14, approximately, months, and the analysis  
12 in modeling reports, the process modeling reports, the  
13 earlier TSPA system. So all those documents have been  
14 summarized and put together in the outline that we've  
15 shown you, just to again bend that information and  
16 make the summary a little bit more accessible.

17 But there's no additional information  
18 there. So we put that out to help people understand  
19 the process, understand the technical information, and  
20 to formulate comments in the comment process as we go  
21 forward to hearings on a possible recommendation.  
22 That's specifically what the document is for.

23 So I guess the action is for people to  
24 understand where we are and hopefully being able to  
25 formulate comments and ask additional questions, but

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1 there's no action required on these documents.

2 DR. HORNBERGER: And also was -- as I  
3 recall you said that it was a summary document and it  
4 wasn't aimed at providing sort of a traceable path all  
5 the way down through your documents. It was simply  
6 summarizing to be a little more readable than, for  
7 example, the PMR's; is that fair?

8 MS. HANLON: It summarized it to pull the  
9 whole story together, and pull it together within the  
10 context of what's required by 114. So within that  
11 context, to take the information that we've been  
12 developing through the last many -- what? Two years  
13 at least in AMRs and PMRs and put them in that  
14 context.

15 We hope that it's traceable and readable.  
16 We've gone to great effort to put a reference after  
17 every statement and reference you to where that  
18 information is previously available, and an AMR  
19 analysis modeling report or a process modeling report  
20 of the TSP itself.

21 So we've gone to great lengths to try and  
22 get those references in. So hopefully anywhere you  
23 wanted to you would be able to go there and pull the  
24 thread and see where the background statement and the  
25 references in more detail is on that particular

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1 statement in the references.

2 But you shouldn't find anything that you  
3 have not already addressed in more detail in the  
4 specific reference documents themselves. This is a  
5 compilation more after the fact than any new  
6 information.

7 CHAIRMAN GARRICK: Milt.

8 MR. LEVENSON: Yeah. In your offer to  
9 clarify, and following up on George's question, I'm  
10 having -- I'm not sure I understand what you mean by  
11 quantifying uncertainty. Is this an attempt to  
12 quantify the parameters so you can reduce the  
13 uncertainty or are you just trying to define how  
14 little you know? I mean what --

15 MS. HANLON: Well, I go back to my  
16 original answer which I already made, and that is it's  
17 an attempt to clarify the process and in some issues  
18 to reduce the conservatism, the bounding and give a  
19 realistic parameter.

20 Kathryn, is there -- does anybody else was  
21 to say anything in Nevada on that point?

22 MR. LEVENSON: We can't hear them.

23 MS. HANLON: They hear us.

24 CHAIRMAN GARRICK: They can change it.

25 MR. LEVENSON: Oh.

1 MR. SULLIVAN: Hello, Carol. This is Tim.  
2 Can you hear me?

3 MS. HANLON: Yeah. We can hear you fine,  
4 Tim, and the question was if we can enlarge upon  
5 Milt's question on unquantified uncertainty.

6 MR. LEVENSON: What does it mean to  
7 quantify an uncertainty?

8 MR. SULLIVAN: It's to develop a  
9 distribution, a PDF that better represents our  
10 understanding of a specific parameter value, and to  
11 incorporate those in parameters that have previously  
12 been represented by single points, estimates, often  
13 bounding or conservative.

14 MR. LEVENSON: Okay. So it's not an  
15 attempt to reduce the uncertainty. It's only an  
16 attempt to illuminate the uncertainty; is that right?

17 MR. SULLIVAN: Fully capture or more fully  
18 capture the uncertainty, correct.

19 MR. LEVENSON: Thank you.

20 MS. HANLON: Thanks, Tim.

21 CHAIRMAN GARRICK: How many of those are  
22 you chasing?

23 How many -- can you characterize, can  
24 somehow characterize the magnitude of the problem of  
25 quantifying unquantified uncertainties?

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1 MS. HANLON: One of the things, I think,  
2 that we can do a little better on answering your  
3 question is in July when we come back to you and  
4 discuss with you this document itself as supplementary  
5 science and performance analysis. You know, at that  
6 point we'll have more information on that and we can  
7 discuss a specific document with you at that time.

8 So that, again, is something that we're  
9 doing for this document which is under development  
10 right now and in internal review this SPA, as you call  
11 it, or the supplementary science and performance  
12 analysis.

13 Perhaps Tim did you want to answer how  
14 many -- the range of --

15 MR. SULLIVAN: I don't have a specific  
16 number. We could certainly provide you that. It is  
17 in the range of 50 to 100.

18 CHAIRMAN GARRICK: Okay. What I'm really  
19 getting at is are they important as far as performance  
20 assessment is concerned. Is the reason they were not  
21 unquantified in the first place or that they were not  
22 quantified in the first place is that the analysts  
23 judged that they were not important contributors to  
24 the risk?

25 MR. SULLIVAN: No. The analysts judged

1 their bounding estimate was more appropriate, and it's  
2 that that was incorporated in the GSPASR. We visited  
3 that construct and asked the analyst to develop  
4 quantified distributions to the extent that they felt  
5 the information will allow them.

6 CHAIRMAN GARRICK: Okay.

7 MR. SULLIVAN: So that the process that  
8 we've gone through, and that will be reported in the  
9 supplementary science and performance assessment  
10 report that will be available next month.

11 CHAIRMAN GARRICK: Okay. Tim, while I've  
12 got you, in the engineering and science report, you do  
13 a pretty good job of identifying the places that you  
14 think you were conservative and the places that you  
15 think were bounding analyses. I'm curious about what  
16 your strategy is in this whole area of things that are  
17 important to the performance.

18 Is your strategy eventually to try to  
19 establish a consistency in terms of these parameters  
20 with respect to how they're treated? That is to say  
21 you indicated earlier what you mean by quantifying  
22 parameters as a probability distribution function. Is  
23 it your intent to try to develop realistic probability  
24 distribution functions for the parameters that are  
25 important according to your model to the bottom line

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1 performance of the repository?

2 MR. SULLIVAN: Yes.

3 CHAIRMAN GARRICK: So you really are  
4 striving to move in the direction of a realistic  
5 representation of the performance.

6 MR. SULLIVAN: Correct.

7 CHAIRMAN GARRICK: Because as it now  
8 reads --

9 MR. SULLIVAN: That's -- sorry. That is  
10 the goal of the supplementary science and performance  
11 analysis, and then as Carol has described, in the  
12 preliminary suitability evaluation we will present  
13 results both from a GSPASR and supplemental science  
14 and performance assessment report, and they'll be  
15 available for comparison.

16 CHAIRMAN GARRICK: Okay. That's  
17 interesting to hear --

18 DR. WYMER: It sure is.

19 CHAIRMAN GARRICK: -- because I didn't  
20 quite get that out of reading the science and  
21 engineering report, that that's the direction that you  
22 were going. So I'm pleased to hear that.

23 Thank you.

24 MR. SULLIVAN: I'll turn it back to you,  
25 Carol.

1 MS. HANLON: Thanks again, Tim.

2 CHAIRMAN GARRICK: Let's see. I think,  
3 John, you had a question, did you not?

4 MR. LARKINS: I think it's been answered.

5 CHAIRMAN GARRICK: Okay. How about it,  
6 Milt? Ray?

7 MR. LEVENSON: No, I'm fine.

8 CHAIRMAN GARRICK: George?

9 Any questions for Carol from the staff?

10 (No response.)

11 CHAIRMAN GARRICK: Okay. Good.

12 MS. HANLON: Thanks.

13 I'd like to turn it over now to Kathryn  
14 Knapp, who's going to provide you with some technical  
15 details on the individual portions.

16 MS. KNAPP: Hello. I'm Kathryn Knapp, and  
17 I support the Yucca Mountain DOE project through the  
18 contract with the Management Technical Services.

19 I'm going to present some highlights of  
20 the content that's in the science and engineering  
21 report. I have been quite involved with more of the  
22 review of this document and the development. There is  
23 what they call a core team or senior review team that  
24 was lucky enough to read this several times over  
25 before it actually was complete and issued for public.

1                   So with that, first, you'd like to know --  
2 I think Carol showed the contents of the S&ER, and if  
3 I do say "S&ER," I'm sorry. It's the science and  
4 engineering report. I, unlike Carol, probably do tend  
5 to use acronyms more than maybe I should.

6                   And it does follow the format very similar  
7 to the Nuclear Waste Policy Act because, as she had  
8 mentioned, one of the primary reasons of releasing the  
9 science and engineering report or developing it was to  
10 address the Nuclear Waste Policy Act, 114(a)(1)(B) and  
11 (C).

12                   So we have an executive summary for those  
13 of you who are familiar. It's just about a 20 page,  
14 very easy reading document that very well covers  
15 what's going to be in the document, and it also has a  
16 CD-ROM for those of you that would ever want to  
17 download the entire document.

18                   The introduction is Section 1, and then  
19 Section 2, 3, and 4 and 5 is when we start addressing  
20 some of what's require by the Nuclear Waste Policy  
21 Act.

22                   Section 2 provides the description of the  
23 potential repository, and it satisfies 114(a)(1)(A)  
24 and provides a description of the surface and  
25 subsurface facilities of the repository to include the

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1 preliminary engineering specs.

2 Section 3 provides the description of the  
3 waste form and packaging, and it should be noted that  
4 it really only satisfies the first part of (a) (1) (B),  
5 which is the description of the waste form and  
6 packaging. The relationship to the waste form and  
7 packaging to the geological medium is more addressed  
8 in Section 4, which is the discussion of the data  
9 relating to the post closure safety.

10 Section 4 also addresses the Nuclear Waste  
11 Policy Act (a) (1) (C), which describes the discussion  
12 of the data from the post closure safety.

13 And the Section 5 also satisfies Nuclear  
14 Waste Policy Act (a) (1) (C) from the pre-closure safety  
15 perspective.

16 One thing that I hope that it's becoming  
17 more and more clear and really needs to be kind of  
18 understanding before you even read the science and  
19 engineering report is there was a couple of  
20 enhancements, and it's not new information, but it's  
21 where we have been focusing and some of the  
22 enhancements that have come along within the last six  
23 months, and it's been a lot of the things we've been  
24 addressing throughout this meeting, is to take a look  
25 at reducing quantifying the uncertainties.

1           One of those is to incorporate a flexible  
2 design in which to take a look at operating over a  
3 range of thermal operating temperatures in order to  
4 hopefully reduce and to take a look at potential  
5 benefits from the performance perspective of doing  
6 that.

7           The design and the performance assessment  
8 that's contained in the science and engineering report  
9 is based on the higher temperature operating mode, and  
10 then also within the science and engineering report we  
11 did try to attempt to show where future studies and  
12 evaluations, sensitivity analysis would be done to  
13 better quantify those key uncertainties in addition to  
14 one of the ways of doing that being a lower thermal  
15 operating mode.

16           So with that, I'll start into the content  
17 section by section. The executive summary, as I  
18 mentioned, is 20, 21 pages. It does provide a good  
19 overview of what is contained in the entire document.  
20 It provides the reader with the understanding of the  
21 geology of the site, the repository and the waste  
22 package design; the processes that are important to  
23 long-term performance; and it also ends by giving the  
24 results of the performance assessment that's contained  
25 in the TSPA SR.

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1           The introduction, as Carol has mentioned,  
2 is really a good background of the entire project over  
3 the past 20 years. It presents the framework of the  
4 site recommendation process, which includes the  
5 statutory and the regulatory road map of that process.

6           It provides the background information  
7 relative to the project to include the sources of high  
8 level waste and spent nuclear fuel and where they are  
9 located, and it also provides the U.S. policy for  
10 geological disposal.

11           It provides a description of the site, to  
12 include the 20 years of site investigation studies and  
13 the results of those, and also a good description of  
14 the Yucca Mountain site, the geology, the hydrology,  
15 and the important site characteristics.

16           And finally, it provides the discussion of  
17 the responsibilities of various organizations and what  
18 their role is in the evaluation of the Yucca Mountain  
19 site.

20           Section 2 presents the description of the  
21 potential repository, and a lot of what I'm going to  
22 focus on might be changes or evolutions that are  
23 different than what was presented in the viability  
24 assessment, and so that's probably going to be in my  
25 starting point in where the changes happen.

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1                   It starts out by the design process. It  
2 provides the hierarchy for allocating requirements.  
3 So it talks all about how you take requirements at the  
4 federal level and then down through to where they end  
5 up being project level requirements and getting  
6 integrated into the design. That's for both the  
7 repository design and the waste package.

8                   And it also discusses the evolution and  
9 the flexibility of the design. So when we talk about  
10 lower temperature operating modes, how we can vary the  
11 thermal output to have a lower temperature design,  
12 that's discussed up front in Section 2.

13                   The surface facility design continues  
14 similar just to the VA where the waste handling  
15 operations are all within one building, the waste  
16 handling building. So all of the radiological  
17 operations, if you will, takes place in that waste  
18 handling building.

19                   The evolution since the VA is it does have  
20 expanded capacity, and this is to support the thermal  
21 management blending strategies. In order to get lower  
22 temperature height output, it might mean that you  
23 might have to wait longer to actually put a fuel  
24 assembly into the waste package so you can support  
25 your thermal management strategies.

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1           The subsurface. In these first three, a  
2 lot were driven -- even though in the science and  
3 engineering report we call it a higher thermal  
4 operating mode, it is much lower in comparison to the  
5 viability assessment. So some of the ways to achieve  
6 a lower temperature output that's done in the science  
7 and engineering report was through the emplacement  
8 drifts.

9           In the VA they were 28 meters center to  
10 center spacing, and now in the science and engineering  
11 report, the design is 81 meters.

12           It also went to a line load versus a two  
13 meter spacing of the waste packages, and although it  
14 went to a line load, which you might say, well,  
15 wouldn't you have a higher temperature by going line  
16 load, what it did is reduced the requirement of the  
17 heat output of the waste package.

18           The VA, I believe, was around 18 kilowatt  
19 heat output, and in the design described in the  
20 science and engineering report it's around 11  
21 kilowatts. So it went to a line load.

22           Also, the ventilation system now has an  
23 additional function of maintaining temperature and  
24 humidity, which is different than what was presented  
25 in the viability.

1           Some of the things that also were changed  
2 that you'll see in the next graphic, we went away from  
3 a concrete steel set -- I mean away from concrete to  
4 steel set for the ground control. Some of that was to  
5 eliminate some of the maybe uncertainty associated  
6 with the degradation of concrete and changing the pH  
7 within the environment of the drift.

8           Also, the footprint or the layout was  
9 changed, reoriented to increase drift stability, and  
10 because we went to a line load, you will also see the  
11 support assembly of the waste package was changed to  
12 emplacement power. In order to put the waste package  
13 closer together, they ended up coming up with a  
14 different way of emplacing the waste packages within  
15 the drift.

16           And probably one of the -- another big  
17 change was the addition of the drip shield. In the  
18 viability assessment, the drip shield was an alternate  
19 to the design. It wasn't included as part of the  
20 design. A drip shield made of a corrosion resistant  
21 material, titanium, has been included in the design  
22 presented in the science and engineering report, and  
23 it's to provide defense in depth. Its main function  
24 is to help divert water from away from the waste  
25 package.

1           And a different material was chosen from  
2 what the waste package is, defense in depth, so that  
3 you could look at different kind of -- eliminate  
4 different common fail modes.

5           MR. LEVENSON: While it might eliminate a  
6 common failure mode, doesn't it introduce the  
7 potential for electrolytic corrosion which might be  
8 more of a risk than a common failure mode from a  
9 material as opposed to a process or something else?

10          MS. KNAPP: Part of the material process  
11 they do look at compatibility of the materials. I  
12 wouldn't be able to maybe give you the specifics of  
13 that, but compatibility is one of the determinations  
14 of materials chosen, and that would probably be found  
15 in the material selection report that would give the  
16 details of that.

17          And finally, the drift invert is still  
18 part of the design. The drive invert potentially  
19 delays the radionuclide transport through the system.

20          And for those of you who like pictures --

21          CHAIRMAN GARRICK: Except you don't seem  
22 to take credit for it in the analysis. The invert, as  
23 I recall, you don't take credit for the invert in  
24 terms of radionuclide transport.

25          I don't know. Is that right, Tim?

1 MR. SULLIVAN: Dan Kane is going to answer  
2 this.

3 CHAIRMAN GARRICK: Okay.

4 MR. SULLIVAN: Are we on?

5 MS. KNAPP: Yeah, you're on.

6 MR. KANE: We don't take direct credit for  
7 it in the TSPA models, but what we do know that it  
8 does, it's going to hold up certain radionuclides that  
9 if you had a different material or didn't have that  
10 material, that those radionuclides could then escape  
11 also.

12 So one of the functions of that invert is  
13 to hold up certain radionuclides to permit a flow such  
14 that the radionuclides are trapped in that flow. What  
15 you find is when you get it in there, you have the  
16 radionuclides would move by fill rather than by flow.  
17 So that's the purpose that we really use that ballast  
18 for.

19 CHAIRMAN GARRICK: Will the residence time  
20 of the radionuclides eventually be taken into account  
21 in your model?

22 MR. SULLIVAN: The whole saturated zone,  
23 the unsaturated zone is just underneath, is take as an  
24 overall unit. We do not anticipate at this time going  
25 ahead and taking credit for that, some of the

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1 advective flows and some of the other stuff that would  
2 occur within the ballast material.

3 We are doing some different material  
4 property tests to try and paint the appropriate  
5 materials Dan had mentioned, but we do not anticipate  
6 that we will use the whole unsaturated zone underneath  
7 as a single unit and it will have properties that will  
8 help consider some of the different advective and  
9 different flows that flow through that entire region,  
10 including the invert section.

11 CHAIRMAN GARRICK: So as soon as the fuel  
12 element cladding corrodes, given that you don't take  
13 credit for containment provided by the stainless steel  
14 and other portions of the waste package, you only take  
15 credit for the Alloy 22 and the cladding. So assuming  
16 that when the cladding disappears you really have your  
17 source term essentially instantaneously; is that  
18 correct?

19 Because there is mobilization of the  
20 radionuclides in the absence of taking credit for  
21 either the invert or a waste package minus the Alloy  
22 22. I'm just trying to --

23 MS. KNAPP: That's correct.

24 MR. KANE: That's essentially correct.

25 There is some variation on that, of course, on where

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1 we've looked at water dripping down. We've done our  
2 probabilistic analysis of looking at different seepage  
3 and how it would come down, but what you essentially  
4 said is essentially correct.

5 We do not anticipate that all waste  
6 packages would degrade all at the same time or all at  
7 the same rate, and that that's going to give -- but  
8 you're right. It does give you essentially the source  
9 term, and then that's where it starts the unsaturated  
10 zone flow, et cetera, down in through your unsaturated  
11 zone to your saturated zone.

12 CHAIRMAN GARRICK: Thank you.

13 DR. HORNBERGER: So is this something that  
14 you would characterize as an unquantified uncertainty?

15 MR. KANE: I don't believe so. This is  
16 more of the conservatism. It's something that we  
17 understand what would happen. It's just like the  
18 cladding. We don't really look at the cladding  
19 necessarily as informed by uncertainty because we  
20 understand how generally those processes work, and as  
21 Tim mentioned earlier, generally there's different  
22 categories that we're looking at making more  
23 realistic.

24 But those realistics has to do with those  
25 primary properties because the flow through the invert

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1 material is over the life term of even a compliance  
2 period, is relatively small. So the overall  
3 contributor of that element, it actually would be  
4 quite small.

5 So we've tried to take those major  
6 elements that really contribute to the the dose and  
7 take a look at trying to make them much more  
8 realistic. And invert material really doesn't do much  
9 for you.

10 MR. SULLIVAN: I would call this a  
11 conservative assumption.

12 MS. KNAPP: Right.

13 MR. SULLIVAN: And I can't tell you  
14 specifically whether the supplemental science and  
15 performance analysis report reevaluates this  
16 assumption, but we can give you that.

17 CHAIRMAN GARRICK: Yeah, I think the  
18 question that we're sort of getting to is how many of  
19 those kind of assumptions do you make before you  
20 compromise the concept that you alluded to earlier,  
21 Tim, of trying to develop a realistic model.

22 MR. SULLIVAN: That's what we have  
23 attempted to do, is to root them out and represent  
24 them realistically with quantified uncertainties where  
25 appropriate, and the SSPA will document how we've done

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1 that.

2 And then it will also explore the impacts  
3 on performance.

4 CHAIRMAN GARRICK: Because there's other  
5 assumptions like this. The assumption of the wetting  
6 of the waste package, when it's partly wet, it's all  
7 wet, and so on and so forth.

8 So there's a whole series of those kinds  
9 of assumptions that I guess the question is how far do  
10 you take that before you have violated the rule of  
11 conserving the concept of realistic assessment, where  
12 realistic includes, of course, the uncertainty  
13 distributions that we talked about earlier.

14 Anyway, that's something we'll come back  
15 to, I'm sure.

16 DR. HORNBERGER: Just another quick  
17 follow-up though. If I understand correctly, what  
18 you're saying is that the analysts make an  
19 determination that, for example, in this case that  
20 we're talking about, the invert over the long term  
21 doesn't matter and, therefore, a conservative  
22 assumption is not going to be important in the final  
23 assessment, and that's why it's not an unquantified  
24 uncertainty in your terms. Is that right?

25 MR. SULLIVAN: Yes.

1 DR. HORNBERGER: Okay, and then just one  
2 last thing then. When you come forward with your  
3 supplemental science and engineering report, are you  
4 going to give any kind of documentation as to how  
5 these decisions are made?

6 MR. SULLIVAN: Yes. You will find a  
7 discussion in what we call the SSPA on essentially a  
8 subsystem model by subsystem model basis. You'll see  
9 a discussion of the analyses, number one; the  
10 unquantified uncertainties; and then analytical  
11 results at the subsystem level.

12 CHAIRMAN GARRICK: One thing that --  
13 excuse me.

14 MR. SULLIVAN: We don't mean to be  
15 unresponsive here to your questions. You know. We  
16 could as soon as is practical, you know, give you a  
17 presentation on the SSPA if that's what you're  
18 interested in.

19 You know, these presentations are focused  
20 on what's in the science and engineering.

21 CHAIRMAN GARRICK: Yes, I think we will be  
22 very interested in the SSPA. One of the things that  
23 your comment earlier about the fact that the time  
24 constance of migration through the waste package and  
25 the inverts are small compared to the time of

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1 compliance, et cetera, may be true, but on the other  
2 hand, if you try to unravel this problem and see what  
3 is important to other things, we're not looking at  
4 this for the moment so much from the standpoint of  
5 regulatory compliance as we are from the standpoint of  
6 getting a dose and when.

7 But I would suspect that some of these  
8 things would have quite an impact on the time of  
9 occurrence of the peak dose. Would you not also think  
10 that?

11 MR. SULLIVAN: I can't answer that.

12 MR. KANE: Initially, and this is very,  
13 very preliminary. This is, as Tim talked about, would  
14 be -- more discussion related to the SSPA, but some of  
15 our early analysis related to specifically some of the  
16 absorption and some of the other factors results to  
17 it. The answer doesn't make that terrible much  
18 difference. The assumptions that we've made in the  
19 SSPA, in other words, those that we focus on and say  
20 these are the more important factors, as Tim talked  
21 about, that would be in Volume 1 of the SSPA. It  
22 really gives you the logic of what we're talking  
23 about, saying these are some of the more important  
24 factors.

25 They enter and assess and they try to give

1 you more of the probabilistic analysis of where those  
2 bound, and they will give you kind of the general  
3 portion of what is the results of the impacts from  
4 those.

5 And additionally, there's only a few of  
6 those unquantified uncertainties that provides any  
7 real impact to the dose or time. We do shift it out  
8 some.

9 It's just like you were mentioning  
10 earlier. We don't take credit for the stainless  
11 steel. We don't take credit for some of the  
12 cladding. Obviously those could help push some things  
13 out.

14 But it's still, again, in the overall term  
15 related to the compliance period, yeah, it's probably  
16 small, but the overall what we're finding out is our  
17 TSPA SR does a pretty good job of bounding the  
18 conditions of what we anticipate.

19 CHAIRMAN GARRICK: Yeah, I appreciate your  
20 comment about the fact that there's probably not too  
21 many parameters that actually end up impacting the  
22 bottom line performance, and it sounds like some of  
23 the questions we have, and maybe most of them, are  
24 questions that we should bring up again when we hear  
25 about the SSPA.

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1 MR. SULLIVAN: Yes, and we don't have the  
2 authors or the analysts here right now.

3 CHAIRMAN GARRICK: Yes, yes. Okay, all  
4 right.

5 MS. KNAPP: And what I would offer, too,  
6 is that there is a section in Section 4 that talks  
7 about barrier analysis, and what some of that does is  
8 looks at, okay, if we weren't necessarily so  
9 conservative in that barrier and changed the parameter  
10 and they do a sensitivity analysis to look and see  
11 what that does to the mean dose, and so there is other  
12 ways of getting information to see by changing your  
13 barrier analysis what it does. And that is also part  
14 of Section 4.

15 MR. LEVENSON: I have one question for  
16 clarification. I thought I heard you say earlier that  
17 the things you are not going to take credit for you  
18 did not call an unquantified uncertainty. Did I hear  
19 that correctly?

20 MR. KANE: Yes.

21 MR. LEVENSON: So that then when you  
22 proceed to give distribution for unqualified  
23 uncertainties, these things don't get addressed at  
24 all?

25 MR. KANE: Yeah, there will be some cases

1 where they are not addressed at all, where we continue  
2 to use a conservative assumption or a bonding value,  
3 in those cases where we simply have no basis, no  
4 defensible basis to develop the unqualified  
5 uncertainty distributions.

6 I can't give you examples of those right  
7 now, but we certainly can do that as we talk about the  
8 SSPA.

9 MR. LEVENSON: No, I was just trying to  
10 understand what I thought you heard and, therefore,  
11 what I can expect to see so that your limit toward  
12 moving to a realistic assessment will not address  
13 those things that you've for whatever reason decided  
14 to not take credit for.

15 MR. KANE: Yeah, right.

16 MR. SULLIVAN: Some things it looks like  
17 you have diminishing marginal return, diminishing  
18 marginal return on. In other words, it's not going to  
19 affect your dose. It's not really going to affect the  
20 timing, and therefore, we don't feel it's necessary to  
21 only quantify those things. We think it's better to  
22 put the resources more in those particular planners  
23 that would make a difference, the difference being  
24 measured by the dose expectation curves.

25 CHAIRMAN GARRICK: That's reasonable.

1 MS. KNAPP: Okay, and I already pretty  
2 much went over the information. This is just a nice  
3 graphic presentation of the emplacement drift for the  
4 science and engineering report.

5 And as you can see, this is just a cut-  
6 away so that obviously the drip shield will be  
7 continuous along the emplacement drift.

8 Section 3 is a description of the waste  
9 force and packaging, and as I noted in the beginning,  
10 the emphasis in Section 3 for waste form is how the  
11 characteristics complement the waste package design.  
12 The waste form and the degradation characteristics and  
13 the data that support performance is in Section 4.

14 And it also provides a breakdown of the  
15 waste form inventory and also how that results in the  
16 number of waste packages and percentages of the  
17 idfferent sate packages that you would end up  
18 emplacing, and what this does is just essentially show  
19 you that for the most part the waste package design is  
20 very similar. It's the internal components that might  
21 be different to accommodate the different sizes and  
22 characteristics of the waste form.

23 But the basic design of the waste package  
24 is similar, regardless of the waste form.

25 DR. WYMER: This may be a little bit too

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1 detailed, but do you -- can you tell me what capacity  
2 you have for storing these things on site? Suppose  
3 you get jammed up in your repository and you can't  
4 move stuff in, but you've got this waste coming or  
5 you're got to take something out of the repository.  
6 What sort of storage capacity do you have on --

7 MS. KNAPP: You know that, don't you,  
8 Patrick? What's the storage capacity?

9 DR. WYMER: No, the surge capacity, so to  
10 speak.

11 MR. ROWE: Are we talking about for  
12 surface or --

13 MS. KNAPP: Surface. For surface.

14 MR. ROWE: For surface we have a fuel --  
15 inventory up there that we're talking about, which is  
16 5,000 metric tons. That's about 12,000 fuel  
17 assemblies.

18 DR. WYMER: Is that all? I mean, that is  
19 the capacity you have. Okay.

20 MS. KNAPP: In the design.

21 MR. ROWE: That is what we have in three  
22 pools that we have. We have 5,000 metric tons, or  
23 12,000 fuel assemblies, and those would be used to  
24 blend so that we can control the thermal unit of each  
25 waste package.

1 DR. WYMER: Okay. Thank you.

2 MR. ROWE: That's in the current design.

3 In other words, that could change.

4 DR. WYMER: Yeah, sure. Thanks.

5 MR. LEVENSON: That's in pool capacity.

6 do you have any capacity to store shipping containers  
7 before you unload them?

8 MR. ROWE: Sure. Yes, sir. We have an  
9 area out there, a staging area. I forget how many  
10 shipping containers it would hold. It's broken down.  
11 Some would be rail. Some would be road. This is for  
12 our planning purposes, understand.

13 So we do have that. It's called a staging  
14 area.

15 MR. LEVENSON: So your true surge capacity  
16 is more than the pool.

17 MR. ROWE: Well, if you look at 12,000  
18 spent fuel assemblies in a pool and you look at maybe  
19 several hundred spent fuel assemblies out there in  
20 casks, I'd say you, again, have most of your storage  
21 capacity in that pool, right?

22 MS. KNAPP: The next two slides, one is a  
23 graphic presentation of the waste package design, and  
24 then the other one kind of goes over the changes or  
25 the evolution of the waste package since the VA.

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1 I've a lot of times referred to the waste  
2 package design as a reverse of the VA design. One of  
3 the biggest changes in the waste package is the  
4 corrosion resistant materials now on the outside. It  
5 remains to be Alloy 22, which was the same material  
6 for the VA.

7 The inner barrier, as we've mentioned over  
8 and over again, we do not take credit for as a  
9 barrier. So its main purpose is for structural  
10 stability to support design basis events and also for  
11 handling and operating of the waste package.

12 Because we put the corrosion resistant  
13 material now on the outside, the lifting and handling  
14 of the waste package has changed. The VA had a skirt  
15 assembly that you used for lifting it. Now this has  
16 trending collars that are removable.

17 So during the surface facility these  
18 training collars are now the lifting device..

19 In addition, some of the other changes is  
20 this second Alloy 22 outer barrier lid was added.  
21 Alloy 22 is susceptible to stress corrosion cracking  
22 under certain environmental conditions. So as a way  
23 to potentially mitigate that corrosion method, we've  
24 added this middle lid, and then once the closure weld  
25 area is for that first Alloy 22 lid, it will be laser

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1       pained (phonetic) to reduce some of the stress  
2       associated with the weld.

3               And then the second outer lid after the  
4       closure weld, it will actually be induction annealed  
5       for the same defense in depth to remove any mitigation  
6       of the stress corrosion cracking.

7               MR. LEVENSON: Let me ask you a taxpayer's  
8       question. Since you're taking no credit for the  
9       stainless steel, and it's only for structural support,  
10      you've specified what I think is the most expensive  
11      grade of stainless steel you can buy, 316 NG, nuclear  
12      grade. Is there a good reason for doing that, or is  
13      that just -- for something you're taking no credit  
14      for, I'm just curious.

15              MS. KNAPP: I don't have that answer.  
16      It's part of the material selection process.  
17      Different stainless steels were looked at, and that  
18      was the one chosen.

19              In that material selection report, you  
20      will see that it does give a lot of categories of what  
21      choices and what you have to look at, whether it's  
22      thermal, mechanical, and cost comes into play as a  
23      discriminator in most places.

24              So I believe that the project's probably  
25      answer to that is we go out and we select the

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1 materials, and if you end up having several materials  
2 to select from, cost then can become a discriminator.

3 Okay. I think that pretty much covers the  
4 design of the waste package and it should be noted  
5 that this is the one for the commercial 21 PWR design,  
6 and I'd pretty much covered everything in the previous  
7 slide. So these are the words that back up the  
8 graphic presentation of the waste package.

9 Section 4 presents the data discussing the  
10 post closure safety. It does identify the key  
11 attributes for long-term performance, and they are  
12 limited water entry and emplacement drifts, long-lived  
13 waste package interrupt shield, limited release of  
14 radionuclides from the engineered barriers, delay in  
15 dilution of radionuclide concentration by the natural  
16 barriers, and low mean annual dose even when  
17 considering potentially disruptive events.

18 And then I went ahead and listed the  
19 natural barriers. It should be emphasized that the  
20 engineer barriers and the natural environment, natural  
21 barriers complement one another. The engineering  
22 barriers are designed to work with the natural  
23 barriers, and so together in what you will see on the  
24 next slide in a graphic presentation is how the  
25 engineering barriers and the natural barriers help

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1 attribute or contribute to the long term performance.

2 The natural barriers include the surface  
3 soils and topography, the unsaturated rock layers  
4 above and below the repository, and the volcanic tuft  
5 and the low yield deposits below the water table in  
6 the saturated zone.

7 Specifically the natural barriers  
8 contribute to waste isolation by limiting the amount  
9 of water entering the drifts and limiting the  
10 transport of radionuclides through the natural system.

11 And here is a nice illustration of the  
12 different components and models and how they  
13 contribute to the different attributes of the  
14 repository performance so that you can see the  
15 different models that support though limit the water  
16 contacting the waste package and down through the  
17 repository.

18 The performance assessment results. There  
19 is three performance measures, the first being the  
20 nominal scenario and mainly due to the key attributes  
21 in maintaining the waste package integrity. The  
22 calculated dose is no does in the 10,000 year  
23 compliance period.

24 The disruptive scenario, what it  
25 considered and modeled was the volcanic volcanism, and

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1 there's two different ways that it ended up modeling.  
2 The first was that you had a volcanic eruption that  
3 actually brought waste packages to the surface, and  
4 then that volcanic ash became contaminated and it was  
5 available for transport via the air to the receptor.

6 And then the second scenario is igneous  
7 intrusion where the waste package actually stayed  
8 within the subsurface facility and within the drift,  
9 but due to probability, they looked at how many waste  
10 packages would fail, and then that material,  
11 radioactive material, would be available to transport  
12 down through the unsaturated zone into the saturated  
13 zone for groundwater transport.

14 And then the dose that is reflected is the  
15 combination of those two, and it's basically fairly  
16 complex of how they go through the probability because  
17 since you looked that there's going to be one event  
18 within the 10,000 year period, but you don't know when  
19 that will happen, it's just a bunch of different  
20 probability to come up with a mean dose.

21 It does reach a peak at 10,000 years, and  
22 it's calculated approximately at .08 millirem per  
23 year.

24 The human intrusion scenario, this is  
25 modeled that it occurs at 100 years, and basically a

1 driller drills down through the waste package, and the  
2 drill bit goes down into the saturated zone, and then  
3 the radionuclides are available for transport via the  
4 groundwater to the biosphere. That calculated dose is  
5 approximately .008 millirem during the regulatory  
6 compliance period.

7 MR. LEVENSON: I'm curious. The first  
8 bullet says no dose and your last one lists as  
9 apparently a significant dose .008 millirem per year.  
10 Where do you discriminate since it's a continuum?  
11 Where do you cut off? What becomes no dose?

12 MS. KNAPP: It is -- since you do not have  
13 a breach of the waste package, there is no mechanism  
14 for dose.

15 MS. HERON: And let me just add. It's not  
16 a matter of this being a significant dose. It's the  
17 fact that we were required to analyze the human  
18 intrusion scenario, and when we analyzed that for the  
19 100 year and went through it and down to the water  
20 table, that calculation was .008, not the matter that  
21 we consider that significant, but that we were  
22 required to analyze that, and that's the results of  
23 our analysis.

24 MR. LEVENSON: I'm just thinking in the  
25 context of significant figures of numbers you quote

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1 and so forth.

2 MS. HERON: Right.

3 MS. KNAPP: We do struggle with that.  
4 From my background, I think sometimes, you know,  
5 calculated doses and if you went out and actually had  
6 measured these doses, you know, your detection limits,  
7 your variability and background and stuff, where do  
8 you say, well, that's really not even detectable?

9 MR. LEVENSON: Yeah, the variation in  
10 barometric pressure in that area will give you much  
11 greater variation in dose than that.

12 MS. KNAPP: Right, and that's why we try  
13 to stress that it is a calculated dose.

14 And finally the Section 5 is the pre-  
15 closure. I do want to emphasize that yesterday I  
16 think there was a question that do we rely on industry  
17 standards, and we do take advantage of that. A lot of  
18 the reg. guides, the ANSI standards, whatever is out  
19 there, the industry precedents, the human failure  
20 handling of fuel to look at probability distributions  
21 are relied on as part of the pre-closure safety  
22 assessment.

23 The strategy of the pre-closure relies  
24 heavily on trying to prevent through design design  
25 basis events. An example of this is that if you know

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1 that the waste package is designed for a certain drop  
2 height, then to try to make sure that you limit your  
3 lift heights such that you would never exceed that  
4 design basis and, therefore, never have a design basis  
5 event that would exceed the design of the waste  
6 package.

7 What the pre-closure safety assessment  
8 results were was that basically the structure system  
9 and components are being designed to provide safe  
10 handling of the waste and to prevent or reduce the  
11 impact of design basis events.

12 For the Category 1 calculated dose, the  
13 public was calculated to be .06 millirem per year, and  
14 for the worker .01 millirem per year, and because most  
15 of the design prevented waste packages and things like  
16 that from lead pipes, most of this comes from the  
17 handling of bare fuel assemblies and potential design  
18 basis events due to those mishaps.

19 And then for Category 2, the calculated  
20 dose to the public is .02 millirem per year.

21 DR. HORNBERGER: How does the public get  
22 a higher dose than the worker?

23 MS. KNAPP: Because most of the operations  
24 are done in hot cells. So if you were to have an  
25 accident, the worker is actually protected. Most of

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1 your dose is going to be via the airway. So it's  
2 going to go through the ventilation system, and even  
3 though it's HEPA filtrated, they are going to be more  
4 exposed than the actual worker.

5 DR. HORNBERGER: So there are no workers  
6 out at the cars ready to go home when this happens.

7 (Laughter.)

8 MS. KNAPP: We just don't let them  
9 breathe.

10 DR. WYMER: Not for the first 20 seconds.

11 MS. KNAPP: In summary, as Carol and I  
12 have both emphasized --

13 MR. LEVENSON: Excuse me. Let me go back  
14 to that question that comes out of that previous one.  
15 Since what we're really interested in is in the long  
16 run minimizing exposure to anybody, does the system  
17 recognize that if you go to a cold repository, you  
18 increase very substantially the amount of fuel  
19 handling, and you are now not talking about a mythical  
20 risk 10,000 years from now. You're talking about a  
21 very real risk in the near term, which seems to be in  
22 conflict with ALARA. How do you handle that?

23 MS. KNAPP: There is probably many people  
24 that support that argument, is that, you know, the  
25 post closure is showing zero dose, and here by going

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1 to a lower temperature you can actually be increasing  
2 your pre-closure, which in some people's opinion are  
3 more real doses.

4 MR. LEVENSON: they are.

5 MS. KNAPP: Right. So I think that is  
6 very valid.

7 MR. LEVENSON: Well, besides the generic  
8 thing, it's in conflict with ALARA, isn't it?

9 MS. KNAPP: Yes.

10 MS. HERON: Yeah, we recognize your  
11 concern on that point.

12 MS. KNAPP: I think it's a very good  
13 point.

14 MR. KANE: This is Dan Kane.

15 Let me just mention a couple of things  
16 here, if you don't mind. Number one, let's keep in  
17 perspective these doses that we're looking at. Let's  
18 remember how measurable they really are and  
19 quantifiable and understand that the history in the  
20 nuclear industry of handling spent nuclear fuel has  
21 not presented what you would call a challenging area  
22 with regard to either worker or public radiation  
23 exposures.

24 So while if we go to a cold repository  
25 down toward the cooler end of that thermal range, we

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1 may have additional radiological exposures. Let's  
2 keep in mind that these are going to be very much in  
3 line and not significantly less than what most workers  
4 at the nuclear power plants have been receiving.

5 So I'm not arguing with you that there  
6 would definitely be more. One would expect to see  
7 greater exposures to workers and possibly to public  
8 with a cold repository design, but I would say that if  
9 you look at it on a radiological exposure basis, that  
10 wouldn't really be a differentiator.

11 MR. LEVENSON: Well, I agree that the  
12 numbers in any case are small, but I think these  
13 numbers are not representative. I mean .01 millirem  
14 per year, that number comes from an assumed accident.  
15 The normal operating dose to anybody working in the  
16 hot cells will be significantly more than that. So  
17 these are not --

18 MR. KANE: Oh, sure.

19 MR. LEVENSON: These are not the numbers  
20 to use to assess things.

21 MS. KNAPP: These are not normal  
22 operating.

23 MR. LEVENSON: These are not normal  
24 operating numbers. And while I agree that they  
25 probably are not significant, ALARA doesn't allow you

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1 to discard its use just because the number is not a  
2 health risk.

3 MR. KANE: Well, it talks about  
4 practicability.

5 MR. LEVENSON: Yep.

6 MR. KANE: And that is the same approach  
7 that we will be taking with regard to ALARA. I think  
8 that in looking at that, one would want to see what  
9 kind of performance or better performance one might  
10 get in the 10,000 year regulatory period and balance  
11 that off against whatever the increased risks are from  
12 the additional handling of the cold facility.

13 I think that's the way you would be  
14 looking at ALARA.

15 MR. LEVENSON: Yeah, but I wasn't asking  
16 for an answer. My statement was: is that part of the  
17 consideration in looking at a cold repository, that it  
18 does, in fact, make this change. That's all.

19 MS. HERON: Thanks, Mr. Levenson. I think  
20 we --

21 MR. KANE: Okay. At this time that has  
22 not going to be --

23 MS. HERON: Dan, I think we understand the  
24 comment and the statement, and we'll take it into  
25 consideration as we have done.

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1 And I might ask if there are additional  
2 questions for Kathryn.

3 CHAIRMAN GARRICK: Ray, George?

4 MS. KNAPP: Or anyone.

5 DR. WYMER: No, that was fine. I  
6 appreciate it.

7 DR. HORNBERGER: Let's see. I have a  
8 couple questions. First of all, Kathryn, as you  
9 noted, there were several -- you highlighted the  
10 difference between VA and now.

11 MS. KNAPP: Right.

12 DR. HORNBERGER: And you pointed out that  
13 the temperature of the repository, even not  
14 considering the, quote, unquote, cold repository, but  
15 the one for SR, is a good bit lower than VA. And the  
16 question that I have is why was the decision made.  
17 What drove the decision to go to a lower temperature?  
18 Was it to improve corrosion resistance?

19 MS. KNAPP: After the viability  
20 assessment, the project did what they called an  
21 enhanced license design selection, and what they did  
22 is they looked at one OFS (phonetic) from the VA  
23 design, and through that process they decided to go to  
24 a lower temperature, in which for the most part the  
25 emplacement draft walls -- the majority would be below

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1 the boiling point of water.

2 But still the concept continues to be with  
3 the higher thermal operating mode, is to keep some of  
4 those pillars boiling such that you're boiling off the  
5 water, and then in the cooler regions of the drift,  
6 you would still hope to have your flow of water away  
7 from the waste package, and that is the concept that  
8 was the VA, but at the same point also looked at being  
9 able to accomplish that same thing with lower  
10 temperatures.

11 DR. HORNBERGER: Yeah. Well, I guess I  
12 more or less understand that, but what I'm not sure  
13 that I've ever heard is was there something specific  
14 that drove that decision, i.e., was it concern with  
15 having a cold spot between drifts in the collars?

16 MS. KNAPP: Well, that was what drove the  
17 line load.

18 DR. HORNBERGER: That's what drove the  
19 line load, right.

20 MS. KNAPP: Right.

21 DR. HORNBERGER: So why the lower  
22 temperature? I mean --

23 MR. KANE: It was -- excuse me. This is  
24 Dan Kane out in Las Vegas.

25 It was part of our overall strategy to

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1 look at various ends of this thermal spectrum. We had  
2 examined a very high end of it in the VA. In the  
3 PSSC, we examined temperature that wasn't that high,  
4 but still was going to keep the waste package above  
5 boiling, and it was just a natural progression to see  
6 what would happen if you went to the lower thermal  
7 operating range.

8 It was also suggested by the TRB that we  
9 continue along that path. They were looking at it, as  
10 were we to some extent, to see if it could possibly  
11 reduce certain uncertainties with regard to the  
12 chemistry, the thermocouple processes, the  
13 hydrological processes, just to see what kind of  
14 performance improvement you might get with simpler  
15 models, hopefully simpler, because you were going to  
16 go toward a region where you would be below boiling.

17 Now, I know many people think that there's  
18 not that much difference, and I would probably tend to  
19 come down on their side, but for the sake of trying to  
20 be able to know exactly what any improvements would  
21 be, we decided to continue on with that natural design  
22 evolution and see what would happen in a lower thermal  
23 design.

24 Does that clarify it any?

25 DR. HORNBERGER: Well, if I could

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1 paraphrase in a way that you probably won't like, what  
2 I just heard was that, well, let's for site  
3 recommendation look at a cooler repository because we  
4 haven't done it before rather than --

5 MR. KANE: I wouldn't object too much to  
6 that characterization.

7 MS. KNAPP: Plus the NWTRB was  
8 encouraging us to do that.

9 DR. HORNBERGER: Well, I mean, part of my  
10 question is I know that the TRB has beaten you  
11 severely about the head and shoulders over the hot  
12 repository.

13 MR. KANE: I would agree with that  
14 characterization.

15 (Laughter.)

16 DR. HORNBERGER: But I guess what concerns  
17 me is that whether somebody challenges you, it  
18 shouldn't be the primary thing. That is if a hot  
19 repository is truly better and safer, then we should  
20 be looking at a hot repository and not a cold  
21 repository, and what worries me is malleability of the  
22 program rather than standing up and saying, "No,  
23 we" --

24 MS. KNAPP: We don't have all of the  
25 information.

1 MR. KANE: The problem is we haven't  
2 looked at the cold yet. That's what we're doing now,  
3 is looking at that lower thermal --

4 MS. KNAPP: We can't say hot is better  
5 until you take a look at what low does for you.

6 MR. KANE: You look at the opposite of  
7 hot.

8 DR. HORNBERGER: Okay, but again, back to  
9 my -- the question that I have isn't really with the  
10 so-called cold repository. Tell me why the design  
11 that Kathryn presented is better than the design in  
12 the VA. That's really what I want to know.

13 Why is it safer?

14 MR. KANE: I think the short answer to  
15 that is that by allowing drainage between the drifts  
16 through the so-called pillars, you then get out of  
17 having to determine how the water is going to be  
18 remobilized when the boiling fronts coalesce across  
19 all the drifts.

20 DR. HORNBERGER: Right.

21 MR. KANE: So it's safer because you allow  
22 a flow path for what we call the -- it's not the  
23 recharge.

24 DR. HORNBERGER: Reflux.

25 MR. KANE: The drainage of the mobilized

1 water between the drifts. That the principal benefit.

2 DR. HORNBERGER: That's certainly why you  
3 went to a line load.

4 MS. KNAPP: Right.

5 MR. KANE: Right, and adjusted the drift  
6 space. Those are the key differences between the VA  
7 and what we call the ED-2 or the SVR design. There's  
8 no drainage with the VA.

9 DR. HORNBERGER: Yeah, supposedly.

10 MR. KANE: Yes.

11 MS. KNAPP: That was the way it was  
12 modeled.

13 MR. KANE: Epistemologically speaking.

14 (Laughter.)

15 MS. KNAPP: Oh, you had to get that in,  
16 didn't you, Dan?

17 MR. LEVENSON: In the concept of reality,  
18 sine the results of the actual tests done out there in  
19 Las Vegas indicate maybe that's not exactly the case,  
20 is that issue going to be revisited?

21 MR. KANE: Which issue?

22 MR. LEVENSON: The matter of the fact that  
23 water defies gravity and pounds above rather than from  
24 the measurements in the experiments, which appear to  
25 indicate that when it moves out from the drift, it

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1 mostly goes down and doesn't pond above it?

2 MR. KANE: Yes, that's explored further in  
3 the supplemental science and performance analyses,  
4 which provides an update based on --

5 MR. LEVENSON: Okay. I don't want any  
6 details. My question is: it is going to be  
7 revisited?

8 MR. KANE: Yeah, yeah.

9 MR. LEVENSON: Okay.

10 CHAIRMAN GARRICK: Go ahead.

11 DR. HORNBERGER: I have another question,  
12 and again, it relates to in the science and  
13 engineering report, as you say, you're presenting the  
14 material compiled from lots of other reports, and I  
15 guess I also have a question that relates to almost  
16 how do you use the information in the interpretation,  
17 and I know so we almost automatically bridge over into  
18 performance assessment.

19 But let me just take as an example  
20 something that I've been looking at. So if we look at  
21 saturate zone flow and the way that you have  
22 characterized the site and a lot of the work you've  
23 done, you've done testing at the C weld complex and  
24 you interpret those tests.

25 And I guess my question is when you have

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1 people -- now this is an area of a quantified  
2 uncertainty because you've done the uncertainty  
3 analysis, and what I'm curious about is whether or not  
4 your people still bend over backwards to still be a  
5 little conservative rather than characterizing the  
6 uncertainty directly, and I think in particular of  
7 things like fracture spacing and fracture matrix  
8 interaction, where it strikes me that at least some  
9 people have looked at it and said, "Well, yes, okay.  
10 You have certainly incorporated a range that is  
11 consistent with your measurement, but you have also  
12 incorporated or you've pushed the mean of your  
13 distribution, if you will, farther out into a  
14 conservative range."

15 And I'm just curious as to whether or not  
16 that is your standard operating procedure, and if  
17 you've somehow built in even more conservatism  
18 throughout that kind of process, and if that is so,  
19 whether or not you're going to look at requantifying  
20 the quantifiable uncertainties.

21 MS. HERON: Thanks, Dr. Hornberger. I'm  
22 going to ask Tim to take a cut at that question, and  
23 I might also remind you of some rules we had in the  
24 KTI to ask only one question at a time.

25 (Laughter.)

1 MS. HERON: But those are operating for  
2 those situations, certainly. But at any rate, if Tim  
3 got enough of that to answer, Tim, would you take a  
4 cut at that question please?

5 MR. SULLIVAN: Yes, I'll provide the short  
6 answer, and we'll certainly be exploring this topic in  
7 more detail in the future.

8 The goal of the developing of a more  
9 realistic TSPA supplemental model and further  
10 quantification of uncertainties was not to err on the  
11 side of conservatism, but instead to provide realistic  
12 parameter.

13 Now, the extent to which we have succeeded  
14 in that you can judge for yourself in the SSPA when  
15 you get an opportunity to see it. But that was the  
16 goal. Those were the ground rules for the  
17 reevaluation of the key parameters and their  
18 uncertainty.

19 DR. GARRICK: Carrying this discussion a  
20 little further of uncertainties and modeling, you're  
21 waste package failure model as it's described in the  
22 TSPA and the engineering and science report is pretty  
23 much independent of dripping conditions and,  
24 therefore, has little or no dependence on the presence  
25 of the drip shield.

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1 Is that another example of something that  
2 you might try to couple and examine? Question number  
3 one.

4 Question number two: why do we have a  
5 drip shield?

6 MS. HERON: Tim, again, would you --

7 MS. KNAPP: Do you want me to take that  
8 one?

9 MR. SULLIVAN: I think that's Kathryn's.

10 MS. KNAPP: Yeah. The first question is  
11 there is a strong look at the waste package  
12 degradation models and reducing some of the  
13 conservatism within that model. Are you asking the  
14 coupling of the models?

15 DR. GARRICK: Well, if the drip shield --  
16 well, I'm really asking -- I'm really on the -- if the  
17 waste package model is totally independent, the waste  
18 package failure model is totally independent of the  
19 drip shield, then the question is why do we have a  
20 drip shield.

21 But part of the question is are you going  
22 to couple those two analyses and do you expect a  
23 different result when you do that.

24 MS. KNAPP: The reason we have a drip  
25 shield was more to provide defense in depth, and it

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1 was a way to, we feel, provide a defense in depth and  
2 additional barrier to have long term waste package  
3 performance.

4 Now, one of the key attributes we continue  
5 to say is the long term waste package. And so that was  
6 brought in as defense in depth.

7 DR. GARRICK: One of the things that this  
8 committee is trying to push is to stop using defense  
9 in depth as kind of a parking lot or a place to put  
10 things and stop worrying about them, because we  
11 certainly have the tools now and the methods to  
12 analyze how much defense in depth we have. That's the  
13 whole -- there shouldn't be any barrier that we're  
14 putting in our system that we can't say something  
15 about as to its quantitative effect.

16 MS. KNAPP: And what the drip shield  
17 addresses is the potential diversion of water so you  
18 do not have seepage into the drift that's going to  
19 come in contact with the waste package.

20 DR. GARRICK: But you're not taking credit  
21 for it.

22 MS. KNAPP: The drip shield?

23 DR. GARRICK: Well, you're not taking  
24 credit for it as far as the failure of the waste  
25 package is concerned.

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1 MR. SULLIVAN: We do take credit.

2 MS. KNAPP: Yes, we do.

3 MR. SULLIVAN: We do take credit for the  
4 drip shield.

5 DR. GARRICK: Well, that isn't what the  
6 engineering and science report says. It says that a  
7 failure model of the drip -- of the waste package is  
8 independent of the -- it does not depend on the  
9 presence of the drip shield.

10 MS. KNAPP: It is taken credit for and  
11 also during that time frame if you were to have waste  
12 package failure and with the drip shield in place, it  
13 also takes credit that you would not end up having  
14 advective transport, but everything is diffusive at  
15 that point, and until you lose your drip shield, which  
16 happens beyond, I think, 12,000 years.

17 DR. GARRICK: Well, then there's an  
18 inconsistency somewhere, yeah, because it doesn't say  
19 that in the report. Well, it may say that, but it  
20 also says that the waste package failure model is  
21 independent of dripping.

22 MR. KANE: When one looks at the warmer  
23 end of the spectrum with regard to the design, the  
24 drip shield doesn't really perform a function there  
25 until your repositories -- until decay heat has gone

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1 down sufficiently that water can start seeping in.

2 At that point the drip shield in the  
3 higher end of the thermal spectrum operates or would  
4 perform a function. Should we go to the lower end of  
5 the thermal spectrum operating mode, in that case the  
6 waste -- the drip shield would play a function early  
7 on.

8 Now, again please keep in mind, everyone,  
9 that we're still looking at various alternatives and  
10 how we might choose to design the various elements,  
11 how we might choose to operate them. So we really  
12 haven't made a decision yet, but should this project  
13 go forward, when we come in with a license application  
14 we will have a specific design.

15 We will give all the parameters that we  
16 feel that we're going to be asking you guys to  
17 approve, that we would be operating within, and we  
18 will have definitive answers at that point to  
19 questions like have you taken credit for your drip  
20 shield.

21 You see, there might be some licensing  
22 strategy that says, "Don't take credit for  
23 everything," and then if you get back up into a  
24 position, then you might want to take credit for that  
25 particular thing. Does that make sense?

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1 DR. GARRICK: Yeah, yeah, it does. But it  
2 sounds like what you're really saying is there is a  
3 time dependence feature to this because in your model  
4 the first waste package failure occurs before failure  
5 of the drip shield.

6 MS. KNAPP: Drip shield.

7 DR. GARRICK: Is that not correct?

8 MR. KANE: Well, that might be correct.

9 MS. KNAPP: That is correct.

10 MR. KANE: That's the modeling and  
11 analysis we're doing for this particular stage where  
12 we are in this process, but again when we go to a  
13 license application, should the project go that far,  
14 then you will see a very definitive approach, and the  
15 kind of questions you're raising now will probably be  
16 answered at that time.

17 DR. GARRICK: Okay.

18 MS. KNAPP: But your waste package  
19 failure, I believe, is around maybe 11,000 years.

20 DR. GARRICK: Right, and your --

21 MS. KNAPP: And your drip shields is  
22 around 12,000.

23 CHAIRMAN GARRICK: -- drip shield is  
24 around 15,000 years.

25 MS. KNAPP: Fifteen thousand?

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1 DR. GARRICK: Yes.

2 MS. KNAPP: Right.

3 MR. KANE: It's a decouple process.

4 CHAIRMAN GARRICK: Yeah, that's right.

5 MR. KANE: If you go into licensing, it  
6 won't be.

7 DR. GARRICK: Okay. That was my question.

8 MS. KNAPP: But they're still -- the drip  
9 shield does still play a role and is modeled as part  
10 of the TSPA.

11 DR. GARRICK: Yeah. Okay. Good. Thank  
12 you.

13 Any other questions? Go ahead.

14 MR. LEVENSON: Just one comment on another  
15 possible inconsistency or disconnect. You said that  
16 in the higher end temperature-wise, in the relatively  
17 near term there's no water entering the drift, but in  
18 the discussion of thermal effects on water flow, I  
19 think the assumption is made that there's water  
20 dripping into the drift at all times, even under high  
21 temperature conditions.

22 So I think -- I don't want a long  
23 discussion. I just point out I think there's quite a  
24 few places that we can identify inconsistencies.

25 MS. HANLON: One thing we can do, Mr.

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1 Levenson, if you identify some of those, we'll look at  
2 them again as we move forward.

3 DR. GARRICK: Are there any other comments  
4 or questions from the staff?

5 Wake up, staff.

6 MR. CAMPBELL: You've hit just about every  
7 one.

8 DR. GARRICK: Good, good.

9 DR. WYMER: Well, we just look forward to  
10 getting this more detailed run-down later on, where  
11 we'll really be able to ask specific questions. This  
12 is not the right venue to do that.

13 CHAIRMAN GARRICK: Yeah.

14 DR. HORNBERGER: I have just a curiosity  
15 question --

16 CHAIRMAN GARRICK: Oh, okay. Go ahead.

17 DR. HORNBERGER: -- which is a direct  
18 follow-up to what you just said. If -- I haven't read  
19 it closely enough, obviously, but if you have a waste  
20 package failure before your drip shield fails, does  
21 the waste package fill up with water right away, and  
22 if so, where does the water come from?

23 Do we know that? Because I thought that  
24 in talking with Andy that the waste package fills up  
25 with water once it --

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1 MR. CAMPBELL: When they model the  
2 chemistry that is then subsequently used in the  
3 release models, it is assumed that the waste package  
4 is full of water.

5 DR. HORNBERGER: Okay.

6 MR. CAMPBELL: There's no time constant  
7 applied to that, but it is assumed that the waste  
8 package is full of water. So you have releases that -  
9 - maybe you guys can answer this. I've thought of a  
10 question now that you've prompted me -- is if you fill  
11 the waste package with water, but you only have stress  
12 corrosion cracks, which are precluded from allowing  
13 water to get in, how do you get releases from that  
14 situation?

15 Where you have stress corrosion cracks  
16 which by your model don't have advective flow of water  
17 through the waste package, how do you get releases  
18 from the waste package? Because you do have releases  
19 from waste packages through stress corrosion cracks in  
20 the absence of any advective water flow on those waste  
21 packages. Because 87 percent of your waste packages  
22 never see advective water flow, and yet all of them  
23 are releasing radionuclides by diffusion in those  
24 cases, and yet your chemistry model assumes you've got  
25 a waste package full of water with a zero

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1 concentration boundary condition on the outside of the  
2 waste package and you're diffusing it out across a  
3 gradient.

4 How does that happen physically?

5 And is that a conservative you'll address  
6 in your unquantified uncertainties.

7 MR. SULLIVAN: It's a non-mechanistic  
8 scenario, and just as with the nuclear plants, we have  
9 examined certain non-mechanistic scenarios to find out  
10 what result might be should it happen. And again, if  
11 we come in with a license application you would -- you  
12 would see a realistic design with realistic analyses  
13 on there.

14 Does that help at all?

15 MR. CAMPBELL: So I wasn't insane when I  
16 was looking for a model for release from the waste  
17 package and couldn't find it. It's not actually  
18 there. Okay. That answers the question.

19 Thank you.

20 DR. HORNBERGER: Yeah, that answers the  
21 question.

22 DR. GARRICK: Questions? Any other  
23 comments or questions?

24 (No response.)

25 CHAIRMAN GARRICK: Okay. Very good. Is

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1 there any more presentation?

2 MS. HANLON: No, thank you.

3 I think if we've answered all our  
4 questions, I'd like to thank you for the opportunity  
5 to present to you, and I'd also like to thank our  
6 folks in Las Vegas, Dan, Tim, Candy, and Pat.

7 DR. GARRICK: We would, too. Thanks a  
8 lot, you people.

9 MS. HANLON: Thanks, guys.

10 MR. SULLIVAN: Thanks for your time. We  
11 appreciate it.

12 MS. KNAPP: Thanks for being so gentle.

13 (Laughter.)

14 DR. WYMER: Oh, really?

15 DR. GARRICK: Wait until we see the SSP.

16 (Laughter.)

17 (Whereupon, at 2:42 p.m., the meeting was  
18 adjourned.)

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CERTIFICATE

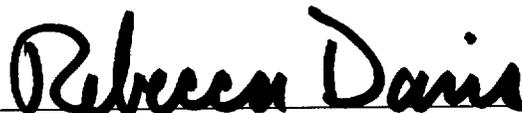
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