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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE

(ACNW)

+ + + + +

128TH MEETING

+ + + + +

WEDNESDAY,

JULY 18, 2001

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ROCKVILLE, MARYLAND

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The Advisory Committee met at the Nuclear
Regulatory Commission, Room T2B3, Two White Fling
North, 11545 Rockville Pike, Rockville, Maryland, at
8:30 a.m., George M. Hornberger, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

GEORGE M. HORNBERGER, Chairman

RAYMOND G. WYMER, Vice Chairman

B. JOHN GARRICK, Member

MILTON LEVENSON, Member

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P R O C E E D I N G S

(8:30 a.m.)

1
2
3 CHAIRMAN HORNBERGER: The meeting will
4 come to order.

5 I guess I have to read this stuff, don't
6 I?

7 Okay. I already said the meeting will
8 come to order. This is the second day of the 128th
9 meeting of the Advisory Committee on Nuclear Waste.

10 My name is George Hornberger, Chairman of
11 the ACNW.

12 Other members of the committee present are
13 John Garrick, Milton Levenson, and Raymond Wymer.

14 During today's meeting, the committee will
15 discuss the following:

16 First, key technical issues, vertical
17 slice report;

18 Then greater than Class C waste;

19 And finally, we will spend time in
20 preparation of ACNW reports.

21 Lynn Deering is the Designated Federal
22 Official for today's initial session.

23 The meeting is being conducted in
24 accordance with the provisions of the Federal Advisory
25 Committee Act. We've received no written comments or

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1 requests for time to make oral statements for members
2 of the public regarding today's sessions.

3 Should anyone wish to address the
4 committee, please make your wishes known to one of the
5 committee staff. It is requested that the speakers
6 use one of the microphones, identify themselves, and
7 speak with sufficient clarity and volume so that they
8 can be readily heard.

9 DR. WYMER: Nicely done.

10 CHAIRMAN HORNBERGER: Nicely done? Thank
11 you, thank you, Ray.

12 So today is Wednesday, and we're at our
13 morning session where we're going to, we hope, Lynn
14 and I hope, really figure out what we are doing with
15 the vertical slice.

16 I think everybody has had a chance to look
17 at what Lynn put together in terms of the overall
18 letter. Well, it's really the structure. It's really
19 the backbone of the letter.

20 MS. DEERING: Copies made for this. We
21 had them last month, but Howard -- here he is.

22 CHAIRMAN HORNBERGER: Okay.

23 MS. DEERING: Just in time.

24 CHAIRMAN HORNBERGER: Just in time.

25 MS. DEERING: Nothing has changed from the

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1 last time on this letter.

2 CHAIRMAN HORNBERGER: But it's different
3 than what's in our books?

4 MS. DEERING: Oh, you're right. It's in
5 the book, too? This one is in the book? I had
6 forgotten it was in there. It probably is. Let's
7 see.

8 CHAIRMAN HORNBERGER: Well, it doesn't
9 matter. Starting on page 31 in the book.

10 MS. DEERING: Okay, all right. Well, now
11 you have more.

12 CHAIRMAN HORNBERGER: Well, that's good.
13 We can work on that copy.

14 At any rate, I think that everyone had a
15 chance to look through this really structure for the
16 letter, and what we basically have to do is -- well,
17 I suppose the first thing is we should agree or
18 disagree on whether this is the structure we want
19 because it's before us, but most importantly, the bits
20 in here that are left blank are items on the
21 individual vertical slices, including the approach
22 used in the vertical slice, and sort of the key issues
23 I think Lynn called them because that's really where
24 the letter is going.

25 Ray this morning gave me a list of key

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1 issues that he extracted from the chemistry vertical
2 slice. Perhaps before we launch into this, I looked
3 at the TSPA one that John and Andy did, and the
4 question that it raised in my mind was whether we
5 wanted to do a separate letter similar to what we did
6 for the chemistry workshop, and I think we should
7 decide that because it will affect to a certain extent
8 how much of that TSPA goes into this letter.

9 John, do you have thoughts on this?

10 DR. GARRICK: Well, it's kind of a
11 difficult issue to put your arms around because it
12 covers everything, and I think that my first
13 impression is that it would probably make sense in
14 terms of our ability to communicate the issues for
15 there to be a separate letter on TSPA, given its high
16 profile in the whole process.

17 But I could be talked out of that if we
18 feel that it overlaps a lot with some of the others,
19 and by adding a few statements we could include it in
20 the letter that we're addressing now.

21 But my reaction is because it's such a key
22 part of the whole licensing and pre-licensing activity
23 that a separate letter might ring the bells a little
24 better than it being part of another one.

25 DR. LEVENSON: I don't think we should

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1 talk John out of it. I think we should talk him into
2 it.

3 I agree, and I think it's a slightly
4 different issue, as a matter of fact. The other three
5 are sort of a review of what the staff is doing, et
6 cetera, and John's was a much more thorough review and
7 particularly what the staff was doing, but of the TSPA
8 itself. I think it warrants a separate letter.

9 MS. DEERING: That could serve as our --
10 at one point we left ourselves open to providing a
11 comment on DOE's documents. You know, that was one of
12 the optionals if we had time and felt the need to
13 comment on their SR. That could almost serve to do
14 that.

15 DR. GARRICK: Yeah.

16 MS. DEERING: In that it does emphasize
17 the TSPA more than necessarily the TPA, what you have
18 so far.

19 DR. GARRICK: Yeah. The thing that's very
20 important to me is, of course, to get the committee's
21 comments, particularly on the section of the vertical
22 slice having to do with the identification of
23 principal issues of concern.

24 CHAIRMAN HORNBERGER: We certainly have to
25 discuss it, regardless of comments, regardless of

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1 whether we fold it into the TSPA letter or the KTI,
2 the vertical slice letter or the separate letter. So
3 I agree with you there.

4 DR. GARRICK: There is one thing that sort
5 of affects this, and that's the SSPA because it,
6 indeed, does address several of the key points that
7 are made in the vertical slice, and the question is do
8 we want to take that into account.

9 DR. WYMER: Yeah, I think that's the
10 point. The TSPA is a little bit strict now.

11 MS. DEERING: Isn't the NRC staff --
12 didn't we hear yesterday -- I guess it's not
13 definitive, but my understanding is they were going to
14 consider that. We would like them to consider that as
15 part of their --

16 CHAIRMAN HORNBERGER: Sufficiency.

17 DR. GARRICK: Yes, but on the other hand,
18 I think it's important background because I think if
19 you really look at the TSPA-SR and what they did in
20 the SSPA, the extreme differences in the results are
21 not surprising.

22 Right now some reaction could be, well, if
23 you were off that much, the TSPA-SR certainly has
24 questionable credibility, and it's not so much a
25 matter of off as it is the assumption set that was

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1 employed. It's not so much that there's been any
2 particularly new information. It's just been a
3 refinement of the modeling more than anything else.

4 And even there, you know, if we get into
5 the SSPA, there's some issues that probably need to be
6 discussed, but this doesn't do that. This is strictly
7 TSPA-SR and TPA.

8 CHAIRMAN HORNBERGER: So there are a
9 couple of ways we could do this. Okay? Let me run
10 through three that occur to me right away.

11 We could go with this pretty much as it
12 is. It's a snapshot, and basically footnote the fact
13 that this review was done prior to issuing this SPA.

14 The second approach would be to basically
15 have this as a report and then spend a little time and
16 write an addendum, not a full blown read of the
17 additional 1,200 pages, but at least an addendum where
18 you poked around a little bit and basically made some
19 of the comments that you had just did, and again,
20 acknowledging that it wasn't a review of the SPA, but
21 to a certain extent the SPA addresses some of these
22 concerns, but some of them still remain.

23 And the third one would be to go ahead and
24 augment the letter, including a review of the SSPA.

25 DR. GARRICK: Yeah. My vote would be for

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1 the first, but with a slight variation, and that is
2 maybe a series of footnotes or caveats that we would
3 imbed in the letter where we knew that there was a
4 particular issue being addressed and different results
5 were being obtained in the SPA.

6 But get on record, I think, some of these
7 findings that I think are kind of important and are an
8 added basis for why the SSPA should be done, and so
9 I think we could kind of accomplish a little bit of
10 two and three, but put more emphasis on the one as the
11 format.

12 DR. WYMER: Well, I have a fourth
13 alternative, which you sort of alluded to right in the
14 beginning, namely, not flood them with letter reports,
15 but use the TSPA condensation of that as the framework
16 for the other three vertical slices that we took, and
17 this would be the overview sort of section, and then
18 we'd each have our three that really fall under the
19 TSPA.

20 DR. GARRICK: But you would do that, and
21 that wouldn't interfere with what we've already done
22 on the chemistry letter, et cetera, et cetera?

23 DR. WYMER: I wouldn't think so, depending
24 on the amount of detail, but a lot of what you have
25 here in issues is covered, for example, in the

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1 chemistry report. So it seems to me that we could
2 write a single, longish letter.

3 DR. GARRICK: Well, actually your project
4 was two projects. It was a vertical slice and it was
5 a stand alone white paper on chemistry.

6 DR. WYMER: Yeah.

7 DR. GARRICK: So maybe one could give it
8 the interpretation that the vertical slice component
9 of that could be brought together with the others.

10 DR. WYMER: Yeah, I think your TSPA is a
11 nice overview of the whole thing, and these other
12 three fit into that.

13 DR. LEVENSON: I don't agree, Ray. I
14 think that the importance and why this almost has to
15 be a separate letter at this point is that with the
16 discussion that -- and we haven't seen Volume 2 --
17 but with the statement in the letter that many of
18 these issues identified in this letter have been
19 recognized by DOE, and they are proceeding to make a
20 revised thing, lay a foundation that indicates that we
21 think the numbers coming from the SS, the new one, are
22 credible because there were defects in the original,
23 but they're modified.

24 I think it's important to have that,
25 independent of our vertical slice.

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1 CHAIRMAN HORNBERGER: Move your mic down
2 just a little bit.

3 DR. LEVENSON: Independent of the vertical
4 slice, to have that as a matter of record that TSPA
5 has some shortcoming that are now being modified, and
6 it seems to me that would be an important piece of the
7 story.

8 DR. WYMER: You don't think that could be
9 integrated with the --

10 DR. LEVENSON: I don't think it should be
11 lost. I think we can summarize it for the overall
12 vertical slice, but I think the point should be made
13 separately. I think it's too important.

14 MS. DEERING: Can I ask a question? I
15 guess we have to consider how much redundancy there
16 would be in our overview, in our group letter with
17 your TSPA letter.

18 DR. WYMER: Quite a bit.

19 MS. DEERING: And if there was quite a
20 bit, that could be problematic. I don't know, but the
21 other thing was, John, you might -- would you or did
22 you, I suppose, take that VA letter that we wrote two
23 years plus ago -- in a way, I think you've already
24 done that. You've kind of made the tie between what
25 was said then and how it's evolved.

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1 DR. GARRICK: Well, I think it's
2 reasonably tied, but, no, I didn't do it deliberately.

3 MS. DEERING: But it could be done if we
4 wanted to make that exclusively a TSPA. You know, our
5 VA comments were almost all TSPA oriented.

6 DR. GARRICK: Right, right.

7 MS. DEERING: But we were trying to tie it
8 into Part 63 at that time. We were saying the NRC
9 staff should in its rulemaking require the following,
10 you know, DOE to have transparency, DOE to have
11 traceability.

12 But I'm just suggesting again that if you
13 wanted it as a stand alone, you could really tighten
14 it up even more by making it an evolution to that
15 other letter that we --

16 DR. GARRICK: That's right, and I think as
17 far as the redundancy issue with the vertical slice
18 letter, we need to, you know, author that in such a
19 way that we minimize that.

20 MS. DEERING: Yeah, we have to.

21 DR. LEVENSON: If we get the TSP letter
22 out first, then the vertical slice letter could just
23 reference it and summarize it in a sentence or two.

24 MS. DEERING: That's true.

25 DR. GARRICK: Or either way, we can make

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1 one more compatible with the other.

2 CHAIRMAN HORNBERGER: Okay. Let me --
3 here's my quick assessment.

4 MS. DEERING: Please.

5 CHAIRMAN HORNBERGER: I think that
6 provided we could get this TSPA letter out reasonably
7 quickly, we probably can't do it this meeting, but we
8 would have to finalize it next meeting.

9 DR. GARRICK: We can do that.

10 CHAIRMAN HORNBERGER: Okay. Then I like
11 that option and for this reason: because I think that
12 perhaps what we can do is orient our vertical slice
13 letter, the overall letter, more to the thrust of
14 reviewing our review of what the staff is doing in
15 terms of sufficiency.

16 So it's not so much TSPA itself, but how
17 the staff is handling the review, and if we can focus
18 all of our vertical slice comments that way, then that
19 gives us a certain commonality across the four slices,
20 and it doesn't make them look -- well, they are
21 different, and we don't want to dismiss the
22 differences, as Milt said yesterday, but at least we
23 would have a certain commonality of focus.

24 What do you think?

25 MS. DEERING: It sounds good. And I like

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1 it especially because the vertical slice, what we've
2 done, vertical slice, if nothing else, even if we
3 didn't have a single comment, it gives us a foundation
4 and a rationale for why we can even comment on staff
5 sufficiency review. You know, it supports us in
6 whatever it is we plan to say. It makes us qualified
7 to do it, in other words. It was our background work

8 CHAIRMAN HORNBERGER: Right. It was.

9 MS. DEERING: That's what we'll use it --
10 if nothing else, we would use it in the letter for
11 that. So we did our own vertical slice, and now we
12 are doing the foundation to make some comments about
13 what we see the staff has done.

14 DR. WYMER: That would mean the TSPA
15 letter would have to be quite general and broad in its
16 treatment of the TSPA, since we have a lot of the
17 details that are in the current write-up here that
18 John has, are distributed throughout --

19 CHAIRMAN HORNBERGER: You see, the way I
20 read this, what John has done, I think, as Lynn
21 pointed out, is really get into the TSPA itself and
22 offer comments on the TSPA, and what we would carry
23 over to the vertical slice letter would be perhaps
24 even going beyond what John and Andy wrote here, and
25 that is to comment on their observations of how the

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1 staff is working to evaluate TSPA, both running their
2 own tests on TSPA and using TPA to check some of the
3 things.

4 I think that could be done. What do you
5 think, Andy?

6 MR. CAMPBELL: Yeah, I think that's a good
7 plan, taking this material. That's a good plan for
8 taking the detailed material and the draft that John
9 and I put together and excerpting, if you will that --
10 the two things into the overall letter.

11 Another question I have is do Ray and I
12 need to do some sort of excerpt of sufficiency issues
13 from the chemistry review as input to this overall--

14 CHAIRMAN HORNBERGER: Yeah, Ray actually
15 did a little of it last night and extracted a set of
16 issues, and again, if we take a slightly -- if we take
17 this approach to the vertical slice letter as focusing
18 mainly on staff, how the staff is doing their job,
19 some of these may not be a --

20 DR. GARRICK: I think that's a good line
21 of division because probably 85 percent of my effort
22 and time on this was devoted to TSPA, and Andy saved
23 a little bit by bringing forward the TPA material, but
24 it's primarily TSPA.

25 CHAIRMAN HORNBERGER: Okay. So we have a

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1 plan? Go with that?

2 Okay. So now let's put John on the spot.
3 What do you think it's going to take to move this
4 letter forward?

5 DR. GARRICK: Well, I think that I would
6 like an impression, a reaction from each committee
7 member particularly of what we have identified as the
8 principal issues of concern and then a draft, and I'll
9 do the draft and a draft that we can discuss at the
10 next meeting and hopefully even complete.

11 So I think review comments, a draft are
12 the immediate. Now, if we want to talk about it
13 today, we can do that, however we want to.

14 CHAIRMAN HORNBERGER: I would say we have
15 to find some time today, but let's move back right now
16 to the vertical slice letter, which we know we have to
17 get out. We may have time this morning to come back
18 to this. Okay?

19 Everybody has read John's draft, right?

20 DR. GARRICK: We could go through each of
21 these issues easy.

22 MS. DEERING: It might be a good idea
23 because --

24 CHAIRMAN HORNBERGER: Well, let's do it.

25 MS. DEERING: -- when we go over other

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1 issues of --

2 CHAIRMAN HORNBERGER: Okay. Let's do this
3 now.

4 DR. LEVENSON: One comment, John. When
5 you're writing your draft, keep in mind that the
6 simplest thing if you're thinking right as you write
7 the draft is some of the introductory things which
8 says they're now being changed, et cetera, if it's
9 written properly, it could just be extracted in the
10 overall letter.

11 DR. GARRICK: Yes, yes. And I would
12 clearly put it in the context that many of these
13 issues have been superseded by the --

14 DR. LEVENSON: Yeah, sure. But if you're
15 thinking about that, then it'll be easier.

16 DR. GARRICK: Right, right.

17 CHAIRMAN HORNBERGER: Okay. Let's
18 actually take this write-up that John and Andy did and
19 go through it. Do you want to lead us, John, to point
20 to the questions?

21 DR. GARRICK: Yeah. Andy, do you want to
22 take us through the first part and I'll take us
23 through the second part?

24 MR. CAMPBELL: Okay. We're not going to
25 read this.

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1 CHAIRMAN HORNBERGER: No, no, no. What
2 we're trying to do is --

3 MR. CAMPBELL: I was going to say we'll be
4 here all day.

5 CHAIRMAN HORNBERGER: -- the idea is to
6 get the committee to either throw out objections they
7 have, clarifications they need, or agreement on what
8 is being said.

9 MR. CAMPBELL: Okay, all right.

10 DR. LEVENSON: Well, before we do that,
11 let me ask a question. Looking at the length of this,
12 do we want to approach this as a one and a half page
13 letter with the bulk of this as an attachment? This
14 is awfully long for a letter.

15 DR. GARRICK: Well, let me write something
16 and then we'll make that decision.

17 MS. DEERING: Some of the background might
18 not even be necessary, period.

19 DR. GARRICK: Yes.

20 MS. DEERING: You know, I mean, it was
21 good for us, but I don't know that you need to take a
22 lot of what -- the whole detailed, blow-by-blow of
23 what the TSPA is doing?

24 CHAIRMAN HORNBERGER: Well, I mean,
25 remember now this is not the letter. Okay? And so

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1 Milt's question is: do we want to make it a longish
2 letter or do we want to have a short letter with an
3 attachment?

4 DR. LEVENSON: I think there's important
5 stuff in here. I'd hate to see it get lost.

6 DR. GARRICK: Well, either format is
7 acceptable.

8 CHAIRMAN HORNBERGER: Yeah, what I was
9 going to say is if we go with a longish letter, and
10 that would be okay with me, too, but then I think we
11 should do what Latif suggested to us yesterday, and at
12 the very least we should have something very short and
13 pithy up front that gets the main messages across.

14 MR. BAHADUR: I think the easier thing
15 would be to take this as an attachment right now and
16 as John had mentioned, once we agree to this, let him
17 look at this and see whether he can extract things out
18 of it and make into a letter or we can add that to his
19 summary and follow that.

20 CHAIRMAN HORNBERGER: Okay.

21 MR. CAMPBELL: As it now stands, let me
22 just add that essentially what we have are two
23 different write-ups that need to be melded into a
24 single project.

25 DR. GARRICK: Yeah, these are working

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1 papers. This is not a polished document.

2 MR. CAMPBELL: This is a work in progress.

3 DR. GARRICK: This is a draft.

4 MR. CAMPBELL: Just basically I'll go
5 through it as quickly as I can. The introduction just
6 basically says that the different documents that we've
7 looked at, including some information on the TPA code,
8 as well as the TSPA-SR -- that's the DOE document --
9 and the supporting AMRs and PMRs, both John and I have
10 looked at some detail trying to link the TSPA-SR
11 results and models and everything back in a few key
12 areas.

13 And basically we followed
14 neptunium/technetium to the extent possible. Those
15 were the two key radionuclides we looked at.

16 And we chose those because those had the
17 largest impact on dose in terms of long-term doses.
18 Now, obviously in 10,000 years TSPA-SR really relies
19 on the waste package and other things, but primarily
20 the waste package to preclude any releases in the
21 early stages.

22 We tried to identify -- this is on page 2
23 of the write-up -- we tried to identify the key issue
24 areas that impact the neptunium and technetium, and we
25 also looked at iodine and plutonium, and those are

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1 bulletized there.

2 Then we looked at the NRC's total system
3 performance assessment, and that's "system" with a
4 little S. So that comes out to be their TPA code, and
5 the integrated subissues, and I even attached a figure
6 which apparently now makes this document unreadable by
7 Word Perfect, that shows that it's actually Figure 1
8 on page 7, although it's clipped out of an electronic
9 document. So it says Figure 3.

10 And the integrated subissues are that
11 bottom tier of issues. So in essence, what we did was
12 we kind of started at dose or risk and worked our way
13 down through one of these connections or I guess you
14 could call it a scenario, through the engineered
15 system, the engineered barriers, and down through the
16 integrated subissues dealing with that.

17 So we didn't really look at the geosphere
18 or the biosphere subsystems. So that gives you an
19 idea of how we looked at this.

20 In the nominal scenario -- now I'm on page
21 3 -- the nominal scenario is the one in which you're
22 looking at long-term degradation processes. You're
23 not looking at disruptive events or, you know, either
24 natural disruptive event or human intrusion. You're
25 just looking at long term performance of the site.

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1 In TSPA-SR, the main contributors to dose
2 in the post 10,000 year, pre-100,000 year period start
3 out as technetium and iodine, and these are released
4 by diffusive processes. They have no solubility
5 limits in the model, and so they come out pretty
6 quickly.

7 A substantial part of that release is by
8 diffusive processes. So even waste packages that
9 don't have any liquid water, you know, other than
10 water ostensibly on surfaces, released those.

11 And then later neptunium and plutonium
12 come to dominate the dose. Those are radionuclides
13 that have some -- neptunium has some retardation, some
14 solubility limit, and then plutonium is associated
15 even though it has a relatively low solubility, it
16 becomes associated with colloids, and it can move out
17 as a colloid at least in the TSPA-SR model.

18 Transport out of the EBS, I'm on page 4.
19 There's this issue that in the sensitivity analysis of
20 TSPA-SR the cracking rate or parameter that controls
21 the rate at which stress corrosion cracks form comes
22 out on top in terms of sensitivity, and we talked
23 about this a little bit in the chemistry report.

24 It's not clear what drives that. We've
25 discussed it amongst ourselves about some of the

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1 reasons for that, but that's an issue that comes out,
2 and it's curious because the area of the stress
3 corrosion crack, any individual one is about five
4 square centimeters.

5 The area of a patch, and the way they
6 model this is they model the formation of these cracks
7 around the welds at one end of the waste package, but
8 they also develop patches, general corrosion patches,
9 on the surface of the waste package. Those patches
10 are 1,000 to several 1,000 or even 10,000 times larger
11 in area than the stress corrosion cracks.

12 So the releases should be proportional to
13 that area. It's not clear why SCC comes out on top in
14 terms of the sensitivity studies.

15 We talk a little bit about the differences
16 between the advection and the diffusion models.
17 Throughout TSPA-SR, diffusion plays a big role, and I
18 don't know whether the SSPA -- whether diffusion still
19 plays that dominant role, but a lot of that dose curve
20 you see that Carol showed yesterday for the base case,
21 which is TSPA-SR, a substantial portion of that,
22 especially in the pre-100,000 year period, is due to
23 diffusive releases.

24 DR. LEVENSON: Andy, I have a vague
25 recollection that one of the PMRs I read, the

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1 statement was made there was an assumption that when
2 a stress corrosion crack penetrated the vessel, 50
3 percent of the wall of the vessel disappeared. That
4 would explain this big difference.

5 MR. CAMPBELL: I don't think John or I saw
6 that.

7 DR. GARRICK: No.

8 MR. CAMPBELL: That's not described in any
9 of the documents that we saw.

10 DR. LEVENSON: I've read so much garbage
11 in the last -- I don't remember where I read it, but
12 that statement is in there.

13 DR. GARRICK: I'm not going to let you
14 read anything of mine.

15 DR. LEVENSON: That would explain this big
16 difference as to why the cracks showed.

17 MR. CAMPBELL: Well, you know, I actually
18 sat down with Dave Esh and looked through some of the
19 Goldsim results and got curves for the surface area
20 stress corrosion cracks and four patches as time
21 progresses, and that's just not the case. At some
22 point they flatten out. Essentially a package becomes
23 covered with patches, but that's --

24 DR. LEVENSON: But why this big difference
25 in releases?

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1 CHAIRMAN HORNBERGER: Wait a minute. No,
2 no. I mean, you shouldn't confuse sensitivity with
3 releases because that's not what it is. The
4 sensitivity analysis is what gives you a change.
5 Okay? And it doesn't say that it's a huge change in
6 release. It just says that, well, this parameter can
7 have an influence. It can change doses.

8 MR. CAMPBELL: And the time length of that
9 whole process is driven at the early times by the
10 diffusion releases. So it may be that it gives you a
11 line you can extrapolate over a longer time.

12 CHAIRMAN HORNBERGER: Yeah, but the point
13 is -- yeah, it is beside the point -- but sensitivity
14 doesn't mean that you're getting huge releases from
15 the stress corrosive cracks.

16 MR. CAMPBELL: No.

17 CHAIRMAN HORNBERGER: That's not what it
18 means. So we shouldn't confuse the issue.

19 MR. CAMPBELL: Most of the diffusion
20 releases are through the patches.

21 CHAIRMAN HORNBERGER: Let's continue.

22 DR. GARRICK: Through the invert, yeah,
23 the diffusion releases.

24 CHAIRMAN HORNBERGER: The patches in the
25 surface of the --

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1 DR. GARRICK: The patches, yes.

2 CHAIRMAN HORNBERGER: But the invert plays
3 a central role in all of this in that it becomes
4 essentially a buffer system. It buffers the releases,
5 and it buffers the chemistry after things get out of
6 the waste package.

7 MR. CAMPBELL: We looked at the TPA code,
8 and I've been following the TPA code for a number of
9 years. So there are -- NRC does it differently. It's
10 in many ways a simpler model, but they have four
11 different release models that they can call upon
12 within the code.

13 Primarily they look at advective releases.
14 They're not looking at diffusive releases in their
15 model, and I didn't spend a lot of time looking at --
16 I mean, we've done committee meetings and working
17 groups on sensitivity, and we've had presentations on
18 that, and it provides some of those on page 6 of what
19 the staff has done in terms of sensitivity analyses,
20 and those will change a little bit as the TPA code
21 evolves, but the factors which control how much water
22 is contacting the waste typically dominate sensitivity
23 analyses, as well as things like downstream issues
24 that affect the rate of water being pumped out of
25 wells and stuff like that.

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1 I think what I don't have in this is sort
2 of a set of conclusions or anything, and so at that
3 point what I think I'm going to do is I think John
4 came to some conclusions in his, and so I'll just pass
5 the baton to John to talk about the rest.

6 DR. GARRICK: The way I eventually broke
7 the logjam in terms of my thought processes here was
8 to try to, on the basis of the read of the TSPA-SR and
9 the discussions with Andy and the material that Andy
10 had generated, get right to the point as best I could
11 as to what were thought to be the principal issues of
12 concern from a repository performance standpoint.

13 And I should say that this is the first
14 time that we as a committee have discussed this. This
15 is simply a working paper, and it should be thought of
16 as just that, and the products that will evolve from
17 it will do so only as a result of committee agreement.

18 But I thought it would be very useful to
19 try to capture the concerns that we had in as few high
20 level statements as possible, backed up with some
21 discussion as to the key contributors to that concern.

22 So most of these concerns are concerns
23 that we have already expressed in public discussion in
24 previous encounters with the previous versions of the
25 TSPA, TSPA-VA, and so on, but some of them are new,

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1 and I'll try to give some emphasis to that.

2 But the first comment that we made had to
3 do with the fact that because of the assumption set of
4 the TSPA-SR, it really masked what I would choose to
5 call a risk assessment of the proposed Yucca Mountain
6 high level waste repository; that it became more of a
7 compliance analysis than it was a real answer of the
8 question what is the risk.

9 And that's a little bit in contradiction
10 with the language found in the TSPA-SR itself, which
11 indicates that the goal of performance assessment of
12 the disposal system is to provide decision makers with
13 a reasonable estimate of their realistic future
14 performance of the disposal system and a clear display
15 of the extent to which uncertainty in the present
16 understanding of the system affects that estimate.

17 And those are words from DOE and not NRC
18 or not Andy or I. The key words are "reasonable" and
19 "realistic," and of course, the comment here, the
20 reason for it being made, is that our judgment is that
21 the assessment is not particularly realistic and maybe
22 not particularly reasonable, and I think the SSPA is
23 verifying that.

24 So one of the reasons that this committee
25 has been rather steadfast in its advocating that these

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1 analyses ought to be realistic is that that's kind of
2 what the risk assessment field was invented for, was
3 to answer the question of what is the risk.

4 And when you answer that question, you'd
5 like to answer it in a reasonable and realistic
6 fashion. To be sure, that answer has to include
7 display and visibility of the uncertainties involved.

8 Now, what we tried to do in making this --
9 expressing this concern was to cite some very specific
10 examples of departures, if you wish, from adopting a
11 risk assessment perspective in the analyses.

12 MR. HAMDAN: John, can I ask you a
13 question before you examine this? Is this okay or do
14 you want me to wait?

15 DR. GARRICK: No, go ahead.

16 MR. HAMDAN: I'm aware of the -- I think
17 it's clear the committee took in its meetings before.
18 I just wanted to point out that NRC is a regulatory
19 body, and in our experience, for example, in the
20 uranium program, when we did performance assessment,
21 it was for compliance.

22 In other words, NRC provides the opening
23 for the licensees to comply with the --

24 DR. GARRICK: Yes.

25 MR. HAMDAN: -- regulations, as opposed to

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1 calculating an absolute vary of risk or whatever, and
2 the reason I'm mentioning this, I want to make sure
3 that you are aware of this, you know, as you write
4 this because somebody in the Commission will come and
5 say, "In the end we want compliance, and we want the
6 TSPA and DOE should they" -- you know, the language
7 that you mentioned that they want to assess risk and
8 what have you.

9 DR. GARRICK: Yes.

10 MR. HAMDAN: From the Commission's
11 standpoint, they may just be interested in compliance.

12 CHAIRMAN HORNBERGER: Well, and that's
13 fine. We do understand that.

14 DR. GARRICK: And we definitely do
15 understand that. The contamination of that
16 perspective comes from also wanting it to be risk
17 informed and also trying to make a reasonable
18 assurance finding, neither of which are as precise as
19 meeting a specific safety goal or what have you.

20 DR. LEVENSON: Well, and I think the
21 Commission has indicated that they want compliance to
22 be based on risk informed performance based analysis
23 rather than just compliance.

24 DR. GARRICK: Yeah. But, yes, we're aware
25 of that, and I think that what we're trying to be is

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1 a bit of a conscience on, well, you practice what you
2 preach. You're preaching risk informed. We need to
3 push that, and we need to start practicing that rather
4 than just giving it lipservice.

5 So the Committee has always been pretty
6 deliberate in trying to push that concept along.

7 I don't want to go into each of these in
8 any more detail than we have to, but let me just give
9 you a flavor of some of the things that were examples
10 of non-risk modeling features.

11 And for example, assuming constant values
12 for selected radionuclide solubilities and then
13 observing there is no uncertainty because the
14 solubilities are taken to be constant.

15 There's a number of these kinds of
16 assumptions that break the chain, if you wish, of
17 logic when you start trying to think in terms of how
18 you propagate from the top down to the underlying
19 contributors.

20 One of the things that not being a
21 chemist, but nevertheless being of quite a bit of
22 concern, and Andy does have a chemistry background, so
23 his support here was important. Treating the waste
24 package as one big mixing cell with no pathways or
25 localized reaction regions accounted for inside the

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1 waste package to take advantage of isolated reducing
2 conditions that may have a major impact on the source
3 term.

4 The whole concept of the evolution of the
5 source term is very difficult to expose in a logical
6 and visible physical process standpoint, and that's
7 true not only for TSPA, but for TPA as well.

8 CHAIRMAN HORNBERGER: John, let me
9 interjection something here just before I lose the
10 thought, and I'll only make the comment here. I think
11 that as you go through this, the one concern that I
12 would have with a statement just such as the one you
13 read is that I don't think that the ACNW wants to be
14 seen as implying that this can't be done with a
15 horrendously detailed, complex model of degradation
16 within the waste package, which is probably, as we
17 know, a hopeless endeavor.

18 In other words, as we've talked about many
19 times, I don't think that what we're saying is that we
20 have to go to an all singing, all dancing model of
21 every single thing, and we know that. But you know,
22 a statement like that can be read by others as
23 implying that we want --

24 DR. GARRICK: I agree with that, and I'm
25 not suggesting that --

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1 CHAIRMAN HORNBERGER: I know you're not.

2 DR. GARRICK: -- there ought to be a
3 monumental mechanistic model of a waste package, but
4 I might be suggesting as much as anything consistency
5 because in some of the natural setting analyses, we go
6 into great detail and get very specific from a
7 parametric and phenomena standpoint, and in some cases
8 it turns out not to be very important, whereas their
9 case, as far as TSPA-SR is concerned, is the waste
10 package as far as compliance is concerned.

11 And so it's extremely important that if
12 that is the basis for no release during the compliance
13 period, essentially no releases, then that case has to
14 really be --

15 CHAIRMAN HORNBERGER: But even there
16 again, I don't want to get into a long argument
17 because we agree on this, but the internals of
18 degradation inside the waste package don't even go to
19 compliance because if the argument that you're making
20 is that the waste package is compliance, then it's
21 corrosion you have to understand and not waste source
22 term.

23 DR. GARRICK: Right.

24 DR. WYMER: It seems to me that an
25 alternative way of doing this is to not include these

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1 bulletized things except by reference to some of the
2 other vertical slices.

3 DR. GARRICK: Well, the only reason that
4 I went to these is that I wanted to have to some
5 specific stuff.

6 DR. WYMER: Yeah, I realize that.

7 DR. GARRICK: And a --

8 DR. WYMER: I'm sort of ambivalent about
9 taking it out.

10 DR. GARRICK: Right, right, and we need to
11 discuss just exactly how far we want to go with this
12 sort of presentation even in the attachment to the
13 letter.

14 CHAIRMAN HORNBERGER: My point wasn't that
15 we need to take these out. I just wanted you as you
16 go through this to be sensitive to the issue that I
17 raised.

18 DR. GARRICK: Right. Okay. The other
19 thing that we were looking for, as noted in the
20 opening paragraph was what is the supporting evidence,
21 and I found several situations where they had some
22 evidence, but then they went ahead and made a
23 different kind of assumption anyway, like adopting a
24 wet clad unzipping model when there's no evidence in
25 all of the years and all the numbers of fuel elements

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1 that have been in wet fuel storage in the nuclear
2 power program, no evidence that such unzipping will
3 even occur.

4 And so here was a case where they really
5 had some evidence. It wasn't a case that they were
6 working in the presence of total ignorance, and there
7 is fuel being stored, not only here, but all over the
8 world, and there's a great deal known about the
9 cladding performance under very extreme conditions,
10 and it just seemed that you didn't have to sweep away
11 all of that experience in terms of the way in which
12 you constructed your model.

13 DR. LEVENSON: Especially since the
14 cladding that exists around the world is several
15 different materials, several different manufacturing
16 techniques, and with all of that, nobody has ever
17 observed that.

18 DR. GARRICK: Right, right. I'm not going
19 to do every one of these. I'm just skipping around.

20 Failing to take a risk perspective on the
21 role of the biosphere, including different uptake
22 scenarios is a major department from a risk informed
23 assessment. Well, the reason that was given here, and
24 it's a reasonable one in most respects, is that the
25 biosphere model is pretty much prescribed. How the

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1 uptake takes place is something that is specified more
2 or less.

3 But, on the other hand, again, harking
4 back to the original premise here, the desire here is
5 for all of the people who don't understand this
6 business to really understand what the experts believe
7 rather than what the model says or what a prescriptive
8 process says. What do the experts believe?

9 There's the business of using commercial
10 spent nuclear fuel as a surrogate for the degradation
11 models for other wastes, such as the Navy fuel and the
12 vitrified high level waste. Well, that's probably
13 okay, but still from a modeling standpoint, here was
14 a case where they had lots of information and lots of
15 data, and so in the face of that information and data,
16 again, they pretty much ignored it, and I think is
17 taking the position that it would be conservative to
18 assume that the Navy fuel, for example, for farms no
19 better than the commercial fuel on the basis that the
20 Navy fuel is under much more severe specs. than the
21 commercial fuel, et cetera, et cetera.

22 There's something just not particularly
23 satisfying about that, and besides, in the field of
24 radiation, even though the commercial fuel constitutes
25 90 percent approximately of the inventory that's going

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1 to go into the mountain in the business of radiation
2 contamination, even one percent might turn out to be
3 extremely important.

4 And so there's some question as to whether
5 or not that kind of logic is consistent with, again,
6 their own stated strategy, and so on.

7 Now, the second --

8 MR. LARKINS: John, before you leave, can
9 I ask a question --

10 DR. GARRICK: Yes.

11 MR. LARKINS: -- just for clarification?

12 You start off in this paragraph talking
13 about reasonableness and --

14 DR. GARRICK: Realistic.

15 MR. LARKINS: -- realistic, and obviously
16 some of these are not realistic, but they may be
17 reasonable, and how are we going to capture that in
18 this discussion?

19 You know, I agree with you in some of the
20 discussion of some of the modeling, it's not
21 satisfactory, but --

22 DR. GARRICK: Well, I think they're
23 beginning to capture that in the SSPA. They have
24 identified some of the critical assumptions and have
25 taken a much more what I would call reasonable

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1 approach.

2 MR. LARKINS: And the second part of that
3 question is, you know, as I look at what needs to be
4 done for sufficiency, they talk about whether or not
5 DOE at depth site characterization and the performed
6 proposal seems to be sufficient. Does this go beyond?

7 DR. GARRICK: Yeah, it probably does.

8 MR. LARKINS: Yeah.

9 DR. GARRICK: It probably does.

10 CHAIRMAN HORNBERGER: Yeah, and I think
11 that you're right, John. We should take care to note
12 indicate that this is a sufficiency comment. This is
13 a TSPA comment.

14 DR. LEVENSON: John, in looking back on
15 the that side, while the Navy fuel might have much
16 higher quality, it also has a potential to have a much
17 higher neptunium content.

18 DR. GARRICK: That's right. That's right.
19 It's very different fuel in terms of enrichment, in
20 terms of materials involved.

21 DR. LEVENSON: Yeah. Outside of being
22 three percent 235, it's 93 percent.

23 DR. GARRICK: Right.

24 DR. LEVENSON: And therefore , the
25 potential to have -- and much, much higher burn-up.

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1 DR. GARRICK: Yes.

2 DR. LEVENSON: So it potentially could
3 have orders of magnitude more than neptunium. So one
4 percent of the total might be ten or 15 percent of the
5 neptunium in the repository.

6 DR. GARRICK: Yeah. The other thing that
7 is in this --

8 CHAIRMAN HORNBERGER: Does that mean they
9 have the wrong source term?

10 DR. LEVENSON: Well, it would just be
11 different for the Navy fuel than it is for the --

12 DR. GARRICK: I don't know that it is that
13 they have the wrong source term because what we're
14 really talking about is the model for release, not the
15 model for the inventory.

16 CHAIRMAN HORNBERGER: Okay, okay. So they
17 have the inventory.

18 DR. GARRICK: Yeah, they accounted for the
19 inventory, yeah.

20 MR. CAMPBELL: John, just to add here in
21 terms of high level waste glass, they do have a model
22 for dissolution of glass. It's separate from the
23 dissolution model for commercial fuel, but the naval
24 fuel is considered to be dissolution rate similar to
25 commercial fuel.

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1 DR. WYMER: Which it won't be.

2 DR. GARRICK: Right. The other thing
3 that's kind of important here in this, in Point 1, is
4 that in some cases they took 95th percentiles or they
5 took very conservative results and then put
6 distributions around those conservative results. So
7 what you have in many cases is propagations of
8 distribution that, indeed, are based on realistic
9 assessments with probability distributions that are
10 distributions about bounding values, and that obscures
11 and clouds the whole issue of what the analysts, for
12 example, really think can go wrong.

13 CHAIRMAN HORNBERGER: John, before we
14 leave this point, again, as you write this letter, I
15 would suggest that if you could put some words in
16 clarifying really the point that Latif made, and the
17 reason that I say that is that you will recall that
18 the NWTRB at their last presentation to the
19 Commission, Jerry Cohen was talking about the NWTRB
20 asking DOE to provide a more realistic performance
21 assessment, and Chairman Meserve, in particular,
22 queried Jerry about that in saying, "Why? Why should
23 we care about that? All we care about is if DOE comes
24 in and it's a case for compliance."

25 And so I think that perhaps you need to

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1 make your point that making a credible decision that
2 takes into account resource use and cost and
3 everything else would benefit by having a realistic
4 assessment because you really understand your margins.

5 You know, all of this, but I'm just
6 suggesting that you perhaps want to take a paragraph
7 and express why we think a realistic assessment is --

8 DR. LEVENSON: Even if you were doing it
9 only for compliance, I think unless you have a
10 realistic assessment, you have no idea what safety
11 margin there is. Even for compliance you need that.

12 DR. GARRICK: Yeah, I say that. I say the
13 result is a clear basis does not exist to quantify the
14 margins of safety involved and provide a basis for
15 rational regulatory decision making process that is in
16 the best public interest.

17 CHAIRMAN HORNBERGER: I know it's there.
18 You might want to think about how it gets emphasized.

19 MR. LARKINS: In terms of realism, you've
20 got to be careful how you state that because you can
21 make it very conservative so that you know you've got
22 margin. So there's the other side of that, the issue
23 that you raise on cost and reasonableness.

24 DR. LEVENSON: But the problem, John, when
25 you over estimate the consequences of this kind of a

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1 complex thing, you don't really know whether it's
2 conservative.

3 MR. HAMDAN: But that's another issue
4 altogether.

5 DR. GARRICK: All right. Moving right
6 along, the second comment had to do with the
7 transparency. I'm not going to spend much time on it.
8 I have always been a believer in a simplified model
9 for the purpose of exercising and building confidence,
10 and for better understanding of what's going on in the
11 reactor assessment field.

12 I point out there has been considerable
13 success in developing simplified risk models based on
14 the dominant contributors to risk. We often call them
15 the dominant sequence model, and these models were
16 extremely helpful for the regulator and for others to
17 understand what was going on, the phenomena that was
18 taking place.

19 They lend themselves to repetitive
20 calculations for checking results. They facilitate
21 the review process, and there just does not appear to
22 be a counterpart of that in the performance
23 assessments that are being performed for Yucca
24 Mountain.

25 And yet there are some indicators that

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1 would suggest that such simplified models are within
2 reach if we are very confident that the risk is driven
3 by so few radio nuclides as, for example, in the long
4 term at least the peak does of neptunium and
5 plutonium. This in itself suggests an opportunity for
6 a simplified model or the ability to abstract a
7 physics based analysis that lends itself to repetitive
8 application and confidence building.

9 Also note that in the TSPA-SR, I was
10 somewhat pleased to see the introduction of the notion
11 of pinch points. It's very limited. However, they
12 create a pinch point at two critical points, one
13 between the waste package and the unsaturated zone,
14 and then one between the unsaturated zone and the
15 saturated zone.

16 There's another pinch point that I think
17 is very important, and that is the one that I would
18 call between the infiltration model and the near
19 field, and that is an area of considerable opportunity
20 for simplified analyses that would help people better
21 understand the relationship between the near field
22 engineered barriers, such as the drip shield and the
23 waste package itself.

24 And the dependence of drip shield
25 performance on infiltration and the dependence of the

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1 waste package performance on drip shield performance,
2 some question is raised there in what was presented in
3 TSPA-SR as there is as to whether or not the drip
4 shield can really be justified based on the model that
5 they employed.

6 But there is the thought that if there was
7 more of a coupling between the drip shield and the
8 waste package, then maybe the case for the drip shield
9 would be better exposed. I don't know.

10 CHAIRMAN HORNBERGER: Couldn't I take the
11 -- I know you have that in your previous thing, and
12 I'm not sure that you've sold me yet. I think that if
13 I were making the argument for DOE, the fact that they
14 are uncoupled is a good thing in terms of multiple
15 barriers.

16 Why not? Why isn't it good that they're
17 uncoupled and the performance of the waste package
18 doesn't depend on the drip shield? Isn't that then
19 really what you'd like to have in terms of multiple
20 barrier?

21 DR. GARRICK: Well, the point that
22 prevails there, George, is again the point of
23 realistic phenomena and what is really happening or is
24 this an artifact of the modeling?

25 CHAIRMAN HORNBERGER: Yeah, but you know,

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1 to me when I look at the model, they're basically
2 saying they're uncoupled. It doesn't depend upon
3 seepage because humid air corrosion of the package
4 takes place even though the drip shield is intact.

5 The place where it stretches credulity is
6 in how the stuff gets out of the waste package --

7 DR. GARRICK: That's right.

8 CHAIRMAN HORNBERGER: -- without dripping.
9 So it's not so much the corrosion, but how stuff gets
10 out after the corrosion takes place.

11 MR. LARKINS: I think John does go on and
12 later on in, say, maybe a more detailed model.

13 DR. GARRICK: Yes.

14 MR. LARKINS: And it sort of reminds me of
15 the separate effects models that we do for thermal
16 hydraulics. You may have a detailed two phase flow,
17 3D code, and then you simplify that in your overall
18 assessment model.

19 CHAIRMAN HORNBERGER: Well, you know,
20 Chris Wipple's peer review panel of TSPA-VA requested
21 exactly that.

22 DR. LEVENSON: Where it stressed
23 credibility is it might be corroding the waste
24 package, but if the drip shield is intact, how do you
25 get water dripping into the waste container?

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1 CHAIRMAN HORNBERGER: Well, that's what I
2 say. It's not so much the corrosion, but how you move
3 material out of the waste package.

4 DR. GARRICK: Yeah. Where does the water
5 come from is a question on the waste package.

6 CHAIRMAN HORNBERGER: Well, the waste
7 package of humid air, that's not -- you know, to me
8 it's not amazing that you can get a very thin film of
9 water on the waste package, but that's not enough to
10 have stuff move out of the package.

11 DR. LEVENSON: You can't fill it up with
12 water for the humid air.

13 CHAIRMAN HORNBERGER: Right. You can't
14 have a bathtub.

15 DR. LEVENSON: But you can in this model.

16 DR. GARRICK: Okay. I don't want to take
17 all of our time here.

18 CHAIRMAN HORNBERGER: Okay. That's fine.
19 Go ahead.

20 DR. GARRICK: Point number three here is
21 the degraded and enhanced scenarios, while useful for
22 making comparisons between two assumption sets, tend
23 to add confusion to the issue of what can we really
24 expect to happen. They do something very interesting
25 in the analysis, and that is that they look at two

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1 degradation scenarios, one a rapid degradation and
2 another a slow degradation.

3 And from the standpoint of seeing what
4 fails and when, it's a very interesting analysis.
5 From the standpoint of understanding what this has got
6 to do with reality, it's not so contributing, and they
7 take their distribution curves, and depending on
8 whether it's the degraded case or the enhanced case,
9 they choose either the 5th or the 95th percentile and
10 use that as a bounding parameter in the conduct of the
11 degradation model.

12 And they get some very interesting
13 results, but it's not clear when they're all done what
14 they have done, except an on the other hand kind of
15 analysis. Obviously if you take a different set of
16 assumptions, you're going to get very different
17 results, and I think what would have been much more
18 informative there would have been for them to have
19 presented what they believed to be the most likely
20 thing to happen, again, with all of its uncertainties,
21 and then looked at departures from that and give
22 insights as to what might happen if things don't go
23 the way they believe it will go.

24 Okay, and then we made a couple of points
25 with respect to the NRC that we partially already

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1 commented on and put -- the one comment indicates that
2 the natural system plays such a little role in
3 impacting dose during the -- with respect to the
4 compliance issue, and there's so much dependence on
5 the waste package performance for compliance.

6 There is some concern as to whether or not
7 the NRC TPA really is sufficiently comprehensive to
8 make a real risk informed assessment of the waste
9 package performance to verify DOE's results.

10 CHAIRMAN HORNBERGER: I have a comment on
11 this. Again, it's a similar comment to what I made on
12 Ray's chemistry paper yesterday.

13 What do we mean by extreme dependence on
14 waste package performance for compliance? And do we
15 know this?

16 Okay. Now, what we know is that in TSPA-
17 SR there are no releases in the compliance period, and
18 the fact that there are no releases certainly is due
19 to the waste package. Is that extreme dependence for
20 compliance?

21 Compliance just means you have to be below
22 15 MR. So that doesn't follow to me. I mean, if we
23 have some juvenile failures and we have a whole bunch
24 of other things, we still might comply. So I don't
25 understand what we even mean by extreme dependence for

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1 compliance.

2 DR. GARRICK: Well, yeah.

3 CHAIRMAN HORNBERGER: Okay, and the second
4 of all, even if we accept that the waste package
5 really is fantastic and that nothing gets out for
6 10,000 years. Why does it follow that we need a more
7 complex model to describe that?

8 DR. LEVENSON: To be sure it's true.

9 MR. LARKINS: I can understand that part.
10 I think you do need some realism, a better
11 understanding, and we traditionally have had
12 sophisticated models to look at specific phenomena or
13 issues where there have been large uncertainties or
14 large questions.

15 The question I have in my mind though is
16 why the NRC should do this as opposed to DOE as you
17 sort of implied.

18 DR. LEVENSON: More complex is not
19 automatically more realistic.

20 CHAIRMAN HORNBERGER: That was my point.

21 DR. GARRICK: It's just like the comment
22 I was making yesterday. There is this tendency to
23 think that one of the reasons that PRA is so
24 unattractive is because it's so complex to do. Well,
25 that's because people have a tendency to take a

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1 reactor PRA and try to template it on a simple
2 facility, and that's not the way to do it.

3 I've seen many very good PRAs on simple
4 facilities where there was no fault trees, no event
5 trees, but clearly it was a risk based analysis, and
6 it gave the perspective that one was looking for.

7 George, I'm not an advocate of complex
8 models for the sake of complexity and for the sake of
9 addressing all the mechanistic phenomena that's going
10 on, but I am suggesting that, as we have in the past,
11 that perhaps a more engineering analysis based
12 model --

13 CHAIRMAN HORNBERGER: Sure.

14 DR. GARRICK: But the reason they have no
15 releases is that they have containment in the waste
16 package.

17 CHAIRMAN HORNBERGER: Sure.

18 DR. GARRICK: And so we've got to convince
19 ourselves or the DOE has to convince the NRC to pick
20 up on John Larkins' comment that that is so.

21 CHAIRMAN HORNBERGER: Sure.

22 DR. GARRICK: And they may have to be
23 thinking in terms of a little different approach with
24 respect to the modeling of the waste package in order
25 to do that.

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1 CHAIRMAN HORNBERGER: Well, I understand,
2 but still this doesn't -- you know, what bothers me is
3 there's this implication that somehow that if we have
4 a nearly perfect waste package, that that means that
5 the mountain is not good, and that doesn't follow to
6 me.

7 DR. GARRICK: No.

8 CHAIRMAN HORNBERGER: That's a
9 nonsequitur.

10 DR. GARRICK: No, I certainly don't mean
11 that.

12 CHAIRMAN HORNBERGER: Okay, but my concern
13 is that that's the way people can read this paragraph,
14 and I just point that out to you.

15 MR. HAMDAN: Can I offer something on
16 this? Over the last two days I thought of one other
17 thing I was going to suggest to John to add to this,
18 and that is it's on that submission here it is
19 mentioned, but this brings it up, this issue, and
20 that's evidence.

21 What is needed? We need that, and I am
22 afraid that we are falling into the same trap. When
23 we want something, we formalize, we formalize, we
24 formalize. But that's not where it's at. It is the
25 evidence that's lacking.

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1 We want evidence that this 10,000 year
2 package will last 10,000 years, and the assumptions
3 that we have, we need evidence that these assumptions
4 are correct.

5 The thing that's really striking about
6 this is when you look at the France engineering report
7 and the repository safety strategy, RSS, there they
8 talk about evidence. They talk about analogues, which
9 might provide some evidence. They talk about
10 confirmatory studies which provide evidence. They
11 talk about methods and ways to reduce uncertainty,
12 which is great, and they talk about defense in depth
13 and multivariates, which is good.

14 What is missing is to take this concept of
15 evidence and incorporate it in the TSPA. That is
16 what's missing. I haven't heard the entire volume.
17 It's this big. I'll be looking for that. Maybe it's
18 there, and I missed it, but the TSPA needs evidence to
19 support the assumptions and the abstractions that are
20 used to integrate the model to calculate and do it.

21 MR. LARKINS: But, Latif, are you saying
22 that what they need to do is to show how these analogs
23 and other observations relate to what assumptions and
24 things are in the models?

25 MR. HAMDAN: Absolutely.

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1 MR. LARKINS: More so than those actually
2 providing a basis for verification of models and stuff
3 because it's always going to boil down to a model, an
4 analysis, an extrapolation because there is no --

5 MR. HAMDAN: Yeah, that's exactly what I'm
6 saying.

7 MR. CAMPBELL: I think that was probably
8 a major conclusion that in our chemistry review we
9 came to, was not that the evidence wasn't there, but
10 that they hadn't really been making a case for a
11 particular assumption or set of models or even a set
12 of data, hadn't really done the kind of marshalling of
13 evidence, if you will, to get you to that point.

14 I do want to add that in terms of that
15 review of the waste package, what the staff is doing
16 in terms of waste package corrosion, the working group
17 didn't really identify any major gaps that they think
18 the staff is doing a pretty good job of identifying
19 all the issues.

20 They do have a process level model called
21 EBSFAIL, E-B-S-FAIL, that deals with package
22 corrosion, and it's abstracted into TPA, and they're
23 certainly changing things, updating TPA based upon the
24 briefing we got last November. So, you know, this may
25 be a work in progress, you know, addresses this issue.

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1 CHAIRMAN HORNBERGER: All of this will be.

2 DR. LEVENSON: John, one slight
3 difference, John, between my perception of the words
4 that are here and what you said just a minute ago when
5 you talked was that your concern is that they're not
6 using the right kind of model, and that's different
7 than saying it needs to be more complex.

8 DR. GARRICK: Yeah, yeah, that's --

9 CHAIRMAN HORNBERGER: Well, you know our
10 concern there.

11 DR. GARRICK: Okay. The other comment, of
12 course, is this whole issue of -- the other comment
13 for the NRC TPA is one thing that has impressed me
14 about the TPA is that it does represent something you
15 can kind of get your arms around, and it does lend
16 itself to some iterations and looking at different
17 scenarios.

18 And I think that one of the real
19 challenges at the NRC, and that's why it's listed here
20 as an item, is being able to convince themselves that
21 all of the pieces of the TSPA model are where they
22 should be and are appropriately interconnected, and
23 all of the coupling processes that have an impact on
24 the performance are adequately understood or at least
25 understood within the uncertainty ranges that can be

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1 tolerated.

2 So I think, Latif, one of the statements
3 we made up front is to acknowledge your comment and
4 agree with you, is that we indicated in the
5 introduction that there were two questions that guided
6 our review. Number one, what is the evidence
7 supporting the results of DOE's TSPA, and number two,
8 what is the adequacy of the NRC staff's approach of
9 using their TPA and review plan to review the TSPA?

10 MR. HAMDAN: John, I know staff -- it's
11 beautiful and beautifully written, and no problem
12 here. I mean I'm just -- you know, all of us
13 sometimes get carried away. This actually comment, I
14 was going to make this as a submitted comment, and it
15 was based in part on what you wrote.

16 And look. My point is that this idea of
17 evidence, the only time it comes in the safety
18 strategy and in the science and engineering report
19 it's repeated, and I was hoping that when we look at
20 the TSPA that data loss, this assumption rebounded
21 these values or they did not really -- because a lot
22 is stored in there. I want to see this nexus.

23 I'm not saying that's not there. I was
24 reviewing the entire document, but the key word -- I
25 want to take what you wrote here, but the evidence and

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1 make it the cornerstone of our review.

2 DR. GARRICK: Good.

3 MR. HAMDAN: I'm just making -- you know.

4 DR. GARRICK: I think it should be, yes.

5 Well, I think I've got kind of the gist.

6 CHAIRMAN HORNBERGER: Okay. Any other
7 comments for John?

8 DR. LEVENSON: Well, I've already made
9 this comment to John because I think the two questions
10 -- this is kind of a policy or philosophical question.
11 The two questions stated in the introduction, I think,
12 are important and well stated. We have not explicitly
13 answered them.

14 MS. DEERING: Right.

15 DR. GARRICK: Yeah, they were behind the
16 whole thought process that went into the
17 identification of the --

18 DR. LEVENSON: Yeah. I don't know whether
19 we should answer them, but I think we need to discuss
20 whether they should be explicitly answered because I
21 think they're good questions and well stated.

22 DR. GARRICK: Yes.

23 DR. LEVENSON: Okay, and Question 2, by
24 the way, is really the question that we want to
25 address in the vertical slice letter.

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1 DR. GARRICK: In the letter, yeah, the
2 vertical slice letter. That's right. Now, that's the
3 context I was thinking of when I was --

4 DR. LEVENSON: Yeah, right, right. So we
5 can take that out of this first letter. What about
6 the first question?

7 DR. GARRICK: Well, we need to address
8 that.

9 MS. DEERING: And, John, I think it's
10 interesting that in the VA letter, one of our main
11 points was that the NRC should require you to provide
12 in the LA data and information packages the supporting
13 evidence to the performance assessment PA at the
14 module level.

15 So, once again, another reason. It's a
16 question; it's the right question. And we want it
17 answered to the best of our ability.

18 DR. GARRICK: Yeah.

19 CHAIRMAN HORNBERGER: And, of course, I
20 think that DOE's approach, their pyramid would say
21 that the AMRs and PMRs is where the evidence base is.

22 DR. GARRICK: Yes.

23 CHAIRMAN HORNBERGER: I'm not saying that
24 we completely accept that, but I think that would --
25 that's the structure of their argument.

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1 MR. LARKINS: Well, maybe they need a
2 cross-walk to get you from --

3 CHAIRMAN HORNBERGER: You know, one of the
4 things that we have all learned in this vertical slice
5 is how difficult it is to go from one thing to the
6 other. We have learned that.

7 Now, whether or not -- well, I wouldn't
8 take the contract from DOE to do this cross-walk.

9 (Laughter.)

10 MS. DEERING: Well, some of the answers,
11 too, lie in the fact that this next iteration has
12 provided perhaps more evidence for more realism, and
13 even though you're not going to explicitly address
14 that here, that can be hinted at as in this evidence
15 question.

16 Can't that be brought into it in some way?

17 DR. GARRICK: Sure, sure.

18 CHAIRMAN HORNBERGER: Well, I mean, as I
19 heard you say what you were going to do is you were
20 going to have some footnotes in here --

21 DR. GARRICK: Yeah, right. I certainly
22 want --

23 CHAIRMAN HORNBERGER: -- was to what we
24 anticipate being done in the SPA.

25 DR. LEVENSON: I wouldn't do it as

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1 footnotes. I'd put it right in the introductory
2 paragraph.

3 DR. WYMER: I would, too. It's essential,
4 or else this gives the wrong impression.

5 MR. LARKINS: Yeah, yeah. And I think as
6 you move forward with this, I mean, there's a lot of
7 good stuff in here in terms of thing that staff should
8 continue to follow and work on, not so much for
9 sufficiency, but towards going beyond for potential
10 receipt of a license application.

11 MR. CAMPBELL: And I think the same thing
12 can be said about the staff approach and capabilities,
13 too, is that this is an evolving process. You know
14 what we hear last November down at the center, Tai was
15 updating me on some of the things that they have done
16 since then that impacted how we worded the chemistry
17 letter. That's something that needs to be folded in
18 there, that both DOE and the NRC are, in essence,
19 moving targets, but there's a good reason for that.

20 MR. HAMDAN: Could I ask Andy a question?
21 Just one question. We can probably take care of that,
22 but on the page 2, Andy, I just wanted to see the
23 basis for.

24 On page 2, the paragraph before the last,
25 and the last sentence is there where it says the

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1 performance measures include radionuclide release
2 rates from the EBS and dose establish member of the
3 group.

4 We know that there is a performance
5 measure, but the release rates used to be, and I don't
6 think they are anymore. They used to be in about 60.

7 MR. CAMPBELL: Yeah, the old Part 60 had
8 release rates standard, but release rates are used in
9 TSPA-SR to display some of the information.

10 MR. HAMDAN: But they are not a
11 performance measure anymore.

12 MR. CAMPBELL: In terms of compliance,
13 you're right, but on the other hand, they do give you
14 a good handle, an intermediate handle as opposed to
15 going all the way to the dose at the end or a look at
16 a submodule. It would have to be reworded, but that
17 was the intent there.

18 MR. HAMDAN: Yeah.

19 MR. CAMPBELL: It becomes a measure of the
20 performance of that subsystem.

21 MR. HAMDAN: Yeah. Now, the reason I
22 think it's important is because about 60 when it was
23 revised at 60, this was a huge --

24 MR. CAMPBELL: Pulled those out, yeah.

25 MR. HAMDAN: -- change.

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1 MR. CAMPBELL: Yeah, we don't want to slip
2 back in there. On the other hand, if you're looking
3 at pinch points, you know, intermediate spots along
4 the way, release rates are a good measure, some
5 intermediate measure of performance even if --

6 CHAIRMAN HORNBERGER: We will make sure
7 that we don't in any way, shape or form imply that
8 we're in favor of subsystem requirements.

9 (Laughter.)

10 CHAIRMAN HORNBERGER: Okay. What I
11 proposed we do is actually go now and talk about the
12 vertical slice letter and what we need to do to move
13 this to a full draft, which we absolutely, positively
14 have to do.

15 So, you know, we all have in front of us
16 this basically -- well, it's more than a skeleton.
17 It's really the form that we're proposing for the
18 letter.

19 MS. DEERING: But it's a little anorexic.

20 CHAIRMAN HORNBERGER: But more than a
21 skeleton.

22 MS. DEERING: Yes.

23 (Laughter.)

24 MS. DEERING: George, before we go into
25 that, I'm just going to, if I could, as John was

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1 talking, and you know, I looked at the three vertical
2 sizes that we have, and I'm going to mention right now
3 some commonalities that they've all addressed, and
4 those include this issue of conservatism and some of
5 the problems associated with it, such as masking, such
6 as potentially not understanding your system, such as
7 not having a risk informed analysis which you can
8 build on, and all of the advantages.

9 That was in all three of the letters. the
10 uncertainties whether or not those are being
11 abstracted and captured and whether or not
12 conservatism is an appropriate way to handle them,
13 that's kind of a commonality.

14 In consistencies is mentioned in all three
15 in the sense that the follow-through. Milt used the
16 term "conservation of mass and energy," but you use
17 the term, you know. You gave some examples. You
18 know, from one module to the next it doesn't follow,
19 and that's kind of a theme I see coming out.

20 The transparency issue, the lack thereof
21 is a theme brought out. Well, I have here listed also
22 as code capability. You've made that point with a
23 TPA code, whether or not we develop that point.

24 Ray brought that point up also, meeting
25 staff needs, the capability if it doesn't have it now.

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1 In fact, there's an implication that it does not in
2 terms of computing capability.

3 And everything else, again, I pulled the
4 main themes out of each letter, and the rest are just
5 duplicative of those basic themes. Now, I'll do a
6 refinement on that, but that's where we stand right
7 now. I could say you could shake those out.

8 And does anyone else want to add to that?

9 DR. WYMER: Well, aren't there through all
10 of them the theme that the process that's being used
11 by the staff is a good one?

12 MS. DEERING: Yes, I forgot to mention
13 that, Ray. Absolutely. I've seen that here many
14 times. I just forgot to pull it out, and you pulled
15 that out for me this morning.

16 Basically the whole issue resolution
17 process seems to be working. It seems that they're
18 capturing the significant issues. A lot of
19 complementary things, I think, about that process are
20 being brought out in our reviews. That's a good one,
21 yeah.

22 DR. LEVENSON: Isn't that really the only
23 point that ought to be in the letter? In the letter,
24 the vertical slice was to evaluate the staff's
25 performance, and I think that all the rest of this

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1 ought to be in an attachment to the letter. The
2 letter ought to -- because that was the question.
3 That's why we started the vertical slice.

4 MR. LARKINS: Well, I thought there were
5 three questions that you had posed originally when we
6 started developing --

7 MS. DEERING: Capability, tools, and
8 guidance, are they such that --

9 DR. LEVENSON: That's right, but that's
10 all --

11 MR. LARKINS: I mean, that's what we
12 presented to the Commission.

13 DR. LEVENSON: Oh, yeah, yeah, I just
14 made the one question, but that whole issue, those
15 three points, but all of the background, all of the
16 vertical slice details ought to be presented.

17 MR. LARKINS: But I want to make sure
18 they're presented to the Commission if we could follow
19 through on those commitments.

20 MS. DEERING: Well, whether or not you had
21 the rest as an attachment or whether you made that a
22 main point and then followed up with some more detail
23 backing you, that is --

24 DR. WYMER: Yeah, I think you need a
25 little bit more fleshing out. Otherwise that's

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1 awfully stark.

2 MR. CAMPBELL: The issue resolution
3 process in and of itself is not the only issue. I
4 mean there is tools, expertise, as a matter of fact
5 the capability. Those are all part of --

6 DR. LEVENSON: I agree, Andy, but all I'm
7 saying is we just respond to just that, the back-up as
8 to why we think the tools are either adequate or
9 inadequate. All of that back-up could be amended in
10 a letter to the Commissioners. In a letter to the
11 Commissioners, the question is: is the staff equipped
12 and prepared to do the review?

13 MR. HAMDAN: I wish we can spend maybe
14 five -- not today; some other time -- think about
15 this correspondence with the Commission because this
16 issue came up again and again and again, whether we
17 should send a short letter with an attachment or a
18 long letter.

19 If we can have the universal format or
20 not, and then if we can, then we resolve this once and
21 for all.

22 CHAIRMAN HORNBERGER: Okay. Let's see.
23 We'll put that on hold.

24 It strikes me that we need to do something
25 a little more than what you just said, Milt. Okay.

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1 And here is my thinking.

2 About this vertical slice, the first thing
3 that we are aiming at is the realization that staff is
4 going to have to give sufficiency comments, and my own
5 belief is that we would -- I think that this is our
6 opportunity to weigh in on sufficiency, and so I
7 personally would like to see this letter oriented that
8 way.

9 Now, the tools, capabilities and what was
10 the third one? I've forgotten.

11 MS. DEERING: Guidance.

12 CHAIRMAN HORNBERGER: Guidance is part of
13 that, okay, and that can be the framework, but the
14 comments that I would like to see us come up with and
15 discuss, I don't think that it's quite right for us to
16 just give a blanket statement, yes, staff appears to
17 be on the right track, because if we think now in
18 terms of sufficiency and separate ourselves from TSPA
19 per se, which we all tend to focus on even within our
20 vertical slice, our own vertical slices, and we think
21 about the staff's issue resolution process and are
22 they asking the right questions and are the agreements
23 with DOE based on risk; is DOE being pushed to
24 conservatism by what the staff is demanding of them?

25 I think that these are questions that we

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1 should probably grapple with.

2 DR. LEVENSON: I don't have any problem
3 with that at all, George. My point is that the
4 vertical slices give us different views, different
5 inputs, different data, and that shouldn't be in the
6 letter. That should be an attachment. What should be
7 in the letter is a single response to the single
8 question. I didn't mean just two or three sentences.

9 MR. CAMPBELL: One wrinkle here, George,
10 is that most of us have not looked in great detail
11 about or even had access to necessarily sufficiency
12 comments by the staff.

13 CHAIRMAN HORNBERGER: Oh, no, no, no, and
14 we can't have that. I mean, we would like to have
15 that, right? We would like to know what's going on,
16 and I guess, see, to a certain extent we can
17 anticipate what the staff might be likely to come
18 forward with in terms of sufficiency comments on the
19 basis of various presentations that we've had on
20 different issues and on looking at agreements that
21 come out of the technical exchanges. All right?

22 And so while we're not privy to the
23 sufficiency comments per se, what we can base our
24 comments on, as I say, are these agreements that come
25 out of the technical exchanges and the presentations

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1 that we've had from staff, and to a certain extent, of
2 course, we're guessing, but we're not completely in
3 the dark about it.

4 MR. CAMPBELL: No. My comment was meant
5 to say that a lot of our focus has not been on
6 sufficiency per se, but more on the resolution process
7 which addresses issue way beyond just sufficiency.

8 CHAIRMAN HORNBERGER: I agree. Okay?
9 Certainly the chemistry letter and the TSPA letter
10 that we just talked about go well beyond.

11 MR. CAMPBELL: Right.

12 CHAIRMAN HORNBERGER: They're not related
13 to sufficiency, and I'm trying this out as my
14 suggestion for the vertical slice letter, and it
15 doesn't mean that the committee has to agree with it.

16 MR. CAMPBELL: No, and I think that's
17 right, and I think when you originally talked about
18 the template and the vertical slice approach, you said
19 that there may be other spinoff documents, reports
20 from this, and that's what we're seeing. The
21 chemistry is a separate stand alone report. John's
22 draft would be a standard separate report.

23 But also they provide the inputs for the
24 vertical slice report, and I think if the staff also
25 holds up to their pre-decisional schedule that we may

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1 get some insights into the comments before this letter
2 actually goes out.

3 CHAIRMAN HORNBERGER: You're right, Andy.
4 We haven't heard what the staff is going to propose.

5 MR. LARKINS: But we will.

6 MS. DEERING: It will be part of our --

7 MR. HAMDAN: I thought your point, George,
8 was not so much that we give a read on the conclusions
9 of staff, but rather that based on our vertical slice
10 review, we feel that the conclusions, whatever they
11 are, that staff may come to would be critical because
12 the staff has the tools, has the capability, and has
13 the guidance to do the job, and the job will be done.

14 MR. LARKINS: There is a reasonable
15 process in place so if that if we follow it, whatever
16 they come up with seems reasonable.

17 MR. HAMDAN: The chances are the comments,
18 whatever they come up with, would be critical.

19 MS. DEERING: A vertical slices leads us
20 to that. I mean naturally the template, if you follow
21 it, leads you to that.

22 But, George, the actual comments that the
23 staff makes, sure, we will see those, but in my
24 opinion if we bless their process and we find that
25 some of the results they have on the table are

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1 traceable, you can find the information to support why
2 they're asking for what they're asking for, we would
3 probably scrutinize those to a less degree because if
4 we like the process, we have to like the outcome.

5 CHAIRMAN HORNBERGER: Yeah, and to a
6 certain extent --

7 MR. LARKINS: Presumably.

8 CHAIRMAN HORNBERGER: -- we may be jumping
9 the gun here, and I think that in terms of saying,
10 "Oh, yes, we love the process" --

11 MS. DEERING: We're not saying that yet.

12 CHAIRMAN HORNBERGER: -- there may be some
13 things about the process that we have some questions
14 about --

15 MS. DEERING: Absolutely.

16 CHAIRMAN HORNBERGER: -- which would lead
17 us to perhaps not jump to the conclusion that we have
18 to love the outcome totally.

19 MR. LARKINS: Yeah, and I agree with you.
20 I think I've heard people say that IRSR process is
21 working fine, but I think there may be some issues
22 associated with.

23 CHAIRMAN HORNBERGER: Right.

24 DR. WYMER: It is not unearthed, as yet
25 unearthed.

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1 CHAIRMAN HORNBERGER: Well, I think in
2 particular the one worry that I have and that I think
3 that we need to have a little discussion on is this
4 whole notion within the template, the question of to
5 what extent all of these are based on a risk informed
6 perspective. You know, are there things out there
7 that we're asking for another rock just because we'd
8 like to see another rock as apart from the risk
9 informed basis, and I think that there might be some
10 doubts in our minds that all of this IRSR process is
11 driven that way.

12 We've seen, I think, a really good
13 movement in terms of the IRSR, the acceptance criteria
14 to be much less prescriptive and much more open to
15 letting DOE provide the evidence that they think, but
16 at any rate, that's the kind of thing that I think
17 that we need to discuss to see if we do have a concern
18 on.

19 DR. LEVENSON: Let me ask kind of a policy
20 related question that I perceive might simplify
21 getting this letter out in the long run, and that is
22 if, in fact, the letter addresses the coherent issues,
23 whatever they are, then in the context that the
24 workshop reports attached to a letter don't
25 necessarily require committee review because they the

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1 output of the workshop.

2 We could simplify getting the letters out
3 if each person and staff member review and accept
4 responsibility for that attachment. The whole
5 committee doesn't have to review and Lynn doesn't have
6 to try to integrate them and all of that. The
7 attachments are the work of individuals, and the
8 committee's output is the letter.

9 DR. WYMER: I think that's already
10 understood probably.

11 CHAIRMAN HORNBERGER: Okay. So let me
12 back up. I'm not sold yet that we are going to have
13 a letter with four attachments. Okay? It strikes me
14 that we have the chemistry letter. We're going to
15 have the TSPA letter. Are we going to have a workshop
16 report on thermal hydrology?

17 We haven't had a workshop. We might
18 have --

19 DR. LEVENSON: It would be the vertical
20 slice report.

21 CHAIRMAN HORNBERGER: The vertical slice
22 report.

23 DR. LEVENSON: Right.

24 CHAIRMAN HORNBERGER: We'll have to think
25 about this, okay?

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1 To the extent that we want to have a
2 vertical slice report ont, say, the thermal hydrology,
3 and on the saturated zone, we could append those. We
4 have to ask the question as to -- you know, you see,
5 the question that I have is we have chemistry report.
6 We have a TSP report because we have really important
7 conclusions from those vertical slices.

8 If we have really important conclusions
9 from the other vertical slices, maybe what we should
10 do is think about the same approach and write a
11 separate letter --

12 DR. LEVENSON: Yeah, I agree.

13 CHAIRMAN HORNBERGER: -- and not have it
14 as an attachment to this, and make this letter
15 vertical slice.

16 DR. LEVENSON: That's an alternative.

17 DR. GARRICK: What I would --

18 MS. DEERING: It doesn't have to be long
19 letters.

20 CHAIRMAN HORNBERGER: No.

21 DR. GARRICK: What I would suggest on this
22 letter is that we go ahead and get another draft with
23 the essential substance in it that we think is
24 appropriate and then maybe reserve the final decision
25 as to whether or not we do a short with an attach or

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1 whatever, but let's get the story together first and
2 then see what we want to do, be satisfied that this is
3 the message we want. This is the message that we want
4 to send.

5 DR. WYMER: I'd like to see Lynn's final
6 distillation of all of the important points that she's
7 drug out of these independent --

8 DR. GARRICK: She's got all of the source
9 material, too, all of the drafts and what have you.

10 MS. DEERING: There are gaps.

11 CHAIRMAN HORNBERGER: Wait a minute.
12 Before we do that, what I'm going to suggest, well,
13 first of all, I'm going to suggest that we're going to
14 take a break, and when we come back, what I would like
15 to do before sending Lynn and me away to come up with
16 this complete draft, I would like to go through and at
17 least have a brief discussion on the template
18 questions, okay, to see what we agree that we want to
19 say rather than have Lynn and I prepare what we think
20 we want to say and then you guys come back and say,
21 "Oh, that's balderdash."

22 Let's try to get some agreement up front.

23 MR. LARKINS: I'd like to hear from Lynn
24 as to what meat or other things she needs to go in to
25 fill out because --

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1 MS. DEERING: What I think are the gaps.

2 MR. LARKINS: What you think are the gaps,
3 yeah.

4 MS. DEERING: What I would like to have
5 and don't have.

6 MR. LARKINS: Right.

7 MS. DEERING: Okay.

8 CHAIRMAN HORNBERGER: Okay. Are we
9 scheduled for a 15 minute break? Do you want a 15
10 minute break or a 20 minute break?

11 PARTICIPANT: We're not scheduled for a
12 break at all.

13 CHAIRMAN HORNBERGER: Oh, we're not
14 scheduled for a break at all?

15 Fifteen minute break.

16 (Whereupon, the foregoing matter went off
17 the record at 10:09 a.m. and went back on
18 the record at 10:31 a.m.)

19 CHAIRMAN HORNBERGER: Okay. We are
20 reconvened.

21 What I want to do now is have Lynn lead us
22 through the template to see what we need from the
23 various bits and pieces to put this letter together.

24 Lynn, I'll let you do the lead.

25 MS. DEERING: Okay. Shall I -- Part 2 of

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1 the template is what we're worried about.

2 CHAIRMAN HORNBERGER: That's right.

3 MS. DEERING: And I'll go through these
4 questions and we can all think about them again. Some
5 of the vertical slice -- sorry. I forget this is
6 being transcribed.

7 Some of the vertical slice templates
8 certainly have addressed some of these. I would say
9 all of them have -- there are omissions in all of
10 them, and whether they're important or not we'll have
11 to decide as a group. Okay?

12 We were going to try to address in each
13 vertical slice is there sufficient evidence supporting
14 the results of DOE's TSPA process model or model
15 abstraction. That question came from John. I think
16 actually that one now becomes part of his, a separate
17 letter. I don't know that we have to address that in
18 a vertical slice.

19 CHAIRMAN HORNBERGER: I agree.

20 MS. DEERING: Okay. Two, is the staff's
21 approach adequate for using the TPA code and the YMRP
22 to review the TSPA, the process models, model
23 abstraction, and all the supporting documents for the
24 SR?

25 This question we're going to take on in

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1 our vertical slice letter. I think this question,
2 George, relates to what you raised right before the
3 break, and that is: is the review that we see in the
4 process risk informed? Is staff using its own tools
5 to help it evaluate relative importance based on risk
6 of the different issues and the level of detail
7 they're asking for and providing?

8 CHAIRMAN HORNBERGER: Yeah.

9 MS. DEERING: That's one aspect of it.

10 CHAIRMAN HORNBERGER: No, I think that's
11 good, and I want to -- does everybody see the
12 distinction here? Because we're going to ask Ray and
13 Milt and me --

14 MS. DEERING: All of us.

15 CHAIRMAN HORNBERGER: -- to contribute,
16 and the distinction here is the question is given what
17 we know of YMRP and the IRSR, do we think that staff
18 is using its own tools to risk inform its decisions on
19 what they are asking for in terms of sufficiency.

20 DR. WYMER: I very nearly answered that in
21 this list I gave you here.

22 CHAIRMAN HORNBERGER: Yes.

23 MS. DEERING: Yeah. Okay, good.

24 CHAIRMAN HORNBERGER: I think that's true,
25 Ray.

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1 MS. DEERING: Good, because that does come
2 back to evidence. Do we have evidence? Do either we
3 have good faith or evidence to answer that question?

4 Okay. Three, is the issue resolution
5 process sufficient based on review of the various
6 integrated subissues?

7 That's an odd question. I think what we
8 were trying to get at was does the process get -- does
9 it insure coverage, integration. Does it cover NRC's
10 basis? Is it going to get NRC where it needs to go?

11 And I think we've all come -- Ray, that's
12 kind of what you mentioned. All of us have made some
13 complements, very complementary statements about the
14 staff's issue resolution process, which I think
15 related to that question, but there may be some
16 negatives, too.

17 Four, is the relative risk of the subissue
18 known or understood by NRC, by DOE? This goes back to
19 the number two question, I think. Is staff using its
20 tools to help it understand relative risk and/or has
21 DOE attempted to provide that in all of its
22 documentation, including the repository safety
23 strategy?

24 And just because DOE says here's what's
25 important, here's what's a principal factor doesn't

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1 necessarily mean NRC agrees, but I think we're looking
2 for the element of whether DOE has done it as well.

3 DR. WYMER: I don't think we've addressed
4 that one.

5 MS. DEERING: Yeah. If anybody is trying,
6 John is in his TSPA.

7 CHAIRMAN HORNBERGER: So the question is
8 can we do it.

9 MS. DEERING: Yeah.

10 CHAIRMAN HORNBERGER: On the basis of what
11 we have or should we strike this one?

12 DR. WYMER: I think we can do it.

13 CHAIRMAN HORNBERGER: Okay. So we've just
14 got to all pay attention to doing that. So right now
15 at least Milt and I have to answer Question 2 or pull
16 stuff that we've already written and point Lynn in the
17 direction, and number four we all have to do, right?

18 DR. LEVENSON: These questions, this list
19 of questions and this numbering is different than a
20 previous version of the template.

21 MS. DEERING: It is. Yes, it is. This is
22 a revised version, but the only thing that was changed
23 really was we added John's two questions that he asked
24 himself for his vertical slice, and we thought they
25 were so good we thought we'd add them to the whole

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1 group's.

2 DR. LEVENSON: Okay. Because --

3 MS. DEERING: Actually John made me do it.

4 DR. GARRICK: But I can be overruled.

5 (Laughter.)

6 DR. LEVENSON: Because Questions 3 and 4
7 I had already answered. They were one and two on the
8 previous list. I've already written something.

9 MS. DEERING: Oh, you're going to have to
10 redo it.

11 (Laughter.)

12 DR. GARRICK: Sorry.

13 CHAIRMAN HORNBERGER: Okay. So, Milt,
14 you've addressed new Question 4.

15 DR. LEVENSON: Three and four both. I
16 already have.

17 DR. GARRICK: Okay, good.

18 MS. DEERING: Because I noticed in your
19 vertical slice write-up there was more questions than
20 answers, but I think they were posed in a way that you
21 had a hunch of how you would answer it, but you
22 weren't trying to --

23 CHAIRMAN HORNBERGER: That's Milt's
24 passive-aggressive.

25 (Laughter.)

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1 DR. LEVENSON: I've got to check this
2 whole thing because you say you've added two, but I
3 answered ten, and the new list has 11.

4 (Laughter.)

5 CHAIRMAN HORNBERGER: You're going to have
6 to do yours in binary. Okay. Moving right along.

7 MS. DEERING: Okay. The next question
8 relates, number five, does the -- or Milt's number
9 seven or Milt's number three probably -- does the
10 NRC's YMRP guidance reflect an RIPB approach?

11 CHAIRMAN HORNBERGER: I think that here if
12 we haven't done it, I mean, I've looked at it, but I
13 haven't written what I need to write. I do think it
14 would behoove us to look at the draft material that
15 we've seen on the YMRP, and even go back to the IRSRs,
16 which really are the basis of technical exchanges
17 anyway.

18 MS. DEERING: Yes.

19 CHAIRMAN HORNBERGER: And try to get an
20 answer to this question.

21 MS. DEERING: I find it frustrating
22 because I think the NRC staff has gone ahead and used
23 this YMRP guidance that we have not even had the
24 opportunity to look at, nor has the public, and they
25 have based their entire sufficiency review on the

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1 structure of this thing that has not been aired in
2 public.

3 And that bothers me, but I feel we're at
4 a disadvantage here in trying to answer questions
5 about the risk informed nature of the sufficiency
6 review.

7 CHAIRMAN HORNBERGER: Well, let me suggest
8 an approach that we might consider. We have seen the
9 IRSRs. The IRSRs have been the basis for the
10 technical exchanges. Let us formulate our answer to
11 this question on the basis of the IRSRs, leaving
12 ourselves enough room that if we see the YMRP that we
13 can make a comment of clarification or make an
14 addendum, and that's only if we see it.

15 Otherwise we will simply have to comment
16 on what we have seen. Is that fair enough?

17 MS. DEERING: That's fair enough, un-huh.

18 DR. LEVENSON: The wording in my RIPB, the
19 general impression is that the staff is moving toward
20 and RIPB approach.

21 CHAIRMAN HORNBERGER: Okay.

22 DR. LEVENSON: They're not there yet, but
23 they're moving toward it.

24 MR. MAJOR: The Part 63 is supposedly risk
25 informed. Of course, it's changing right now.

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1 MS. DEERING: The only thing is, George,
2 I know the staff has specifically told us that the
3 YMRP actually already is risk informed in the sense
4 that the level of detail that they get at in the
5 various areas of concern already reflect consideration
6 of risk.

7 In other words, there's more robustness
8 required where they feel there's more risk
9 significance, and I hope that's true because that's
10 what we'd like to see, but if that's true, that should
11 also trickle down to their sufficiency review.

12 CHAIRMAN HORNBERGER: Right.

13 MS. DEERING: But I don't know that we
14 really have evidence to track exactly is that
15 statement true.

16 CHAIRMAN HORNBERGER: Yeah, and I think
17 that that's right. We probably don't. All we can --
18 we may be reduced to making statements like Milt just
19 said because I think that, for example, we have heard
20 some presentations from the staff on their plans for
21 how they were going to do the Yucca Mountain review
22 plan, and we have this sort of loose indication that
23 they are, as Milt said, moving in a more RIPB
24 direction.

25 But until we see it, we're going to have

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1 to be careful on our comments, right?

2 MS. DEERING: Right.

3 MR. HAMDAN: Yeah, can I make one quick
4 comment? Coming from where I came from --

5 CHAIRMAN HORNBERGER: Which is where?

6 MR. HAMDAN: -- which is the staff, if
7 anything, IRSRs and the Yucca Mountain review plan, as
8 they stand now, in my opinion, they even go too far,
9 if you can say that, to where the risk informed
10 difference means. I mean they do it to a fault. This
11 is my take on it.

12 MS. DEERING: How so?

13 CHAIRMAN HORNBERGER: Now that you're with
14 the ACNW you can't go too far.

15 (Laughter.)

16 MR. HAMDAN: The reason why I say that,
17 the reason why I say that, look at the acceptance
18 criteria in all of the ISIs. They have one generally
19 set of acceptance criteria, and where are they coming
20 from? The TSPA.

21 And what's the TSPA trying to answer to?
22 Risk informed different space. So each ISI has the
23 five acceptance criteria, and they are the same in
24 every integrated subissue, and all of these are coming
25 from TSPA.

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1 CHAIRMAN HORNBERGER: Okay. Now, have we
2 seen that?

3 MR. HAMDAN: I have seen it.

4 DR. WYMER: Well, we haven't.

5 MR. HAMDAN: Well, this is just for
6 information. I know the committee may not have this.

7 MS. DEERING: That's the draft we had last
8 year.

9 DR. LEVENSON: Yeah, we don't have it.

10 CHAIRMAN HORNBERGER: I understand. We
11 need to be a little circumspect in our discussion
12 here.

13 MR. CAMPBELL: The five issues are
14 identified in the IRSR for TSPA. So I mean, if you
15 want something you can reference, that's where they
16 originate. Whereas earlier versions of the IRSRs of
17 the individual KTIs did not necessarily focus on those
18 five areas.

19 CHAIRMAN HORNBERGER: That's correct.

20 MS. DEERING: Do we need to revisit that?
21 Individually I mean. I mean, I can try to write
22 something up if that's agreeable with the group.

23 CHAIRMAN HORNBERGER: Okay. I probably
24 want to say no. I'm not saying, no, that you
25 shouldn't if you feel compelled write something up

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1 that we might approve, but I hesitate to say that we
2 want to go back and revisit this. Okay?

3 My view is that because of the nature of
4 the way that this has progressed, the technical
5 exchanges have been based on the IRSRs. That's what
6 we, therefore, had to do our vertical slices on, and
7 I think that really should form the bulk of our
8 answers to --

9 MS. DEERING: That's right. Okay.

10 CHAIRMAN HORNBERGER: -- Question 5, and
11 as I said, we'll just leave ourselves enough room to
12 modify this should we see the YMRP beforehand.

13 DR. LEVENSON: Well, our vertical slices
14 were a snapshot in time.

15 CHAIRMAN HORNBERGER: That's true.

16 DR. LEVENSON: They were not attempted to
17 be a review.

18 CHAIRMAN HORNBERGER: Right.

19 DR. WYMER: No matter what we do, they'll
20 be a snapshot.

21 CHAIRMAN HORNBERGER: Yeah, and I think we
22 should really take what you said and basically somehow
23 weave in here that from what we have seen, we
24 anticipate that staff is moving in this direction, and
25 we will let off Latif's comment that they've moved too

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1 far.

2 MS. DEERING: And we've already implied
3 that in another letter on the record already saying
4 that from I think a year ago, but okay. We'll weave
5 that into this, too.

6 CHAIRMAN HORNBERGER: Yeah.

7 MS. DEERING: Okay. Let's move on. Six,
8 are the KTIs the real -- will the real KTIs please
9 stand up?

10 CHAIRMAN HORNBERGER: Stand up.

11 DR. GARRICK: They're at such a different
12 level that the mapping process is difficult.

13 MS. DEERING: I don't know that this is
14 something that we can answer with our vertical slice.

15 DR. GARRICK: The TPA is a KTI.

16 CHAIRMAN HORNBERGER: Yeah, I know, which
17 of course, as we've commented before, that's a little
18 weird. I think that we probably should keep this in
19 here because I believe that Ray has addressed this
20 question and made some important comments.

21 DR. GARRICK: We've had this question for
22 a long time.

23 CHAIRMAN HORNBERGER: And Ray, his write-
24 up as I recall pointed out that the KTRS simply are
25 not designed or intended -- I don't know what the

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1 difference is -- designed or intended to extract
2 either a couple of process issues or sort of new and
3 rising issues.

4 DR. WYMER: That's right, especially the
5 latter.

6 CHAIRMAN HORNBERGER: Yeah.

7 DR. LEVENSON: Well, the problem is that
8 they're not directly related because the abstraction
9 in between changes things.

10 DR. WYMER: Yeah, but quite apart from
11 that, they aren't really set up to ferret out things
12 that are --

13 CHAIRMAN HORNBERGER: No, no. So my view
14 is that we don't necessarily have to address this from
15 each individual KTI, but let's read Ray's letter and
16 comments and do it in a for example way.

17 MS. DEERING: Okay, good. Seven, are the
18 staff's IRSRs and resolutions meeting their agreements
19 from the tech. exchanges? Logical, defensible,
20 focused on the most risk significant issues.

21 This relates to the question can we trace
22 back from where -- what we see on the table through
23 all of the documentation. Would we reproduce a
24 similar result?

25 CHAIRMAN HORNBERGER: This to me folds

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1 back into number five.

2 MS. DEERING: Yeah, it does.

3 DR. WYMER: They really weren't focused on
4 the most significant issue. They were just focused on
5 everything.

6 CHAIRMAN HORNBERGER: Yeah, but you see,
7 the nub of this question is if you go to the technical
8 exchanges and the agreements and what staff asked DOE
9 to provide to close an issue, the question we're
10 asking -- because of sufficiency, they were trying to
11 close issues ahead of time, and the question is: was
12 the NRC staff asking for the right information? Was
13 it the most important information or was it just a --

14 DR. WYMER: In chemistry, they were just
15 after completeness rather than risk significant in my
16 view.

17 DR. LEVENSON: The words I had down was
18 staff appears to be in the process of getting to the
19 most important issues, but the discovery process is
20 still underway.

21 DR. WYMER: Well, they're buried in there
22 in most all of the other stuff.

23 MS. DEERING: Yeah, those are good
24 examples.

25 DR. WYMER: Because there's no focus.

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1 CHAIRMAN HORNBERGER: This is good.

2 MS. DEERING: Okay.

3 CHAIRMAN HORNBERGER: We can work with
4 some -- my view is, Lynn, we're going to fold number
5 five and seven together.

6 MS. DEERING: Okay. Number eight, are the
7 staff's agreements/resolutions well documented,
8 transparent, and traceable? Very similar to seven.
9 So seven and eight and five --

10 CHAIRMAN HORNBERGER: Seven, eight, and
11 five will roll together.

12 MS. DEERING: Okay. Number nine, how has
13 uncertainty been evaluated? Are the issues treated
14 with bounding assumptions? Are they realistically
15 assessed?

16 DR. GARRICK: The answer is yes and no.

17 (Laughter.)

18 DR. LEVENSON: Before you leave eight, do
19 you want comments on the -- even though you're going
20 to fold it into something else?

21 CHAIRMAN HORNBERGER: Sure, sure.

22 MS. DEERING: Yes.

23 DR. LEVENSON: Okay. What I had written
24 was that only a conditional yes because since we
25 hadn't been allowed to sit in on the deliberations, we

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1 just don't know.

2 CHAIRMAN HORNBERGER: Oh, yeah.

3 MR. MAJOR: Some of us have and some of us
4 haven't.

5 MS. DEERING: The public wasn't privy to
6 that either, and that should be --

7 CHAIRMAN HORNBERGER: Milt raises a good
8 question. Okay? Do we want to make an issue of this?
9 You know it has to do --

10 DR. LEVENSON: I'm not necessarily saying
11 we'd make an issue, but when we answer that question,
12 we have to recognize that, in fact, we don't know.

13 MS. DEERING: Well, but in my opinion --

14 CHAIRMAN HORNBERGER: I'm not sure about
15 that. Okay? Because to me, I might not have even
16 been to a meeting, and yet if I read the preamble and
17 the agreements and the justification for the
18 agreements, I didn't necessarily have to be in the
19 room to hear the back-and-forth to make it traceable
20 or transparent.

21 MS. DEERING: You shouldn't have to be by
22 definition. If it's traceable and transparent, you
23 shouldn't have had to have been in that room.

24 DR. LEVENSON: That's right if it were
25 documented, but what went on in that room is not

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1 documented.

2 DR. WYMER: Well, it is in a way.

3 MR. HAMDAN: But it is. The result, the
4 results are records.

5 DR. LEVENSON: None of the reasons are
6 there. Only the conclusions are there.

7 MS. DEERING: But those should be in the
8 IRSRs then.

9 MR. HAMDAN: I would suspect that they may
10 be in the file, not accessible to the committee, but
11 I think we would probably have -- could find records
12 of these meetings, but I do not know.

13 DR. WYMER: I don't think we have to know
14 everything that went on in the committee, the back-
15 and-forth arguing of is this important, should we ask
16 for this, should we not ask for this in order to know
17 what their resolutions were.

18 MR. MAJOR: I think they did a pretty good
19 job on number eight personally.

20 DR. WYMER: Yeah, it's reasonably good.

21 CHAIRMAN HORNBERGER: Ray suffered through
22 the process, and John's going to suffer through the
23 caucus process in a couple of weeks. So I think you
24 probably will have some points where you --

25 DR. WYMER: Yeah, we have different views

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1 based on our experience.

2 PARTICIPANT: Because Ray was let into the
3 room.

4 DR. WYMER: Yeah, they actually let me in
5 there.

6 CHAIRMAN HORNBERGER: I don't know. We
7 can think about this. My own feeling is that we
8 shouldn't make an issue of not being in the caucus
9 room.

10 DR. LEVENSON: Well, I'm not saying that
11 we raise that as an issue, but I think the fact that
12 the question here as asked is is the staff's
13 resolutions transparent and traceable, and the answer
14 to that is, from my viewpoint, is no.

15 MS. DEERING: So you would say from what
16 you have seen in the way of agreements --

17 CHAIRMAN HORNBERGER: You don't know why
18 the agreements are there?

19 DR. LEVENSON: I don't know why.

20 MS. DEERING: There's nothing you can find
21 in an IRSR or in the PMR itself. So you go to that?
22 You wouldn't have come up with that as a need
23 yourself, and there's not a trail that shows how you
24 get there?

25 CHAIRMAN HORNBERGER: Okay. So if we're

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1 going to do that, and I don't disagree, what I think
2 we need is at least one --

3 DR. LEVENSON: I think we avoid the issue.

4 CHAIRMAN HORNBERGER: No, no. No, but we
5 need one "for example." So if you could give us --
6 generate at least one "for example," that would be
7 good because then we can judge that.

8 In other words, I think that's important
9 for the committee because as the committee letter, to
10 not just say, "Well, Milt Levenson believed that it
11 wasn't traceable, and therefore, we're going to say
12 it's not traceable."

13 If we're going to say this, I would be
14 really most comfortable with the "for example."

15 MR. HAMDAN: I would suggest before we do
16 that, because, you know, I would suggest that you look
17 at some of these agreements carefully before you --
18 you may want to reconsider your position on this
19 because the agreements really do tell you why the
20 staff and DO --

21 DR. LEVENSON: Don't forget I sat through
22 a meeting. I didn't get into the caucus. They came
23 back from a caucus and asked --

24 MR. CAMPBELL: And had the agreements,
25 right.

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1 DR. LEVENSON: -- asked for things, and I
2 didn't have a clue why those things were being asked
3 for.

4 CHAIRMAN HORNBERGER: Okay. So what we
5 need to do is go back to the write-up on --

6 DR. LEVENSON: What you need is a
7 transcript of that meeting.

8 CHAIRMAN HORNBERGER: Yeah, and most
9 importantly, you have --

10 DR. LEVENSON: I'll look at it.

11 CHAIRMAN HORNBERGER: -- you have to go to
12 the documentation, that is, the write-up, whatever
13 it's called, the meeting summary that Bill Reamer and
14 DOE people sign, and you need to go through that
15 document and you need to say, "Okay. Here's an
16 agreement. Here's a resolution, and we started out
17 here and we wound up here, and it's not clear or
18 traceable how we got there."

19 DR. LEVENSON: Well, you're not going to
20 get that from there because these things, the things
21 they put at each meeting are a snapshot in time, and
22 you have no background and no connection from the
23 previous meetings, which is, again, part of what makes
24 it not traceable.

25 MS. DEERING: Well --

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1 CHAIRMAN HORNBERGER: Andy?

2 MR. CAMPBELL: I was going to add that
3 behind each one of these issues and questions there's
4 a paper trail.

5 MS. DEERING: There's supposed to be.

6 MR. CAMPBELL: And one of the things if
7 you're going to go to the summaries, and I know we did
8 this in the chemistry review, I would then in a number
9 of cases go back to the staff and ask them about that.
10 And usually what would happen is forthcoming would be
11 some E-mails with documentation of that issue and
12 where it originated.

13 So I think you've got to step carefully
14 here because just because the wording in an agreement
15 that came out of a caucus is such-and-such doesn't
16 mean there isn't a paper trail.

17 CHAIRMAN HORNBERGER: No, no, and don't
18 get me wrong. I'm not suggesting that if we get
19 Milt's "for example," that we will immediately rush to
20 print without checking with the staff. We will check
21 with the staff. We will do our reality check, and if
22 we are proved wrong, then that's fine.

23 DR. LEVENSON: I think there's kind of a
24 basic question, and see, I read this to mean as a
25 transparent and traceable. These are supposed to be

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1 public issue. The fact that you can call a staff
2 member and get a piece of paper does not make it
3 traceable and transparent to me --

4 MS. DEERING: I agree. I agree.

5 DR. LEVENSON: -- in the normal definition
6 of those words.

7 MS. DEERING: But what I would think it
8 means, to me what it means is that you could go to the
9 NRC's issue resolution status reports, which
10 unfortunately are in a revision mode right now.
11 They're trying to integrate all of those, and so
12 perhaps it's in that document that's forthcoming, but
13 it would be there.

14 The detail that you seek and wanting more
15 explanation for why NRC thinks it's a risk significant
16 issue, why NRC believes they want -- they're asking
17 DOE to spend more money or more time on more data to
18 support, you know, an analysis. It should be there.

19 CHAIRMAN HORNBERGER: Okay. So I don't
20 want to put too heavy a burden on Milt. Okay? And I
21 don't want to preclude the issue from being raised,
22 and so my "for example," I'm not challenging you to do
23 it exactly the way Andy did. It can be a "for
24 example" as to a comment on the meeting and it being
25 not transparent at the meeting, and that's fine, and

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1 we can make that comment and not --

2 MS. DEERING: That's fair.

3 DR. LEVENSON: Let's get the transcript of
4 that.

5 MR. MAJOR: You know, I don't think there
6 are transcripts for those technical exchanges.

7 DR. LEVENSON: So the only thing that is
8 is the summary.

9 MR. MAJOR: The summary.

10 DR. LEVENSON: Okay. Get me a copy of the
11 summary and I'll review it.

12 CHAIRMAN HORNBERGER: Okay. So we're on
13 nine now, back to nine and the uncertainty and the
14 bounding assumptions and whatnot. And to a certain
15 extent, Lynn, I think that the five items that you
16 listed as commonalities across all, at least three or
17 four of those fit in there. So you probably have
18 enough information on --

19 MS. DEERING: Yes.

20 DR. WYMER: I think there's a strong tie
21 between nine and five.

22 CHAIRMAN HORNBERGER: Nine and five?

23 DR. GARRICK: It seems like all of the
24 questions are collapsing into five.

25 CHAIRMAN HORNBERGER: Why do you think --

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1 MS. DEERING: What's the link?

2 CHAIRMAN HORNBERGER: Yeah, I don't see
3 the link there.

4 DR. WYMER: Well, if you move in the
5 direction of risk informed performance based, then
6 that means you're moving away from uncertainty and
7 conservatism.

8 CHAIRMAN HORNBERGER: Well, not away from
9 uncertainty.

10 DR. WYMER: Well, insofar as you have
11 additional data and input, which they seem to be
12 striving for.

13 DR. GARRICK: That is certainly a key part
14 of it.

15 MS. DEERING: Well, but also --

16 CHAIRMAN HORNBERGER: It's a key part, but
17 I don't think you move away from it, yeah.

18 DR. WYMER: Well, you do if you get more
19 input.

20 CHAIRMAN HORNBERGER: Well, you and I
21 could have a philosophical discussion on that off-line
22 sometime.

23 MS. DEERING: Well, this is like John
24 raised the issue of solubilities. If you crank them
25 up to their max, you don't have any uncertainty,

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1 right?

2 (Laughter.)

3 MS. DEERING: And if that was an answer to
4 this question, which it potentially could be, say, in
5 John's area or the chemistry area, you could say,
6 well, the issues were dealt with very conservatively
7 as a way of dealing with uncertainty. This is how DOE
8 documented.

9 CHAIRMAN HORNBERGER: Right.

10 MS. DEERING: And, you know, DOE is doing
11 its own extensive shakedown of how uncertainty was
12 handled in all of the various areas across the board
13 and whether they need to modify that or tighten that
14 up or make that more consistent.

15 But I still think we all know the answer
16 to that question in our area.

17 CHAIRMAN HORNBERGER: I favor keeping that
18 as a separate question.

19 DR. LEVENSON: Yeah, I think it's a
20 separate question. And my assessment for the TEF KTI
21 review is that it was a mix. In some cases they used
22 bounding assumptions and in some cases they used
23 probability distribution.

24 MS. DEERING: And that's a good answer.

25 CHAIRMAN HORNBERGER: That's a good

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1 answer.

2 DR. LEVENSON: And, in fact, in the area
3 that I reviewed, the ratio was ten to one. There was
4 ten bounding assumptions for each probability
5 distribution.

6 CHAIRMAN HORNBERGER: What's the
7 uncertainty on that ten to one?

8 (Laughter.)

9 DR. LEVENSON: One significant thing.
10 But the other point that I thought was
11 important is that the sensitivity analysis is
12 primarily based on bounding assumptions which makes it
13 very questionable whether it's of any use at all.

14 MS. DEERING: And that was a theme that
15 came out in several of them actually.

16 CHAIRMAN HORNBERGER: Yeah, yeah.

17 MS. DEERING: And that was a question that
18 you all raised.

19 CHAIRMAN HORNBERGER: That is. That's a
20 good point because that's handy in Ray's point on
21 this, the tracking sensitivity. Who know what that
22 means?

23 DR. WYMER: That's Andy's.

24 CHAIRMAN HORNBERGER: Okay. Ten?

25 MS. DEERING: Ten, has integration between

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1 integrated subissues and KTI subissues --

2 CHAIRMAN HORNBERGER: Do we know what the
3 ISIs are? Have we seen that?

4 MS. DEERING: Yeah, that's the figure that
5 we all see and Andy included in his.

6 CHAIRMAN HORNBERGER: Oh, that's right.
7 Okay. We know that. Okay.

8 MR. HAMDAN: Yeah. Do you need more? I
9 mean, do you want me to explain what this is?

10 CHAIRMAN HORNBERGER: No.

11 MS. DEERING: No, because we know it.
12 However, it's never really been explained to us or
13 detailed to us in a public briefing, and I think that
14 remains a concern DOE has posed to the NRC, too. You
15 went and changed in midstream from KTI subissues as
16 per the tech. exchanges, and now you're orienting,
17 organizing your sufficiency review around integrated
18 subissues.

19 What gets lost in that process and where
20 is that process documented in detail?

21 MR. HAMDAN: Can I? This may help. On
22 page 58 of the TSPA-ISR, this table, it lists the KTIs
23 with 88 KTI submissions.

24 CHAIRMAN HORNBERGER: That's right.
25 That's right.

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1 MR. HAMDAN: And TS-14 integrates some
2 issues that are supposed to be under the TSPA.

3 CHAIRMAN HORNBERGER: Yeah.

4 MR. HAMDAN: So each of these 14 subissues
5 serve the TSPA, and then in that table, they have some
6 relevant KTI subissues.

7 CHAIRMAN HORNBERGER: Yeah, I remember
8 seeing that.

9 MR. HAMDAN: So there's some relation
10 between the two, but the other point is that since
11 they are no going back and integrate some issues, it's
12 all TSPA based.

13 MS. DEERING: You mean KTI subissue based?

14 MR. HAMDAN: Sure.

15 CHAIRMAN HORNBERGER: I guess what I don't
16 know, Lynn, is whether we have the information needed
17 to answer this question.

18 MS. DEERING: But now, which makes me
19 wonder. I've been concerned that this should be a
20 comment in our general letter.

21 CHAIRMAN HORNBERGER: Yeah.

22 MS. DEERING: To the extent we attended
23 tech. exchanges based on KTI subissues and we're
24 seeing a product and sufficiency under some other
25 organization, we don't have the visibility to

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1 understand whether everything was integrated and
2 captured. It's going to get lost in the --

3 CHAIRMAN HORNBERGER: Let's let this
4 question in, and that will basically be our answer.

5 MS. DEERING: Potentially, potentially.

6 CHAIRMAN HORNBERGER: Unless somebody
7 has --

8 DR. WYMER: How can you answer it any
9 other way?

10 CHAIRMAN HORNBERGER: Okay.

11 MS. DEERING: Yeah.

12 CHAIRMAN HORNBERGER: So that will be our
13 answer, and I like that because it also lets a crack
14 in the door so that if we do see things in time, we
15 can add to that comment.

16 MS. DEERING: Fair enough.

17 CHAIRMAN HORNBERGER: Okay.

18 MS. DEERING: The final question are, you
19 know -- some of these are redundant and overlapping.

20 DR. GARRICK: It's a summary question.

21 MS. DEERING: It is.

22 CHAIRMAN HORNBERGER: That's a summary
23 question.

24 MS. DEERING: It's trying to catch it all
25 if we didn't catch it before. Are the staff's tools,

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1 guidance, and capabilities sufficient for conducting
2 a sufficiency review or review of the potential LA?

3 DR. GARRICK: That's the bottom line
4 question.

5 CHAIRMAN HORNBERGER: Yeah. In fact,
6 probably what we should do in structuring the letter,
7 move that to number one, probably even address it
8 because the answer is going to be at least a qualified
9 yes, and then the rest of the letter will basically be
10 the details which, in part, will be the
11 qualifications.

12 DR. LEVENSON: One of the qualifications
13 is a qualified yes, but only if the LA comes in before
14 the entire present staff has retired.

15 (Laughter.)

16 PARTICIPANT: So what document isn't
17 traceable? You don't need to worry about it.

18 MS. DEERING: Yeah, that's ideally what we
19 would find, is that it is traceable and documented and
20 such that any staff person could come in and use it,
21 and if they can't we should say that we've got a
22 problem.

23 MR. LARKINS: Was that your answer on
24 eight?

25 MS. DEERING: Eight?

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1 CHAIRMAN HORNBERGER: Oh.

2 MS. DEERING: Oh.

3 (Laughter.)

4 MS. DEERING: Eight is a conditional yes,
5 and some of us are going to answer it one way and some
6 of us may answer it another way, and then we're going
7 to see what we've got.

8 Some of us think that this is true.
9 Different approaches here, but we discussed it at
10 length, John, before you came in.

11 MR. LARKINS: Well, when you say
12 "transparent" and "traceable," to whom?

13 CHAIRMAN HORNBERGER: Yeah, that's part of
14 our problem.

15 MS. DEERING: Yeah, and what does that
16 mean to each of us? And there was kind of a different
17 meaning for all of us.

18 CHAIRMAN HORNBERGER: We're going to have
19 to be clear on that when we write something.

20 DR. LEVENSON: We might need to consider
21 defining --

22 DR. WYMER: What we mean by transparent
23 and traceable.

24 CHAIRMAN HORNBERGER: Yeah. Well, see,
25 that's what I asked you to do in your "for example."

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1 DR. WYMER: No, no, but the point is is it
2 transparent and traceable to somebody. For instance,
3 a TSPA, is it transparent and traceable to somebody
4 like John or to ordinary people like --

5 DR. LEVENSON: Ordinary mortals.

6 CHAIRMAN HORNBERGER: You know, there are
7 only three people in the world who understand risk
8 assessment.

9 (Laughter.)

10 DR. LEVENSON: And unfortunately, John,
11 one of them is dead.

12 (Laughter.)

13 DR. GARRICK: Lynn, would you now
14 summarize all of these in the context of what's going
15 to be in the vertical slice letter and what's going
16 into the specialized letters and what are being
17 collapsed into one, et cetera, just for --

18 MS. DEERING: I can try, the best I
19 understand it.

20 DR. GARRICK: Including the movement of
21 number 11 up to sort of the overarching question.

22 MS. DEERING: To answer that, I'm going to
23 move to this.

24 CHAIRMAN HORNBERGER: Good. Let's go to
25 the letter. That's a good idea.

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1 MS. DEERING: Okay. And what I heard this
2 morning and previous to this morning, this letter on
3 the total look at -- the key to this letter is a
4 couple of things, as I understand it. One is we want
5 to make sure it addresses staff sufficiency review.
6 That's the whole purpose.

7 But to do that, we can bring in a couple
8 of other elements, including our own template
9 questions, maybe not all of them, but as we just went
10 down this list, I think there's some of them all of us
11 are going to go back to our vertical slice areas and
12 if we didn't feel we answered it in the first cut,
13 we're going to make sure -- we're going to try the
14 second round here to be more explicit about some of
15 these based on this discussion, and you're going to
16 give that to George and I.

17 Then we're going to take that last
18 question, the summary question, and try to make that
19 a main theme in this letter coming out first, staff's
20 tools, guidance, capability.

21 CHAIRMAN HORNBERGER: Down here on Line
22 46, Lynn, because we may not have phone observations
23 and recommendations. We may just want to make that
24 the main point of the letter.

25 MS. DEERING: Okay.

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1 CHAIRMAN HORNBERGER: Just a suggestion.

2 DR. GARRICK: And I think that partially
3 gets to Milt's question earlier.

4 CHAIRMAN HORNBERGER: Yes, it does.

5 DR. GARRICK: About making the fundamental
6 question that we've been asked very visible.

7 MS. DEERING: Yeah.

8 DR. LEVENSON: Let me ask a question back
9 up on Line 10, 11, and 12. This has bothered me a
10 number of times. The law only requires comments on
11 site characterization and waste; does not require any
12 comments on performance or anything else.

13 I don't know whether we could comment on
14 that, but everybody is going way beyond the
15 requirements of the law. Maybe that's okay, but I
16 think we need to do it consciously if we're going to
17 do it.

18 MR. HAMDAN: The staff upstairs is
19 sticking with the site and the waste and they are
20 staying away from performance in their comments.

21 MR. LARKINS: That's the point I was
22 trying to make earlier.

23 CHAIRMAN HORNBERGER: Okay. So my answer
24 would be that even if the staff is doing that, it
25 would be inconsistent for us to throw any notion of

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1 performance out the window when commenting on
2 sufficiency. Okay?

3 DR. LEVENSON: I don't disagree with that,
4 but I think we need to identify maybe that this is --
5 the legal requirement is this. We believe performance
6 is so important it also needs to be included.

7 CHAIRMAN HORNBERGER: I don't quite look
8 at it that way. The way I look at it is it provides
9 the context for the comments on site characterization
10 and waste form. In other words, it just provides
11 context. It doesn't mean that you have to comment on
12 everything else. It just means that this is the
13 context in which you're going to make the comments.

14 DR. LEVENSON: Okay, but it also is a
15 framework then for not requiring all kinds of detailed
16 information which is only relevant to performance.

17 CHAIRMAN HORNBERGER: You lost me on the
18 round about there.

19 DR. LEVENSON: Well, the discussion that
20 you had with John about containment, internal
21 chemistry, et cetera. That's not relevant to either
22 site characterization or waste form.

23 CHAIRMAN HORNBERGER: Or made to be the
24 waste form, right?

25 DR. LEVENSON: No.

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1 CHAIRMAN HORNBERGER: It's not a waste
2 form issue?

3 DR. LEVENSON: There's no requirement that
4 you justify the waste form. There's a waste form
5 proposed, and you comment on that.

6 DR. WYMER: It's just a matter of
7 interpretation. You can interpret it pretty broadly
8 if you want to. You've chosen to.

9 DR. LEVENSON: All I'm saying is that the
10 law was fairly specific, differentiated site
11 characterization and waste form.

12 CHAIRMAN HORNBERGER: Okay. I guess what
13 I'm perhaps doing is trying to be a rational citizen
14 and not a legal scholar, and to me if DOE came forward
15 and said, "We're going to put this stuff in a paper
16 bag and put it in the mountain," that would be a waste
17 form, but that would not be good for sufficient -- it
18 wouldn't be sufficient, and therefore, you have to
19 evaluate the waste form.

20 MR. HAMDAN: This may be helpful. When
21 you think about the sufficiency, one way I found for
22 myself to understand it is what we call the acceptance
23 reviewed. When NRC receives a license application, we
24 usually do an acceptance review, the idea being is
25 does the application provide all the information that

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1 we need in order to do a good and objective review?

2 So I like the idea of using the TSPA as a
3 context, but a context only to see if the information
4 about the waste and the site is sufficient to conduct,
5 you know --

6 DR. LEVENSON: You need a detailed
7 description of the waste form at this point, but not
8 necessarily its performance assessment.

9 CHAIRMAN HORNBERGER: Oh, I see what you
10 mean.

11 MS. DEERING: Right, and that's correct
12 for sufficiency review.

13 CHAIRMAN HORNBERGER: No, I don't agree.

14 MR. LARKINS: I think George has got it a
15 little bit --

16 DR. LEVENSON: The issue is not whether
17 it's acceptable, whether you can issue a license.
18 It's only whether it's sufficient to evaluate it, and
19 so you only need a complete description of the waste
20 form. You don't need its performance.

21 CHAIRMAN HORNBERGER: No, I guess I
22 disagree. If we didn't know anything at all, if we
23 know zip about Alloy 22, we would not be happy doing
24 a sufficiency review just because DOE came in and say,
25 "We're going to put it in this, and that's a

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1 description of the waste form."

2 MR. LARKINS: There wouldn't be adequate
3 information available --

4 CHAIRMAN HORNBERGER: Right.

5 MR. LARKINS: -- for the staff to do an
6 assessment.

7 CHAIRMAN HORNBERGER: To do an assessment,
8 and so performance is not divorced from this in my
9 mind.

10 MS. DEERING: You know, our letter
11 actually addresses the scope and how staff did this
12 because we did hear a year ago, and we struggled with
13 this question then. But I think we got through it,
14 and I have tried to capture this concept of
15 performance versus just looking at this
16 characterization data. On page, well, Lines 58
17 through 74 roughly, and I am just going to read a line
18 here.

19 We're saying that the staff -- and I'm
20 pretending as if we've already seen their sufficiency
21 review, but I'm saying rather than do a full blown
22 comparison of dose requirements in Part 63, the staff
23 provides preliminary comments to DOE on where data
24 analysis appears sufficient or insufficient, what
25 additional data and analysis are needed and within

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1 what time frame, whether conceptual models are
2 supported by sufficient data.

3 Now, that kind of gets you a little closer
4 to what you're saying. You need models, and we need
5 to comment on whether we feel the models are
6 supported, but we're not comparing those models'
7 results to a dose requirement.

8 CHAIRMAN HORNBERGER: That's right.

9 MS. DEERING: And you're also looking --

10 DR. LEVENSON: And you stop short of
11 the --

12 CHAIRMAN HORNBERGER: I agree with you.

13 MS. DEERING: Okay. So we're looking at
14 models and whether abstraction is done in ways such
15 that it could --

16 MR. LARKINS: And you can actually go back
17 to the Yucca Mountain review plan and acceptance
18 criteria and stuff in there and use that as a guide.

19 CHAIRMAN HORNBERGER: If we ever see it.

20 MS. DEERING: It's subtle, but I think if
21 you can remember -- okay.

22 DR. WYMER: I think she's dealt with it,
23 don't you?

24 CHAIRMAN HORNBERGER: I think this is
25 great.

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1 MS. DEERING: All right. So, Milt, that
2 was your question. We've dealt with that. Previous
3 to that we were kind of going through the scope of
4 this letter, I guess, and --

5 CHAIRMAN HORNBERGER: John.

6 MS. DEERING: John's question, right. I
7 think we do know what we do know. There's some
8 decisions we haven't made yet. I think we know you're
9 going to do a separate letter, and you are going to
10 divorce from your letter comments on whether the staff
11 has used the TPA code in a way that we feel helps them
12 make a risk informed judgment about these various
13 areas.

14 You're going to focus more on the TSPA and
15 whether there's sufficient evidence to support, you
16 know, whether it's transparent, some of the comments
17 you have, and you're going to make that as quickly as
18 possible. You know, you're going to also divorce any
19 real robust comments about the SSPA so that you can
20 get it out, and we reserve the right to do that later,
21 but that way --

22 CHAIRMAN HORNBERGER: You can even read
23 the draft tomorrow.

24 MS. DEERING: But this way you can go on
25 record with some of the deficiencies as you see them

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1 now, even though they may have been corrected in SSPA
2 or on the right track. It's important to say what you
3 want to say.

4 Okay, and we've got Ray's chemistry letter
5 just ready to go. Milt may want to make -- did I hear
6 correctly? We have not decided yet whether there's a
7 sat. zone and a thermal effect separate. Maybe short
8 letters just on the details of those.

9 DR. LEVENSON: That's not been decided
10 yet.

11 I have another comment on Lines 43 to 45.
12 Staff is doing a good job, et cetera. All of the
13 issues likely to be important to dose. Well, it's
14 much broader than that. It's all of the issues
15 important to a license review, and this is just dose.

16 MS. DEERING: You're right. That probably
17 should be absolutely taken out maybe because it gets
18 us too close than we want to be to this idea of
19 performance.

20 DR. LEVENSON: Yeah.

21 MS. DEERING: Okay. Good, Milt. Very
22 good.

23 CHAIRMAN HORNBERGER: Yeah. In fact,
24 that's where we do want to take that out and
25 concentrate on what sufficiency is all about.

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1 MS. DEERING: I don't even know if this
2 statement is true. I borrowed it from something Ray
3 had said verbally in a meeting last month, thinking
4 that if, in general, we find we can say something
5 positive about the process, let's say something like
6 this.

7 CHAIRMAN HORNBERGER: Yeah.

8 DR. LEVENSON: Even if we say something
9 like it, it needs to be relevant to what was needed
10 for us and --

11 MS. DEERING: Absolutely. You're
12 absolutely right.

13 DR. WYMER: I forgot about that.

14 CHAIRMAN HORNBERGER: And remember you're
15 moving the Question 11 up into there, and to a certain
16 extent that's the answer to the Question 11.

17 MS. DEERING: Right. I will have to
18 revise this based on discussion we just had and bring
19 11 and replace that. Good point.

20 Okay. So at some point, George, what's
21 missing from this letter, I think, is a section that
22 addresses the staff's sufficiency review itself, but
23 a lot of this is vertical slice, background to our
24 vertical slice describing our basis for why we can say
25 anything about anything, because we've done these

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1 vertical slices.

2 But what we don't have here and probably
3 should add is, you know, we heard the -- well, maybe
4 I've set us up for that, but I don't -- a section on,
5 you know, we've heard the staff sufficiency review,
6 and we feel that it's this, that, and the other.

7 DR. LEVENSON: I think we've got most of
8 it in here.

9 MS. DEERING: They followed their own
10 process.

11 DR. LEVENSON: You've described what the
12 staff has done, and all we need is a sentence saying
13 whether we think that's okay or not.

14 MS. DEERING: Right, exactly.

15 DR. LEVENSON: I think most of it is here.
16 I mean, you may need to change the tense or something,
17 you know, but --

18 CHAIRMAN HORNBERGER: But are you
19 suggesting that we want to put in a reference to
20 hearing a presentation by staff?

21 MS. DEERING: Well, that's already in
22 here.

23 CHAIRMAN HORNBERGER: Yeah, that's what I
24 thought.

25 MS. DEERING: But it was to go back to

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1 what you said this morning. I think this letter if it
2 does one thing should make sure it focuses on what we
3 think about the adequacy of staff's sufficiency
4 review.

5 DR. LEVENSON: This is the back-up for the
6 answer to the question.

7 CHAIRMAN HORNBERGER: Yeah, and what we're
8 saying is to the extent that what we saw is the
9 process that they're following, we agree that they
10 seem to be taking a rational process, but we haven't
11 seen the product, and therefore we can't comment on
12 the product.

13 MS. DEERING: By the time we send this
14 letter, we will have seen the product.

15 CHAIRMAN HORNBERGER: That's probably
16 true.

17 MS. DEERING: Is that going to be true?

18 CHAIRMAN HORNBERGER: Well, I don't know.

19 MR. LARKINS: It depends on the timing.

20 MS. DEERING: Are we going to send this
21 whether or not we've heard this sufficiency review in
22 public? We could.

23 DR. LEVENSON: I think we almost have to,
24 don't we?

25 MS. DEERING: No, no, because the staff is

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1 scheduled to come here in August and give this to us,
2 and we would want to wrap our letter up at the end of
3 that meeting, I suppose.

4 CHAIRMAN HORNBERGER: And that's why, you
5 know, my view is that what we want to have this letter
6 essentially ready to go, but have a couple little
7 doors part way open so that when we hear the staff's
8 thing that we fill in the paragraph that --

9 MS. DEERING: Now, Scenario B is that --
10 and this is also a real possibility -- they're still
11 hedging, equivocating whether they're going to bring
12 that to us in August because of their own readiness
13 level. It might be October, which would mean that we
14 might want to think about sending this -- see, the
15 Commission, they have to send it to DOE by November 1.

16 CHAIRMAN HORNBERGER: Yeah.

17 MS. DEERING: So our meeting is October
18 17, 18, 19.

19 MR. LARKINS: We have to do this in
20 August. I mean, otherwise we're going to miss the
21 window.

22 MS. DEERING: Yeah.

23 CHAIRMAN HORNBERGER: I agree with you,
24 John. I think we do it in August.

25 MS. DEERING: So with or without a

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1 presentation.

2 CHAIRMAN HORNBERGER: If staff doesn't do
3 a presentation to us, then those paragraphs get filled
4 in on the basis of what we can say.

5 MR. LARKINS: Base it on what available
6 information you currently have.

7 CHAIRMAN HORNBERGER: Yeah, right. And
8 you know, we'll have to put in some caveats.

9 MS. DEERING: Okay. No problem.

10 MR. LARKINS: What are you missing?

11 MS. DEERING: Well, before you walked in
12 the room, we went over what we're missing, and that
13 was we walked through the template, and I think each
14 of us had our own thoughts about how we can clarify
15 what we've already said or add to what we've already
16 said to help. Those are what I think are missing
17 pieces from where we are right at this minute.

18 And I don't know. We haven't set time
19 frames when we need that by, but --

20 MR. LARKINS: Well, you're going to have
21 a revised draft tomorrow, right?

22 MS. DEERING: No.

23 CHAIRMAN HORNBERGER: We'll do that right
24 after John's letter.

25 (Laughter.)

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1 CHAIRMAN HORNBERGER: Actually we're not
2 too far from having that draft if everybody pitches
3 in. Now, Milt to a certain extent has indicated that
4 their answers are in here. We just have to get the
5 right numbers.

6 Ray should have an easy time helping us
7 with the answers to the question, and I can certainly
8 sit down and do that in fairly short order.

9 Now, whether or not we have time to do
10 that today and give it to Lynn, I have some doubts,
11 but in setting a time frame, if at all possible, if
12 people could give something to Lynn before we leave
13 tomorrow, that would really help us get this out and
14 E-mail to people.

15 MS. DEERING: Quickly, within a week or
16 so.

17 CHAIRMAN HORNBERGER: Yeah, and then let's
18 have a round of comments back to try to polish it so
19 that we don't have to do all of the polishing at the
20 meeting.

21 DR. GARRICK: Why don't we do some
22 caucusing --

23 CHAIRMAN HORNBERGER: We could do that.

24 DR. GARRICK: -- this afternoon.

25 CHAIRMAN HORNBERGER: We could do that.

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1 What do we have this afternoon?

2 DR. GARRICK: Well, we have the greater
3 than Class C, but then we have from 2:45 on.

4 CHAIRMAN HORNBERGER: Let's spend some
5 time and do it. Maybe we can knock this out, Lynn.

6 MS. DEERING: Good. Question: those
7 commonalities that we were talking about earlier we
8 saw, you know, shaking out of all of the vertical
9 slices, one was on inconsistencies, you know, lack of
10 continuity throughout the analysis, conservatism, the
11 concern for masking, some of these things. Are those
12 going in here?

13 I know we want to address the big
14 questions: tools, capability, guidance, but I don't
15 know if I'm clear on whether that's the only question
16 we're going to address or are we also going to have --
17 are we going to try to say based on the vertical
18 slices, we have noticed some common issues across?

19 CHAIRMAN HORNBERGER: Okay. So we're
20 going to follow your template. Okay? Modified, and
21 if you look at Question 9 of your template, that's
22 where I suggest we build in some of these comments
23 that you referred to on conservatism, uncertainties,
24 inconsistencies.

25 MS. DEERING: I see. I see what you're

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1 saying. Okay. So this very template, this type of
2 structure will be somehow incorporated into this
3 letter, and we will answer -- bring the commonalities
4 into the answers to these questions.

5 CHAIRMAN HORNBERGER: You know, my own --
6 okay. I'll try this out. What I had envisioned
7 almost is that we use the template per se, that we
8 itemize these questions, just state them as you have
9 them, and write the text as our answer to these
10 questions that we pose to ourselves.

11 MS. DEERING: I think that's right.

12 DR. WYMER: I think it might go beyond
13 that though. If it's going to be most useful to the
14 staff, I think we need to add some additional points.
15 It's not only the Commission, but the staff uses it.

16 CHAIRMAN HORNBERGER: Yeah.

17 MR. LARKINS: I mean, points that won't
18 show up like in your chemistry report or John's
19 report?

20 DR. WYMER: I think there are some points
21 that we want to consider carefully, but probably
22 should be stuck in there as help.

23 MS. DEERING: Do you know what those are?

24 DR. LEVENSON: Would they be in the form
25 of more questions?

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1 MS. DEERING: Should we add them to the
2 template?

3 DR. WYMER: They'd be kind of along the
4 lines of some of the stuff I gave you.

5 MS. DEERING: This morning?

6 DR. WYMER: This morning.

7 MS. DEERING: Does everybody have that?

8 CHAIRMAN HORNBERGER: Are you talking
9 about the --

10 MS. DEERING: Issues, concerns,
11 extractions.

12 MR. LARKINS: I looked at that. I thought
13 a lot of those would be addressed in the --

14 MS. DEERING: This is a very good point.
15 This is the point I was making. We have the template,
16 but then as we shock out the vertical slices, there
17 were some things that fell out. They may or may not
18 relate one to one to the template questions. They may
19 be extra and beyond the template.

20 DR. WYMER: But they may be useful.

21 MS. DEERING: And they may be useful, and
22 we don't want to lose them, or we may be able to weave
23 them into the template questions we have, but I think
24 that remains to be answered.

25 We got some additional information we

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1 might not have even asked for.

2 DR. WYMER: We could just have a separate
3 category and say, "Here are some other stuff."

4 MS. DEERING: Okay.

5 CHAIRMAN HORNBERGER: But wait a minute.
6 You know, when I look through these, at least as far
7 as I've gotten, they're going to be incorporated or
8 can easily be incorporated, or the third one I would
9 say doesn't belong here because you've already
10 addressed it in your chemistry letter. The fifth one
11 you've already dealt with in your chemistry letter.
12 I don't think we have to reiterate those things.

13 DR. WYMER: No, we don't.

14 DR. LEVENSON: I don't know.

15 DR. WYMER: Well, maybe we do.

16 MS. DEERING: But see, George, in some
17 ways some of these are generic. I heard John say
18 something similar to number -- the treatment of
19 coupled processes is inadequately handled due to their
20 complexity and difficulty -- no, I'm sorry. That
21 wasn't the one.

22 You know, some of these are generic. What
23 about the unevenness in quality and thoroughness? Did
24 we see that across other vertical slices? And if we
25 did --

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1 CHAIRMAN HORNBERGER: Well, even if we
2 didn't see them across other vertical slices, remember
3 we're going to answer these template questions either
4 generically or we're going to call out that in the
5 chemistry subissue we noted that there were
6 inconsistencies.

7 DR. WYMER: Yeah, that's the point. How
8 exhaustively are we going to address each of the
9 template issues, in how much detail?

10 CHAIRMAN HORNBERGER: Well, you know, to
11 a certain extent that remains to be seen. We'll have
12 to put a draft together and then have you look at it
13 and see whether we've adequately handled it, but I
14 just don't see that there's anything left out.

15 DR. WYMER: If there's a fair amount of
16 detail, I can see that we can incorporate it in the
17 template. The template, we want to keep it at a
18 higher level, then --

19 CHAIRMAN HORNBERGER: No.

20 MR. HAMDAN: May I say something just
21 to -- I think the format that John followed in his --
22 you know, this morning. In other words, you have some
23 common theme, and you give examples. In answering
24 each one of the questions you say, "We found this
25 problem. Examples are this. We found this problem."

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1 DR. WYMER: Well, that's really the
2 question. To what extent do we detail the answers to
3 the template questions?

4 DR. GARRICK: Well, this is sort of a
5 summary letter. We're trying to keep a --

6 DR. WYMER: Yeah, that's the question.

7 DR. LEVENSON: They give examples how each
8 of these questions or each vertical slice --

9 DR. WYMER: It gets a little awkward,
10 yeah.

11 MS. DEERING: And the idea was any detail
12 we would lose in that process, abstraction process,
13 would be caught in the individual letters or some --

14 DR. WYMER: Maybe that's true. Maybe
15 that's true.

16 MS. DEERING: Especially if it's unique,
17 particularly unique to that topical area.

18 DR. WYMER: Just how much --

19 CHAIRMAN HORNBERGER: Because it doesn't
20 solve the issue if this is a summary letter and you
21 say, "Well, we're going to put a catch all question at
22 the end for issues that we didn't capture," because
23 you're still putting it in then.

24 I mean, so this is a summary letter. On
25 the other hand, we don't want to make it so bland as

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1 to not be useful. So to the next that we have to --

2 MS. DEERING: Or redundant.

3 CHAIRMAN HORNBERGER: Redundant. I'm less
4 concerned totally with redundancy, although I would
5 argue with Ray that we don't have to make the same
6 point that's already been made. If we really feel
7 strongly about it, we may want to.

8 But to a certain extent if a well chosen
9 example helps us make our point, then by all means it
10 will be included, I think.

11 MS. DEERING: Yes.

12 CHAIRMAN HORNBERGER: But I don't think we
13 will feel compelled when we go through the template to
14 have Sections A, B, C, and D for each question.

15 DR. WYMER: Nor do I.

16 CHAIRMAN HORNBERGER: No.

17 MS. DEERING: No?

18 DR. WYMER: Okay. Well, let's see how it
19 plays out.

20 CHAIRMAN HORNBERGER: Yeah, okay.

21 MR. HAMDAN: How about Part 1? Lynn, you
22 did not have this Part 1. Is this a done deal or
23 how --

24 MS. DEERING: Part 1 where?

25 MR. HAMDAN: Of the template.

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1 MS. DEERING: Oh, that Part 1. Well, that
2 was really more for --

3 MR. HAMDAN: Intel views?

4 MS. DEERING: Yes, I think so. I don't
5 know. It seems to me that this was sort of at an
6 earlier stage where this was more important to us.

7 CHAIRMAN HORNBERGER: Yeah, good. That's
8 good.

9 DR. GARRICK: It was kind of guidance for
10 how we'd do the vertical slice.

11 CHAIRMAN HORNBERGER: It was guidance for
12 us doing our work.

13 DR. LEVENSON: It was guidance that we
14 didn't follow very well.

15 MR. HAMDAN: That's good. I'm glad to
16 hear that because I was afraid I'd have to do all of
17 this.

18 CHAIRMAN HORNBERGER: No.

19 MR. LARKINS: Yes.

20 DR. GARRICK: But it did get us started.
21 It did get us started, and that was the main thing.

22 MS. DEERING: It did, and these Part 2s
23 were more outcome, what we would like to see a letter
24 say.

25 CHAIRMAN HORNBERGER: And so that's the

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1 important point of it.

2 MS. DEERING: Yeah. So, well, I feel
3 comfortable about what we're doing. I don't know.
4 What other questions do we have?

5 CHAIRMAN HORNBERGER: Okay. So let me go.
6 John has suggested that -- is it tomorrow or today,
7 John? It's today from 2:45 to, well, actually 5:36.
8 We have time, and we are going to spend some of that
9 time going back and pulling some of this information
10 together and giving it to Lynn and doing other work on
11 other letters. Okay?

12 Now, having said that, let me back up
13 because I do think that we need to have some
14 discussion on igneous activity issue resolution, and
15 I think we definitely need more discussion on our
16 research plan.

17 So we are simply going to have to do that,
18 and it remains to be seen whether we have to have a
19 discussion on greater than Class C.

20 So we're not going to simply break at 2:30
21 and not have a discussion. We're going to have our
22 discussion starting at 2:45, and hopefully that
23 discussion will be over in 45 minutes or so, and then
24 we can take a break and work on some letters. Okay?

25 MS. DEERING: Great.

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1 CHAIRMAN HORNBERGER: Does that sound
2 right?

3 DR. GARRICK: Is there any chance we could
4 have some of that discussion now?

5 CHAIRMAN HORNBERGER: Yes, that is
6 possible. In fact, if there aren't any other -- we're
7 through on this?

8 DR. GARRICK: You know, are we going to
9 have a discussion on the other vertical slice like
10 we've had on chemistry and TSPA, the other vertical
11 slices?

12 CHAIRMAN HORNBERGER: We can. Maybe we
13 should do that. Okay.

14 So let me go and talk a little bit because
15 you don't have --

16 DR. GARRICK: Well, I'm just asking
17 because if we don't need that, I don't want to be the
18 one to push for it, but we haven't had much
19 discussion.

20 DR. LEVENSON: If we're going to have
21 letters on those, we certainly need discussion.

22 CHAIRMAN HORNBERGER: Absolutely,
23 absolutely. We need discussions, and so let's take a
24 little bit of time just to say where we are.

25 DR. LEVENSON: Let me ask a procedural

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1 thing since we're talking somewhat about procedure.
2 Is the 1:00 p.m. adjournment for tomorrow a valid
3 number or do you want to run later?

4 DR. GARRICK: I have to leave if I want to
5 get home before midnight.

6 CHAIRMAN HORNBERGER: We have two people
7 gone and so we will not have an official meeting.

8 DR. LEVENSON: But, Rich, if there's
9 any -- perhaps we can get a copy of the summary of
10 that.

11 MR. MAJOR: I have a copy.

12 DR. LEVENSON: You have a copy.

13 CHAIRMAN HORNBERGER: So that would be
14 good. So you can do some work.

15 I also am going to be here. In fact, to
16 the extent possible, I don't know how many of the
17 staff would be available, but what I'd like to do is
18 a little bit of post mortem, see where we are, what's
19 come out of this meeting, and what our -- what do you
20 call them, Rich? -- action items or something.

21 MR. MAJOR: At a follow-up meeting we may
22 have one. Maybe just at a follow-up meeting we can
23 see how we go.

24 CHAIRMAN HORNBERGER: Good. Okay. And
25 then I can just participate in that. Okay, and then

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1 what I'd also like to do is in that follow-up meeting,
2 if we can have also a bit of a forward look as to the
3 August meeting and see what we're doing. Okay?

4 MS. DEERING: Yep. What time is that?
5 Tomorrow afternoon?

6 MR. MAJOR: Yeah.

7 CHAIRMAN HORNBERGER: When and where?

8 MR. LARKINS: Typically we have it next
9 door in the subcommittee room. I think we'll probably
10 shoot for around two o'clock.

11 CHAIRMAN HORNBERGER: Okay.

12 MS. DEERING: Who puts it together?

13 MR. LARKINS: Howard.

14 MS. DEERING: Howard? Well, then two
15 o'clock.

16 (Laughter.)

17 CHAIRMAN HORNBERGER: Okay. So the
18 saturated zone, you'll recall that the issues -- we
19 basically made a decision to focus on flow pads in the
20 saturated zone. When we made that decision, there
21 were some potential questions that the staff had, in
22 particular, with the alluvium. All right?

23 And let's see. Several thing occurred.
24 Lynn and I had a conference call with some people from
25 the center and people here where it was sort of free

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1 form discussion and a lot of issues were raised and a
2 lot of things were kicked around, and by and large, I
3 had the feeling that the staff really did start to ask
4 themselves what was important with respect to risk.

5 And so some of the issues that apparently
6 were going to be real issues in sufficiency sort of
7 went away.

8 We also in March 2001 -- there was a
9 review of the saturated zone flow and transport
10 process model report by Jim Winterly and David Farrell
11 that was issued; basically went through and is
12 consistent with the results from the TSPA or from the
13 saturated zone technical exchange, and I think the
14 bottom line is that there are some questions certainly
15 about how DOE -- the information that they have and
16 the way that they're using it.

17 So, for example, the question of
18 anisotropy in the saturated zone and whether they were
19 using the results from the C well complex test as an
20 example.

21 They were looking forward to doing some
22 more testing in the alluvium now that they have that
23 test bed in the Nye County well system, but when you
24 look at it, the bottom line was that the staff and I
25 concluded that in a sufficiency context, these things

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1 being closed or closed-pending, it made a lot of
2 sense.

3 There are firm plans in place to develop
4 information that is needed. So the bottom line is
5 that it turned out to be a fairly easy vertical slice
6 because, you know, I don't think that there are any
7 real show stoppers there.

8 MS. DEERING: I was going to add I
9 thought a good point raised by a staff member was what
10 is the risk significance of this issue. It's not even
11 a principal factor.

12 And we accepted that, but recognizing that
13 it supports transport. You don't do transport without
14 flow. So that became, again, a basis for all the --
15 again, we found valid the requirements NRC was placing
16 on DOE in those areas for data and information.

17 MR. LARKINS: A question on uncertainty.
18 Do you feel as though the staff, you know, will be
19 able to get their arms around this question of
20 uncertainty on this particular issue?

21 MS. DEERING: Yes.

22 CHAIRMAN HORNBERGER: I do. Okay? One of
23 the potential big questions at the beginning of this
24 were the flow pads in the alluvium and the retardation
25 and the potential interaction and everything else.

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1 My own view is that, well, it's like
2 everyone else's view. There's no way that we are
3 going to know definitively exactly what the flow paths
4 in the alluvium are or how long they are or whether
5 there is water coming up from the carbonates, and on
6 and on and on. Okay?

7 And what DOE has done is taken, I think,
8 a very reasonable approach to the uncertainty, and
9 part of this to a certain extent leads to one of these
10 questions that I don't know the answer to because
11 we're always saying, well, we should have realism, and
12 yet in the face of this kind of uncertainty, DOE says,
13 "Well, okay. All of the water that makes it past 20
14 kilometers goes into the well," and this is a pretty
15 radical assumption, but it certainly does eliminate a
16 lot of questions having to do with flow in the
17 alluvium.

18 DR. GARRICK: From a modeling or
19 phenomenological standpoint, what do you think are the
20 most important phenomena or parameters contributing to
21 dose in the saturated zone? What should we be most
22 concerned about?

23 CHAIRMAN HORNBERGER: So that's sort of a
24 tough one. Yeah, the dilution volume is a big --

25 MS. DEERING: TPA took care of for us.

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1 MR. HAMDAN: Can I? Maybe I can offer a
2 response. There were two major issues in my mind, and
3 I was a member of the strategy zone. One of them was
4 the conceptual model. I really had serious problems
5 with it, and I can discuss that briefly if you want.

6 Another issue that came up, Mel Nabb when
7 he was in NMSS, came one day to a meeting, and he
8 asked the weekly meeting if there will be any
9 surprises that will come out that nobody has through
10 about, and I never -- the only thing that came to my
11 mind, and I was the only one who spoke at that time,
12 is that when you have fractured systems, there's
13 always the risk of the radionuclides and the flow to
14 take a bath that you never thought about and will come
15 in places that will surprise you.

16 That risk in my opinion is still there,
17 and so for dilution, dilution is one to one. I mean,
18 they have in the rule, they are going to describe the
19 volume of water that they're going to pump. They'll
20 specify the mass of radionuclides. So dilution with
21 the word "bumping," I don't think we have too much
22 leverage there.

23 But on the conceptual model and possible
24 fractures, a third issue arise to me, but now we have
25 it covered in an agreement. So all of these issues

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1 are covered. The conceptual model, after a lot of
2 hard work and a lot of convincing, we convinced DOE
3 and they agreed to look at an alternative conceptual
4 model to flow from Yucca Mountain to the critical
5 group that's different than what you have been seeing.

6 And on the anisotropy, DOE agreed to take
7 a hard look at the results of the serial test and come
8 up with a better bounding for that case, and it's
9 possible that even the nominal case is going to be a
10 case in the end, in the license application.

11 On the alluvium, that was a big issue, of
12 course, but that's where the program comes in, and
13 they're doing all they can on that. So that's the --

14 DR. GARRICK: So is a real boil down of
15 this that pathway uncertainty is the real, if there is
16 one, concern in the saturated zone as far as the
17 impact on dose is concerned?

18 MR. HAMDAN: That's definitely, yeah, I
19 would say that's true.

20 DR. GARRICK: And then, of course,
21 whatever you assume on dilution.

22 MR. HAMDAN: Dilution has a great impact
23 on dose, of course, because the mass is fixed. How
24 much dilution assumed will definitely impact the dose
25 linear relationship.

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1 The reason I don't consider this to be an
2 issue, it looks like the rule is going to specify how
3 much bumping you're going to use to value that mass.
4 So the mass is fixed. The bumping is going to be
5 fixed. So there are not going to be any surprises as
6 far as, you know, in the license application insofar
7 as compliance, I mean, those calculations.

8 DR. GARRICK: Well, I was just trying to
9 get a handle on from, again, a realistic point of
10 view. What do we need to worry about?

11 CHAIRMAN HORNBERGER: And with all due
12 respects, I have some disagreements with Latif. Okay?
13 We know that, for example, one can think about --
14 well, first of all, we have experience in fractured
15 rock systems, and we know that quite often on
16 relatively short distances, there do tend to be
17 surprises. Okay?

18 I personally tend to think that if you
19 look at a 20 kilometer boundary that the chance for
20 there being a fast path from Yucca Mountain to
21 Amaragosa Valley is not a very realistic scenario. Of
22 course, we can't rule it out, but you can never rule
23 anything out, but I don't think that we do our
24 analysis on that basis.

25 The idea of alternative conceptual models,

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1 one can argue back and forth on that. My gut level
2 feeling is that that's not going to be a big issue.

3 DR. GARRICK: See, the reason I asked the
4 question is that in the TSPA-SR near the end of the
5 report, they go through all of the barriers. They
6 have nine barriers that they go through, and they
7 basically say the only two that are important are the
8 saturated zone and the waste package.

9 CHAIRMAN HORNBERGER: Yes. And it
10 basically -- Andy will undoubtedly correct me if I'm
11 wrong -- but the saturated zone pops up because of
12 basically interaction with the matrix of the
13 radionuclides, in particular, neptunium, and there's
14 enough delay in both transit time and retardation to
15 affect the --

16 MS. DEERING: And dilution.

17 CHAIRMAN HORNBERGER: And dilution to
18 basically push the neptunium peak beyond 10,000 years.

19 Is that roughly what you would say?

20 MR. CAMPBELL: Yeah, the retardation plays
21 a major role.

22 CHAIRMAN HORNBERGER: That's why it's
23 saturated and pops up as an important barrier.

24 MR. CAMPBELL: Because the path link is so
25 long basically.

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1 CHAIRMAN HORNBERGER: Yeah.

2 DR. GARRICK: Right. Okay.

3 DR. LEVENSON: George, let me ask kind of
4 a policy question. John's letter on TSP is based on
5 his reading the whole thing. In doing my vertical
6 slice, we at random looked at a couple of things
7 directly relevant and have discovered, well, for
8 instance, the seepage model for water entering the
9 drifts assumes a steady state value from day one. It
10 rises and falls as a result of climate change, but
11 there's always water entering the drift.

12 The thermal hydrological model predicts
13 that in the early years and for quite a long time
14 water moves only away from the drifts, and no water
15 comes back into the drifts until it's cooled down.

16 Now, even though that time interval is
17 relatively short to a million years, the reason it's
18 of major significance is by the time water comes back
19 in and it's cooled down, corrosion rates are down by
20 a couple orders of magnitude.

21 Now, this is an issue that's a conflict
22 between models in the TSPA, and my question, the
23 reason I raised the policy question is I can address
24 it as part of my vertical slice or we could put it
25 into John's as an example.

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1 You know, I just don't care. I'm just
2 asking what do you think we should do with things like
3 this.

4 CHAIRMAN HORNBERGER: Well, my own view is
5 that that's basically an issue that comes up in the
6 thermal hydrology, and so that you should deal with
7 it.

8 DR. GARRICK: And when you come up to
9 things like that, I'd much rather us be redundant and
10 then scrub it out than we go over the letter and miss
11 something. So don't hesitate to put it in.

12 CHAIRMAN HORNBERGER: Do you want to give
13 us a brief synopsis of thermal hydrology?

14 MR. LARKINS: Is the plan to do a separate
15 paper?

16 CHAIRMAN HORNBERGER: Oh, for saturated
17 zone?

18 MR. LARKINS: Yeah, for saturated zone.

19 CHAIRMAN HORNBERGER: I don't know. I
20 haven't sorted that out in my mind.

21 DR. LEVENSON: I wouldn't think so.

22 CHAIRMAN HORNBERGER: Yeah. I don't know.

23 MR. LARKINS: It doesn't sound like it,
24 yeah.

25 MR. HAMDAN: If the ultimate -- if the

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1 objective is to evaluate the tools, capabilities, and
2 guidance, the staff has enough of those to do the
3 sufficiency comments, and by doing two examples
4 already on the chemistry and TSPA, I just don't see
5 the need for doing a report on every vertical slice.

6 CHAIRMAN HORNBERGER: No, no, no.

7 MR. LARKINS: No, the question is if
8 there's something of significance there that should be
9 further expanded, you know, detailed, then, yeah.

10 MR. HAMDAN: Or maybe it can be folded
11 into this other letter.

12 CHAIRMAN HORNBERGER: I guess what I'd say
13 is probably not, but I don't want to -- probably not.

14 MS. DEERING: Unless there was a
15 conspicuous absence. In all the others we had one and
16 there it stood.

17 CHAIRMAN HORNBERGER: Well, that doesn't
18 worry me either, but what I want to reserve is I want
19 to go back and look at all of the stuff that I've been
20 through in answering the questions for the vertical
21 slice letter, and if something should occur to me that
22 jumps out, I don't think it will, but if it should,
23 then we would reevaluate. Fair enough?

24 MS. DEERING: Fair enough.

25 DR. LEVENSON: Well, basically what we

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1 started was to say this issue of risk is driven -- I
2 mean the 900 pound gorilla is water. If there's no
3 water, there's no corrosion of the waste container,
4 and even if it fell apart from gravity or something,
5 no water dissolves.

6 CHAIRMAN HORNBERGER: It diffuses out.

7 DR. LEVENSON: That's right.

8 CHAIRMAN HORNBERGER: We learned that.

9 DR. LEVENSON: Solid state diffusion. So
10 we tried to do as an outline for Rich and I to get
11 started is to look at a base case for a cold mountain
12 with no waste in it; then look at thermal effects,
13 look at effects that might arise from time at
14 temperature, weather patterns; look at water movement.

15 We excluded things like corrosion of the
16 canisters because other people were doing that, and
17 see if we could follow through why people made the
18 assumption that there was water there, and the answer
19 is we don't think it's justified by any of the
20 evidence or facts, and in fact, there's conflicts, as
21 I pointed out.

22 Let me jump ahead to some of the -- I
23 mentioned this inconsistency in the TSPA, and there's
24 places in the TSPA model where, for instance, in some
25 cases gravity is ignored. So if you drive water out

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1 by heating it, it comes back into the repository from
2 360 degrees. Water which is drained out and goes down
3 a crack comes back up into it as it cools.

4 There's been a lot of discussion about
5 whether J-13, well water, is a reasonable surrogate.
6 Again, this goes to the corrosion issue. We think it
7 may be a conservative thing because statistically
8 different water compositions would probably decrease
9 releases, not increase them by complexes and
10 solubilities and so forth.

11 One of our things that's being done, I
12 don't know if it would be appropriate for us to make
13 a recommendation, but I think that one of the reasons
14 some of these things have come up in the TSPA is in
15 the early days of doing work like this, model
16 generation was done by a team of a modeler and a
17 technical expert working together.

18 WE've gone away from that, and so we end
19 up with all kinds of models that don't necessarily
20 conform to the laws of physics. We identified a
21 number of inconsistencies in the abstraction process.
22 The staff has also identified a number of those
23 inconsistencies between hand calculations, the AMRs,
24 the PMRs, and the model abstractions, and we think the
25 staff is doing a good job of chasing those.

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1 But basically, I guess I would summarize
2 it by saying that I think that the thermal effects on
3 water flow are not substantiated by technical
4 information or evidence of any kind. Almost all of
5 the issues in it come from the modeling.

6 MR. LARKINS: So it sounds like your
7 answer to the first question on the template is no.

8 DR. LEVENSON: The first question? Which
9 one is that?

10 MS. DEERING: Milt has got his number one
11 different than the rest of us.

12 DR. LEVENSON: Because you have a
13 different list of questions, but on the new list of
14 questions, my answer would be no.

15 (Laughter.)

16 CHAIRMAN HORNBERGER: What's the question?

17 MS. DEERING: What is the question?

18 DR. LEVENSON: Is there sufficient
19 evidence supporting the results of DOE's TSPA process
20 model or model abstraction?

21 DR. WYMER: Well, that's pretty hard
22 saying, Milt, no.

23 DR. LEVENSON: Well, in this area. I'm
24 not talking about the total thing. The thing I've
25 looked at, it's just not supported at all.

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1 DR. GARRICK: Do you have any sense of --
2 but it's not a show stopper I don't think -- do you
3 have any sense of what the impact would be if there
4 was a what you might describe as a more rational
5 approach taken to the treatment of flow? What can we
6 expect to happen?

7 DR. LEVENSON: Well, I think it impacts
8 two things in a significant way. I think regardless
9 of what you think corrosion rates are and corrosion
10 mechanisms are, if you have substantially less water,
11 it's just slower and takes longer.

12 And secondly, if you have significantly
13 less water, all of the transport of stuff if and when
14 it ever does come out is slower.

15 CHAIRMAN HORNBERGER: Less water for the
16 thermal period you're talking about.

17 DR. GARRICK: Yeah.

18 DR. LEVENSON: Yeah.

19 DR. GARRICK: The hold-up times or the
20 residence times become very important not so much in
21 the short term, but in the long term where the
22 magnitude of the peak dose and when it occurs.

23 DR. LEVENSON: Yeah, but you see, one of
24 the things ignored in the current design is the fact
25 that the mountain breathes.

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1 DR. GARRICK: Yeah.

2 DR. LEVENSON: What that kind of means is
3 for current meteorology you'd probably never reach
4 saturation and dripping into the repository because of
5 the breathing. I mean the measurements in the USGS
6 indicate something like 25 to 30 million cubic feet of
7 air net out of the repository per year in an area
8 where you've only got a couple of inches of water per
9 year on the outside.

10 I think they estimate from the models and
11 stuff we've seen that -- was it a quarter of an inch
12 per year of water that reached the repository? I
13 think it's something like that.

14 You take the rainfall and you take the
15 transportation and all the rest of it. It's a very
16 small number, and you know, if you're pumping 25, 30
17 million cubic feet of air in and out of there, these
18 things have major impact.

19 MR. HAMDAN: So, Milt, you're concern
20 about the model notwithstanding the abstraction, is it
21 your feeling that in the end, when they did the
22 performance with this model, that it makes things
23 worse or better from the standpoint of dose or do we
24 know?

25 DR. LEVENSON: Oh, if there's no water in

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1 there, there's no dose.

2 MR. HAMDAN: No.

3 DR. GARRICK: That was the whole point of
4 the discussion about the film, how it gets there and
5 how much of a film is it and what are we really
6 talking about there. But we have more discussion on
7 that later.

8 CHAIRMAN HORNBERGER: Yeah. I think that
9 what we'll have to do is break now for lunch, and
10 we'll reconvene according to schedule, which I think
11 is at one o'clock.

12 (Whereupon, at 11:57 a.m., the meeting was
13 recessed for lunch, to reconvene at 1:00 p.m., the
14 same day.)

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AFTERNOON SESSION

(1:03 p.m.)

CHAIRMAN HORNBERGER: Okay. The meeting is called to order.

This afternoon we have one presentation, and then after break, the ACNW is going to go to preparation of reports. The presentation is on the greater than Class C wastes, and our lead member is Ray Wymer. So I will turn it over to Ray.

DR. WYMER: Well, I don't want to dig into Joel's time, but I just want to say this is a very important and very difficult issue, and we're pleased to have you come here and give DOE's perspective on it. Thanks. Proceed.

MR. GRIMM: Okay. Can everybody hear me okay? How's that? Is that a little better?

Thank you for introducing me. My name is Joel Grimm. I work at the Department of Energy, the Albuquerque Operations Office. I've been involved for a couple of years now in dealing with some aspects of DOE's responsibilities for greater than Class C waste.

For a little bit of background, I used to work right next door in One White Flint in the Waste Management Division, spent a couple of years there, spent a few years at DOE's field office in Denver

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1 working on mill tailings and in situ leach mining, and
2 when that office was closed, landed in Albuquerque
3 working on DOE's mixed waste.

4 That moved me specifically into dealing
5 with waste management issues at Los Alamos National
6 Labs, and since they had a role in dealing with some
7 sealed sources containing special nuclear material,
8 ended up dealing with it specifically on a day-to-day
9 basis.

10 CHAIRMAN HORNBERGER: Are you a geologist
11 or a geochemist by an chance?

12 MR. GRIMM: My background is geology.

13 CHAIRMAN HORNBERGER: Excellent.

14 (Laughter.)

15 MR. SINGH: That got you one vote out of
16 four.

17 MR. GRIMM: Now, unfortunately, you know,
18 back in graduate school we were the scum of the
19 department because we were called the dirt bag
20 geologists. I was in geomorphology and quaternary
21 geology, but that's what led me into dealing with
22 radioactive waste disposal criteria and mill tailing
23 stabilization and topics like that.

24 I disavow all knowledge of this zero in my
25 diagram. I have no idea how that got there. It means

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1 nothing in more ways than one.

2 (Laughter.)

3 MR. GRIMM: What I'm going to try to cover
4 today is describe greater than Class C waste
5 activities at DOE and more specifically activities
6 addressing greater than Class C sealed sources, the
7 scope of these activities, the regulatory and
8 administrative drivers behind them, and at least start
9 talking about the strategy we're taking toward
10 disposal, and the status of some of those activities.

11 DOE's responsibility for this stems
12 largely from the Low Level Waste Policy Amendments Act
13 of 1985. As you already know, that act largely spells
14 out the legal and regulatory criteria for low level
15 waste disposal technology and NRC regulations of Class
16 A, B, and C waste, the state compacts, et cetera.

17 The law also spells out responsibilities
18 of the federal government and where the government is
19 responsible for disposal of radioactive waste instead
20 of commercial industry and the states. Specifically
21 it talks about DOE being responsible for disposing of
22 its own waste from its various nuclear activities, for
23 disposing of waste generated from the Naval Nuclear
24 Reactors Program, and for disposing of all low level
25 waste that exceeds NRC's Class C criteria. And that's

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1 the way the law reads.

2 We just call that greater than Class C
3 waste and affectionately GCCC. Everything has to have
4 an acronym. Some of the requirements of the law
5 involve not only providing disposal for it, but having
6 an NRC license facility for doing so, and requires DOE
7 to consider charging the industry that benefits from
8 this for the service.

9 Okay. What is greater than Class C waste?
10 This is a great point of confusion within the DOE, and
11 I assume it's a point of confusion in the license
12 industry as well, although I could be wrong.

13 Many people, especially in DOE, treat
14 greater than Class C waste as a monolithic issue, that
15 it's one type of waste. It's one waste stream. It
16 can all be handled and disposed of the same way. IF
17 you look at the regulation, 10 CFR 61.55, it spells
18 out which radionuclides can qualify to make low level
19 waste greater than Class C, and it's a relatively
20 short list. There's only 13 items listed
21 individually.

22 Some of them are listed twice because
23 they're dealt with as activation products in metal or
24 not in activated metal, and it splits it into two
25 major categories: long-lived radionuclides and short-

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1 lived.

2 That allows us to approach them from
3 different angles if we wish to. The one that we've
4 been dealing with most at DOE Albuquerque when it
5 comes to sealed sources is the alpha emitting
6 transuranics in a wide variety of radioactive sealed
7 sources used in the license sector. They're also used
8 in the DOE sector and in the Navy as well.

9 There's only 11 isotopes listed on this
10 chart. so it's a pretty brief treatment for things
11 that qualify as greater than Class C waste.

12 Now, what are the waste streams? As I
13 said, sealed sources. Some of them have a variety of
14 short-lived isotopes. Many of them are long-lived
15 isotopes, and especially the actinides. They are
16 activated metals coming from the components of nuclear
17 power plants, and I tried to have a nice diagram of
18 the inside of a nuclear reactor II to show you which
19 components might be greater than Class C waste. It's
20 just really hard to find pictures of the inside of a
21 reactor.

22 To a large degree it involves various
23 stainless steel components inside the reactor vessel,
24 things like the control rod blades, the core shrouds,
25 the diffusers, items like that.

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1 And then largely from the utility industry
2 it also involves a variety of other miscellaneous
3 debris and scrap and filter media, especially things
4 like IX resins that come from the water purification
5 systems in the power plants.

6 The diagram on this slide is an example of
7 an americium-beryllium neutron source used in the well
8 logging industry. It's a three Curie source. IT's
9 about the size of my thumb. It's inside this device
10 called a bull plug, which is screwed onto the end of
11 a cable tool and lowered down an oil well, and it's
12 used to characterize geological strata for oil, gas,
13 or even water production.

14 What are we doing in Albuquerque with the
15 actinide sealed sources or what are they used for? I
16 manage a project at DOE Albuquerque called the off
17 site source recovery project. The name is implies to
18 mean that we're dealing with DOE responsibility
19 sources that are not in DOE's hands. They are not at
20 a DOE site.

21 We've been recovering sources largely
22 based on requests from NRC and other regulators since
23 1992. That was a very slow pace based specifically on
24 perceived or real emergencies with sources that had
25 been mishandled by the licensees.

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1 However, we are now in the mode of doing
2 proactive recovery of sources, largely Plutonium 238
3 sources. It's the first one that we were able to
4 develop procedures for at Los Alamos to bring to the
5 lab in large quantities, terminate safeguards and
6 security requirements and store them as waste.

7 We're trying to establish the same
8 procedures for other radioisotopes, specifically
9 americium sources and Plutonium 239 sources. We're
10 pretty close to success on americium. The Plutonium
11 239 is going to be a little more difficult for us to
12 manage.

13 In the license sector, there exists about
14 300 of those sources left that DOE hasn't recovered
15 yet, but they contain about ten kilograms of PU-239,
16 and understandably the DOE safeguards folks are
17 extremely nervous about terminating security
18 requirements and storing those as waste.

19 And then finally, Strontium 90 sources
20 found in very large radioisotope thermoelectric
21 generators are also part of our responsibility.
22 They're largely in the hands of the military. They're
23 used for reliable, but small sources of electric power
24 in remote locations.

25 We're conducting an environmental

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1 assessment with the Air Force right now to move ten of
2 these out of a seismic listening array in Alaska to a
3 DOE storage facility, and EA is going to select that
4 facility.

5 Moving on to the nuclear utility generated
6 GTCC, DOE headquarters has developed no plan to
7 provide interim storage of these sources or this
8 waste, contrary to the strategy we've developed at
9 Albuquerque for taking sealed sources.

10 There's a current policy or at least an
11 assumption that activated metal greater than Class C
12 waste will continue to be stored at power utilities,
13 along with their spent fuel either under their current
14 Part 50 license or according to the proposed
15 rulemaking during the decommissioning licenses.

16 And this is consistent with the existing
17 policies of spent fuel remaining in those storage
18 facilities until a repository is prepared for the
19 spent fuel.

20 Just recently the Environmental Management
21 Office in Germantown has announced a policy to begin
22 initiating an environmental impact statement to
23 address greater than Class C waste disposal issues.
24 There's a relatively small amount of funding in the
25 Fiscal Year '02 budget to start the public scoping

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1 process for this, but the EIS is probably not going to
2 get significantly underway until Fiscal Year 2003.

3 The EIS will cover aspects of the
4 technical criteria that would go into selecting and
5 designing a disposal facility, and the actual site
6 selection itself.

7 What are some of the alternatives that
8 could be selected? Well, first of all, any
9 alternative that DOE identifies and ultimately selects
10 could include intern storage either at the licensee's
11 facilities or at a DOE facility yet to be named, for
12 example, Los Alamos for the sealed sources that we're
13 dealing with now.

14 Secondly, some other storage facility that
15 would be selected for the Strontium 90 sources.

16 Some of the disposal options for activated
17 metal waste streams would include things like the high
18 level waste repository, some other intermediate or
19 deep facility, whether it's a mine repository or a
20 deep drilled bore hole or some other technology like
21 that has yet to be determined.

22 Some people have floated the idea that
23 certain greater than Class C could be stored for decay
24 or maybe there are other alternatives.

25 None of these are really attractive

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1 alternatives right now because they're all so far in
2 the future. None of these really solve the problem
3 for the utilities right now.

4 For sealed sources in other greater than
5 Class C waste, 10 CFR 61 does not eliminate shall land
6 burial from consideration. The rulemaking says the
7 repository is appropriate or the geological repository
8 is appropriate, but it also states any other
9 technology or application that the NRC approves.

10 So any disposal technology is available to
11 us. It remains to be see whether we can meet
12 performance objectives with those various tactics.

13 If greater than Class C waste were dealt
14 with, you know, as a monolith, again, the repository
15 could serve the purpose for all greater than Class C.
16 I believe the Yucca Mountain project is not planning
17 on accepting greater than Class C waste in the first
18 phase of some 70,000 metric tons of waste. That's
19 completely occupied by commercial spent fuel and DOE
20 high level waste.

21 Thirdly, we have an open and operating
22 disposal site for actinide waste at WIPP. There are
23 two laws that block us from using it for anything
24 else. The Low Level Waste Policy Amendments Act says
25 we have to have an NRC license for greater than Class

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1 C, which does not have one, and the WIPP Land
2 Withdrawal Act says it can only take defense --
3 transuranic waste from defense nuclear energy
4 activities.

5 So that gets interpreted many different
6 ways by many different people, but the lawyers are the
7 ones who matter, and greater than Class C waste from
8 nearly any angle does not qualify.

9 Fourthly, just like activated metals,
10 intermediate or deep facilities, whether it's some
11 sort of a mined facility or a deep bore hole is a
12 possibility. Here's an example at the Nevada test
13 site of a deep bore hole that was drilled three meters
14 in diameter, 36 meters deep. It was used as a test,
15 and some transuranic waste and some Strontium 90
16 sources were placed down this hole.

17 What you see the crane lifting was a
18 monitoring strong which went from the top to the
19 bottom of the hole. The heat loading from the
20 strontium sources ruined the monitoring equipment.
21 Deep down I believe most of it was melted. I guess
22 it's a good thing it was just a test, huh?

23 (Laughter.)

24 MR. GRIMM: And then finally, again, other
25 alternatives that maybe we haven't considered yet and

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1 other people would help us out through the scoping
2 process.

3 So in conclusion, when it comes to dealing
4 with greater than Class C waste now, DOE has started
5 proactive recovery and storage of limited types of
6 greater than Class C waste, specifically the actinide
7 sealed sources. The department has no plans to store
8 activated metal ahead of a disposal facility being
9 available.

10 DOE headquarters has announced that a NEPA
11 process will begin in fiscal year '02 to address the
12 full spectrum of issues related to greater than Class
13 C waste disposal requirements and site selection.

14 Certain alternatives, for example, WIPP,
15 would require changes in the legislation in order for
16 us to implement them. The law suggests that we can
17 recover fees for the storage and disposal activities,
18 although we don't have a program set up to do that at
19 this point.

20 And EM is promising in various
21 correspondence to utilities and governors that they
22 will be fully engaged with all stakeholders as the
23 NEPA scoping process and site selection process gets
24 underway.

25 So that's the first half of my

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1 presentation related to the general issues of greater
2 than Class C waste. I could entertain questions now
3 or I could move on to specific issues related to
4 sealed sources.

5 DR. GARRICK: Does DOE have any particular
6 preference or plan to go forward with respect to
7 either the storage or disposal of greater than Class
8 C waste that's more of a long-term solution?

9 MR. GRIMM: You mean storage or disposal?

10 DR. GARRICK: Yes.

11 MR. GRIMM: The reason that -- I have a
12 two-part answer -- the reason that DOE and the
13 environmental management program specifically is
14 sponsoring this project at Albuquerque to store sealed
15 sources is because of the high risks posed by them to
16 public health and safety. We've been dealing with the
17 NRC for nearly ten years now, and increasingly the
18 requests for assistance from DOE for dealing with
19 excess, unwanted, and orphan materials was involving
20 greater than Class C sealed sources.

21 Because of the larger numbers of sealed
22 sources in the commercial sector, the numbers we've
23 projected, it's a significant public health and safety
24 risk, and that's why we've moved forward with
25 establishing this storage project.

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1 I believe there's no inclination at
2 headquarters to provide any storage for any other type
3 of greater than Class C waste, and to rely on the
4 utility companies and other licensees' abilities to
5 store in advance of a disposal facility being
6 available.

7 Does that answer your question?

8 DR. GARRICK: Yeah. Thank you.

9 CHAIRMAN HORNBERGER: But it strikes me
10 that the second part of the question is: is storage
11 DOE's vision for the long-term solution or is there
12 disposal?

13 MR. GRIMM: Oh.

14 CHAIRMAN HORNBERGER: I mean, you talked
15 about the NEPA, but is there a long-term view that, in
16 fact, a disposal option will have to be chosen, a
17 geological disposal?

18 MR. GRIMM: Okay. I understand. It is
19 Environmental Management's perspective that greater
20 than Class C waste disposal will be available by the
21 time high level waste disposal is available. I think
22 what you're getting at is are the licensees going to
23 be stuck with their greater than Class C waste after
24 the spent fuel is gone, and the answer should be no.
25 That is the aim of DOE headquarters.

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1 DR. LEVENSON: Is this proactive recovery
2 program limited to sources not in DOE's custody?

3 MR. GRIMM: No, it's designed --

4 DR. LEVENSON: You're recovering them from
5 all of the DOE sources also?

6 MR. GRIMM: It can. The off-site source
7 recovery project was designed specifically to deal
8 with sources that are DOE's responsibility, but are
9 not in DOE's hands. In my two or three years'
10 involvement with this, I've been deliberately trying
11 not to get sidetracked by DOE's internal problems with
12 excess and unwanted radioactive sealed sources.

13 There's a separate program in EM-20 that
14 deals with excess nuclear materials, and they manage
15 it as a materials project, whereas we're trying to
16 deal with this as a waste management project.

17 They recently kicked off a trade study to
18 deal with neutron sources within the DOE sector, and
19 it turns out the DOE inventory is only about 1,000
20 sources, and compared to the 18,000 we think we're
21 dealing with from the licensed sector, it's not that
22 big an increase in work scope.

23 So once we're underway with dealing with
24 all of the actinides that are part of our project,
25 we'll start dealing with DOE sites as well, and we'll

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1 be charging them for the service.

2 DR. WYMER: If it isn't DOE's plan to put
3 these sealed sources in with the spent fuel initially,
4 and if these sealed sources are going to be stored as
5 they are being stored, not the sealed sources, but the
6 greater than Class C material is being stored on site
7 with the spent fuel -- pretty much that's how it's
8 being done --

9 MR. GRIMM: Un-huh.

10 DR. WYMER: -- and yet there will not be
11 any problem with storing greater than Class C sources
12 when there's no problem with storing spent fuel.
13 Where will they go? And will you not have a difficult
14 problem getting your facility approved on a timely
15 basis?

16 MR. GRIMM: Are you speaking specifically
17 about sealed sources?

18 DR. WYMER: Not about sealed sources.
19 More broadly.

20 MR. GRIMM: For example, the activated
21 metal components for power plants.

22 DR. WYMER: Yeah, exactly.

23 MR. GRIMM: I know that one of the
24 unresolved issues is how should the utilities package
25 their greater than Class C wastes. If one assumes

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1 it's going to go to the repository some day, is it
2 going to be packaged the same way as spent fuel? I
3 don't know the answer to that.

4 DR. WYMER: But I thought you were saying
5 at the time there was no longer an on-site storage
6 problem for spent fuel. There will not be an on-site
7 storage problem with the greater than Class C waste,
8 and that means that there has to be some sort of a
9 storage facility coincident with the start-up of the
10 Yucca Mountain repository.

11 MR. GRIMM: I'm not sure I understand the
12 question, but I --

13 DR. WYMER: You don't have anyplace to put
14 it.

15 MR. GRIMM: No, you're exactly right. I
16 think the answer is that it's EM's goal to have
17 greater than Class C disposal capability by the time
18 the repository is open so that there is no need for
19 further storage somewhere else.

20 DR. WYMER: And I guess my point was
21 considering how difficult a road it has been to follow
22 -- to get the repository approved for spent fuel, you
23 will have an equally difficult problem, and you don't
24 have the same amount of time.

25 MR. GRIMM: I understand.

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1 MR. BAHADUR: Excuse me, Joel. My
2 understanding is that for the nuclear power plants
3 they're storing their spent fuel either in their fuel
4 pools, and if those capacities are already met, their
5 full capability, then they are put in the dry cask.

6 MR. GRIMM: Right.

7 MR. BAHADUR: And so the greater than
8 Class C waste has also been put in the dry cask with
9 the idea that it would be over packed and then
10 transported to a centralized either storage or
11 disposal facilities, as and when it comes on line.

12 Is that -- is that correct?

13 MR. GRIMM: I think so.

14 MR. BAHADUR: Okay, and then also I
15 believe that if the Yucca Mountain were to become
16 operative, nothing stops them from accepting greater
17 than Class C waste also until a greater than Class C
18 solution is found; is that correct or not?

19 MR. GRIMM: I'm not sure I can speak to
20 that. I believe that the volume projections for the
21 first some years of operation of Yucca Mountain have
22 not included greater than Class C waste volumes. I
23 don't know if that means it can't be done.

24 DR. LEVENSON: Well, I think there are
25 some restrictions on what can go into Yucca Mountain.

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1 MR. GRIMM: Yeah.

2 DR. LEVENSON: It isn't obvious.

3 Let me ask a different kind of question
4 relevant to the sealed sources. DOE has a major
5 program called Can in Can for disposal for surplus
6 plutonium from the weapons program where radioactive
7 material is going to be added to so-called denature
8 the can. Has any thought been given to using the
9 sealed sources, which would be an automatic disposal
10 of the sealed sources with no additional cost or
11 program?

12 MR. GRIMM: No, I'm not aware of that.

13 DR. LEVENSON: Are you aware of the Can in
14 Can program?

15 MR. GRIMM: No.

16 DR. WYMER: Can in Canister?

17 DR. LEVENSON: Well, it's the Can in --
18 well, the official name is Can in Canister. For Yucca
19 Mountain, they're going to take large amounts of
20 weapons plutonium, put them in small cans, put that in
21 the big canister, add fission products or something
22 around it, and then cast it glass as a way of
23 disposing of the plutonium, and it would seem to me
24 that sealed sources would be an almost ideal way of
25 disposal from the sealed sources.

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1 MR. GRIMM: Now I understand. As we went
2 through the administrative procedures to establish Los
3 Alamos as the storage facility for these things, many
4 people came to us and said, "Why don't you just send
5 them to Savannah River and they can put them in the
6 vitrification process with all of their other
7 plutonium waste?"

8 However, at the same time people are
9 saying that, Savannah River was coming to us and
10 asking us if we could take their neutron sources off
11 their hands.

12 So there's something about their high
13 level waste vitrification process in which metal clad
14 sealed sources are not an acceptable waste stream, and
15 I don't know any details for that.

16 DR. LEVENSON: Well, I think we're mixing
17 apples and oranges.

18 MR. GRIMM: Okay.

19 DR. LEVENSON: That's true of their high
20 level waste processing and their present plant making
21 glass, but that's going to have to be modified if the
22 Can in Canister program goes ahead because the
23 plutonium is going to be in metal canisters, in cans
24 inside the big canisters. So all of that is going to
25 have to be changed and adapted to.

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1 MR. GRIMM: The only other potential issue
2 I can think of with that is that when it comes to the
3 plutonium sources we're dealing with as off-site
4 source recovery project, they're not high level waste.
5 They are licensed greater than Class C waste.

6 DR. LEVENSON: Yeah, I understand that.

7 DR. WYMER: Okay. Well, if there are no
8 more questions, how about Part 2?

9 MR. GRIMM: Okay. Now, this gets into the
10 area -- perhaps I can answer questions much better, or
11 not.

12 (Laughter.)

13 MR. GRIMM: There we go.

14 As I said earlier, the off-site source
15 recovery project is designed specifically to handle
16 DOE's responsibilities for disposing ultimately of
17 greater than Class C sealed sources that aren't in
18 DOE's hands or aren't DOE owned, but are DOE's
19 responsibility.

20 As I also said earlier, the main goal of
21 this is to address the public health and safety issues
22 posed by these large numbers of sealed sources that
23 are in the license sector. Some people call them
24 excess sources or unwanted sources. The name "orphan
25 sources" also gets attached to these in cases where

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1 licensees have lost control of them.

2 For example, when a licensee goes out of
3 business or in many cases these are very small firms,
4 and all that has to happen is for the owner of the
5 company to pass away, and you know, suddenly there is
6 no control of the licensed material any longer.

7 What qualifies greater than Class C in
8 sealed sources is mainly the long-lived actinides.
9 Americium-beryllium well logging sources are probably
10 the biggest risk because they're relatively large.
11 They're three Curies a piece. They have a pretty
12 significant neutron dose coming from them, and many of
13 them are in the hands of many of the smallest and most
14 insolvent licensees.

15 There are some thousands of them in
16 storage at large firms in Houston, but there's some
17 amount of them that are also scattered all over the
18 country with much smaller licensees.

19 And these include the AmBe neutron
20 sources, other americium sources including portable
21 gauges, fixed gauges, and other various neutron and
22 gamma sources; PU-238 medical pacemakers and other
23 various heat sources; Plutonium 239 neutron sources,
24 although most of those are also in the hands of
25 relatively responsible university and medical

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1 licensees, and there's only about 300 of those that
2 remain to be recovered; and then finally the Strontium
3 90 RTGs, which are largely in the hands of the
4 military.

5 Conspicuously missing from this list is
6 Cesium 137 sources. I don't deal with those on a
7 routine basis because there remains a commercial
8 demand for those sources, and they are largely reused
9 and recycled by the licensed community, and we rarely
10 have situations where DOE is called upon to take those
11 off of anybody's hands.

12 To address one of the earlier questions,
13 this is specifically designed to deal with the
14 licensed community, although we are gearing up to deal
15 with DOE sources as well.

16 We only deal with sources that exceed the
17 Class C criteria.

18 DR. WYMER: You get all of the NASA
19 sources, too, if they come back from outer space?

20 MR. GRIMM: Presumably. I know many --
21 are you talking about the PU-238 RTGs and other heat
22 sources?

23 DR. WYMER: Yeah, yeah.

24 MR. GRIMM: Yeah, presumably we would take
25 those.

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1 Our game plan is to store these as waste
2 at LANL or other DOE facilities, and to start
3 addressing disposal options.

4 Now, over the last two years we spent some
5 two or \$3 million at Los Alamos and Sandia National
6 Labs to start laying the groundwork for how we would
7 go about disposing of these things. We got direction
8 from the Secretary a year ago telling us to step up
9 the recovery program, to get more sources off the
10 street faster, and in response to that, the DOE cut
11 our budget by 60 percent next year.

12 (Laughter.)

13 MR. GRIMM: So there will be no
14 acceleration of recovery next year. In fact, we'll be
15 limited specifically to dealing with high risk
16 licensees, and there will be no more effort next year
17 in working on disposal options, at least not at
18 Albuquerque.

19 This gives you an idea of where we find
20 these things around the country. As usual, Texas has
21 to be bigger and better than everybody else. They
22 hold about 3,000 out of the 3,500 americium-beryllium
23 neutron sources. Once again, that's an artifact of
24 the oil and gas industry being there and the fact that
25 these are used for well logging.

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1 As you can see, there are other sources
2 that we deal with, include the PU-238 sources, PU-239,
3 things like curium and californium sources would also
4 qualify. Largely we don't deal with californium
5 because there's still demand for that as well. Oak
6 Ridge National Lab manages that in their isotope sales
7 pool. So they take all of the californium off our
8 hand.

9 Strontium 90 RTGs, we're dealing right now
10 with finding a storage site for the ten we find in
11 Alaska. Those are Air Force RTGs, although our EA is
12 going to address storing up to 40 to 50 of them at a
13 DOE site. Those are all of the RTGs we ever expect to
14 see back from the people who have those.

15 This map and these numbers do not include
16 the 1,500 Plutonium 238 sources that we've recovered
17 this year. Starting in December and going through
18 May, we addressed about 1,500 of these sources from
19 about six or seven licensees who manufactured heat
20 sources and medical pacemakers in a variety of states,
21 and there's one licensee left to recover those sources
22 from in Texas.

23 The importance of this slide is not to
24 show you the concentration in Texas, but to show you
25 that this is a widespread problem, that these things

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1 are all over the place, and the other significant
2 point here is that with the PU-238 sources, this adds
3 up to about 6,000, which means we don't know where
4 12,000 of these are. The regulators might, but
5 they're not in our database of excess and unwanted
6 sources.

7 And it would help us greatly for planning
8 purposes if we knew names and addresses and phone
9 numbers of people who had those.

10 Here are some examples of how these things
11 are used. This is a PU-238 pacemaker. My earlier
12 presentation had a photograph of a slightly different
13 model. It was Soviet.

14 We had a situation a couple of years ago
15 where a hospital in Boston received a patient who was
16 visitor from Russia, and he was ill with some malady.
17 He had a Russian manufactured pacemaker in his chest,
18 and they replaced it with some new American
19 technology.

20 The hospital was not licensed to possess
21 Plutonium 238. So we called it an emergency with a
22 small E recovery.

23 Portable gauges. These are the kinds of
24 things that you hear about two, maybe three times a
25 year. A civil engineering company out at a highway

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1 construction site reports their portable gauge stolen
2 from a pick-up truck when the guys were at the bar
3 having a beer after work.

4 Typically what happens to these things
5 when they're mishandled is that the thief opens up the
6 case some time later, sees radiation placards and
7 dumps it in the nearest dumpster or lake in the
8 municipal park, and that's when everybody gets all
9 excited and has to rush out and recover these things.

10 Typically the manufacturers take these
11 things back and remove the sources from them when
12 they're no longer needed or wanted by the licensees,
13 and Los Alamos has developed some subcontracts with
14 gauge manufacturers to take their gauges containing
15 greater than Class C sealed sources back from the
16 owners, remove the sources for us, and consolidate
17 them for shipping to Los Alamos when they get full
18 drums.

19 This does not indicate one of the problems
20 with other gauges, which are the fixed gauges, which
21 you find in factories and manufacturing plants all
22 across the country. I'll touch on that in a few
23 minutes.

24 And then this is a photograph of some of
25 the Strontium 90 RTGs which were dismantled and put

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1 down the bore hole at NTS some years ago.

2 These are the 8,000 Curie sources. These
3 have been made as large as half a million Curies.
4 There's one at Oak Ridge National Lab that never got
5 put to use. That's 500,000 Curies of strontium.

6 Our work scope deals with public health
7 and safety hazards sometimes in emergency situations.
8 There was an americium-beryllium well logging source
9 which was damaged down the hole and recovered by the
10 licensee in Beaumont, Texas back in 1995. It required
11 the State of Texas and the DOE folks at PanTex plant
12 to respond with a full radiological assistance team to
13 stabilize that leaking source and put it into storage
14 at Los Alamos.

15 Licensees have been known to abandon their
16 vehicles and equipment with the sealed sources left
17 inside. That's worse than an orphan source. That's
18 an abandoned source, imminent risk to public health
19 and safety.

20 And then there are cases where licensees
21 have pretty shoddy storage facilities. This is a
22 couple of PFC pipes dug down into the ground in a back
23 yard in Oklahoma with americium-beryllium well logging
24 sources down the hole. It would only take one
25 enterprising 14 year old to break in and kill himself

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1 in a matter of days by taking these interesting
2 metallic cylinders from the neighbor's back yard.

3 One of the other hazards that's faced is
4 the inadvertent inclusion of these things when they
5 get lost or stolen in things like metal recycling.
6 The purpose of the Secretary's moratorium on scrap
7 metal recycling from DOE facilities last year was to
8 prevent DOE contamination from finding its way into
9 the recycle metal industry, but there's a more
10 significant risk related to sealed sources escaping
11 control.

12 For example, some years ago a Stroh's
13 Brewery bottling plant was decommissioned. They hired
14 a demolition contractor to come in and tear out all of
15 the structural steel, and they forgot that there was
16 an americium fixed gauge in there for quality control
17 on the level of the fluid in the bottles. That load
18 of scrap got sent to a recycling facility in Kentucky.

19 The recycler begins their process by
20 running it through an industrial shredder so that they
21 get small bits of metal into the smelter. The
22 shredded the source, and at last count, it cost them
23 \$13 million to decontaminate their shredder mill.

24 So it's a significant risk to the metals
25 industry dealing with rogue and lost and orphan

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1 sources.

2 If you look at NRC's database of nuclear
3 materials, events database, you'll find that sine
4 about 1989 there have been about 3,700 reports of lost
5 and stolen sources. Now, this is all kinds of
6 sources. It's not necessarily all greater than Class
7 C, but it highlights the potential degree of the
8 problem of sources out there that we don't have
9 control over.

10 Sometimes the steel mills and the
11 recycling centers don't find these things until
12 they've already been melted. They detect the
13 radiation in their slag or in their bag house dust and
14 emissions and things like that, and that's what kicked
15 off the DOE moratorium on continued recycling of
16 recyclable metal.

17 This also cost the states a fair amount of
18 money because they have to conduct emergency exercises
19 to deal with these events. A couple of years ago in
20 North Carolina, they conducted an exercise based
21 specifically on a portable gauge going through a
22 shredder mill, and it was a considerable effort that
23 involved the state, several states and their agencies,
24 the NRC, DOE, and it's an expensive process just to be
25 ready for this kind of thing.

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1 And this is a close up picture of that
2 source that got damaged in Beaumont, Texas. I had
3 that picture of the bull plug earlier on. This is the
4 bull plug. It's got centimeter thick walls of carbon
5 steel. They managed to chew that thing open and
6 breach the source inside and contaminate the entire
7 drilling site with americium.

8 So far in the United States we've been
9 really lucky and one of these incidents hasn't killed
10 somebody, but other countries haven't been as lucky.
11 Most recently, about a year ago, a gentleman in Egypt
12 found a radiography source lost near a pipeline that
13 was being inspected, and he took it home, and he and
14 his son died. The rest of the family was pretty
15 seriously sick.

16 We've been contacted by the International
17 Atomic Energy Agency to lend them some technical
18 assistance on how to address this problem on the
19 international level, and we may be going to a
20 conference in November to help them establish
21 protocols for dispositioning excess and unwanted
22 neutron sources.

23 This can strike relatively close to home.
24 A little over a year ago in Rio Rancho, New Mexico, a
25 suburb of Albuquerque, a homeowner found two boxes of

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1 plutonium check sources in their front yard. They
2 were ultimately traced to a national DOE lab that will
3 remain nameless in Albuquerque.

4 (Laughter.)

5 MR. GRIMM: They didn't have a procedure
6 that told the employees to check these things out when
7 they needed to take them somewhere, and they were
8 probably stolen from the employee's car, and when the
9 thief discovered what they were, ditched them at the
10 first opportunity.

11 Luckily they were solid metallic sources,
12 very small check sources, and they didn't present much
13 of a hazard.

14 DR. GARRICK: Not a fair question to ask
15 you, but does the absence of procedures and good
16 caretaking activities suggest a looseness in the NRC
17 licensing process that could avoid a lot of this if
18 they were not so loose?

19 MR. GRIMM: I think there are problems in
20 both DOE and NRC. I know from my personal experience
21 as an NRC inspector that there are licensees that go
22 unchecked for years, especially these small Mom and
23 Pop operations that not only do they only have one or
24 two sources, but they do a lot of their work on the
25 road, and it's very difficult to find out where they

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1 are at any specific day that an inspector happens to
2 be interested in talking to them.

3 MR. LARKINS: Also, John, remember some of
4 these are regulated by the states through agreement
5 state programs.

6 DR. GARRICK: Yes.

7 MR. LARKINS: So you have a large
8 difference in ways and means to handle them.

9 CHAIRMAN HORNBERGER: These sealed sources
10 are regulated by states?

11 MR. LARKINS: I think in some cases.

12 DR. GARRICK: So this just keeps bringing
13 up this issue of low level waste and who's really
14 accountable and how we deal with it.

15 MR. GRIMM: To take this discussion one
16 step further, many of these sources are small enough
17 to be sold under general license, especially things
18 like portable gauges, I believe.

19 The manufacturers have specific licenses,
20 but the owners of the gauges, I don't know if they're
21 required to have a specific license to possess the
22 portable gauge, and I don't know if the manufacturers
23 are required to maintain a list of purchasers.

24 And even if they were required to do that,
25 that wouldn't control the resale of used devices from

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1 company to company. So it would be difficult to
2 track.

3 I think I've already discussed regulatory
4 regimes and drivers in large degree, but let me go
5 over it again really quickly.

6 First of all, for DOE, the Atomic Energy
7 Commission back in the '50s and going through the '70s
8 had a loan/lease program for basically giving away
9 under loans and leases sealed sources and other
10 nuclear material largely for research and development.
11 Many universities got these things to involve in their
12 nuclear engineering departments. They can be used as
13 the start-up sources in reactors, or they can be used
14 to do other neutron experiments in their nuclear
15 engineering programs.

16 These are the sources that DOE started
17 taking back in some quantity back around 1980. I
18 think an overall decision was made that PU-239 sources
19 specifically should not have been handed out, probably
20 because of the safeguards concerns.

21 This is the activity that LANL did
22 starting in '79. They brought 80 to 100 sources, PU-
23 239 beryllium sources, 80 to 100 a year, and they
24 chemically processed them. They put them in a glove
25 box line, cut them open, dissolved the materials, and

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1 separated the plutonium and beryllium.

2 It was very expensive. It provided a very
3 large radiological dose to the workers. It was
4 creating waste streams that we didn't know how to deal
5 with. So we stopped it at the end of fiscal year '98
6 and changed our strategy to go to managing these
7 things as waste instead of going through the
8 processing.

9 Most importantly, the Low Level
10 Radioactive Waste Policy Amendments Act points out our
11 responsibility for providing greater than Class C
12 disposal. We don't have an authorized disposal site
13 to do that yet, but two years after the law was
14 passed, DOE sent a report to Congress saying, "Well,
15 we can't take them now, but we'll start taking them
16 for storage in two years."

17 That was 14 years ago, and we're just
18 getting underway with it now at Los Alamos.

19 Two years ago we developed an MOU with the
20 U.S. NRC. The IM&S branch that does the licensing
21 work on these works with our headquarters program
22 staff when they have specific problems related to
23 public health and safety issues or emergency recovery
24 requirements for damaged or abandoned sources. The
25 MOU spells out when they asked for our assistance and

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1 what assistance we're required to give, and it
2 basically spells out that.

3 Sources, it deals only with sealed
4 sources, only sources that are greater than Class C,
5 and it spells out the EM, you know, 20 program off
6 site source recovery program will be the party that
7 responds.

8 Doug, do you want to add anything? Is
9 there another significant point to the MOU I should
10 mention?

11 CHAIRMAN HORNBERGER: You need to come to
12 a microphone.

13 MR. GRIMM: Sorry.

14 MR. BROADUS: It does allow for the
15 consideration of other types of sources under certain
16 situations, but what you said is primarily -- I mean,
17 that's the intent of it.

18 MR. GRIMM: I understand.

19 CHAIRMAN HORNBERGER: Please identify
20 yourself for the record.

21 MR. BROADUS: Oh, sorry. My name is Doug
22 Broadus. Do you want me to spell it? Okay.

23 MR. GRIMM: Thanks, Doug. Sorry to put
24 you on the spot.

25 MR. BROADUS: That's okay.

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1 DR. LEVENSON: While you're interrupted,
2 one of the things that I would have thought might be
3 on the list are fairly large Cobalt 60 sources. Is
4 that not greater than Class C waste because of half-
5 life?

6 MR. GRIMM: I believe it is not. It's not
7 listed in 61.55.

8 DR. WYMER: You see it in some 25,000
9 Curie sources.

10 DR. LEVENSON: I know. That's why I'm
11 asking. There's some mighty biggies out there.

12 MR. CAMPBELL: Cobalt 60 isn't part of the
13 greater than Class C because the half-life is so
14 short.

15 MR. GRIMM: Okay.

16 MR. CAMPBELL: That was a judgment made
17 when we put together Part 61.

18 MR. GRIMM: Yeah. I think what you can
19 draw from the table in 61.55 is that in dealing with
20 either long-lived alpha emitters or really fast
21 burning gamma and beta emitters, and I'm sure that
22 leaves a whole bunch of things in between that aren't
23 considered as greater than Class C, which might be
24 like greater than Class C,

25 MR. CAMPBELL: There is actually a section

1 of the EIS for Part 61 which discusses the particulars
2 of how they went about deciding this.

3 MR. GRIMM: Okay.

4 MR. CAMPBELL: but I think the time frame
5 is, if I recall -- and maybe Jim Kennedy can correct
6 me -- is 12 years. The time frame for the half-life
7 consideration, I think, is 12 years.

8 You've got to go to a mic, Jim.

9 MR. KENNEDY: Jim Kennedy on the NRC
10 staff.

11 That's why Cobalt 60 is not in the greater
12 than Class C category.

13 MR. CAMPBELL: And I think tritium is also
14 excluded from that, and I think that's where the 12
15 years comes in.

16 DR. GARRICK: Speaking of what's greater
17 than Class C, does DOE have a pretty good handle on
18 the greater than Class C waste? Is it fairly well
19 characterized? Could you construct histograms of what
20 the inventory is?

21 MR. GRIMM: I think the answer is yes.
22 DOE Idaho has done a large number of studies trying to
23 estimate quantities both in numbers of items, numbers
24 of Curies, numbers of cubic meters in waste form.

25 The only problem with those studies is

1 that some of them come to drastically different
2 conclusions.

3 Now, I've been most particularly
4 interested in the sealed sources, and the numbers
5 range anywhere from 9,000 to 27,000 sources that would
6 qualify. How we settled upon 18,000 as the estimate
7 I can't really say.

8 Most recently the Yucca Mountain draft EIS
9 in Appendix A addresses some of those estimates and
10 tries to either clarify or summarize them, and again,
11 the numbers of cubic meters for sealed source greater
12 than Class C waste is about 240.

13 Now, I don't know what assumptions they
14 made in that study though because if you took all
15 18,000 sources and just put them in one container, no
16 shielding, no packaging, no nothing, it would be just
17 a little more than a cubic meter.

18 For our project, we've been assuming that
19 we would have to package these things like we packaged
20 transuranic waste for shipment to WIPP, and that would
21 limit us to about 30 Curies per 55 gallon drum, which
22 means about 1,200 drums or 240 cubic meters for just
23 the sealed source waste stream.

24 Now, what assumptions went into packaging
25 on activated metals? I don't know how to answer that.

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1 DR. LEVENSON: Why the big dilution factor
2 in sending it to WIPP?

3 MR. GRIMM: It's the packaging criteria
4 for using Tru-Pak IIs. The individual drums are
5 limited to somewhere around 30 Curies for neutron
6 sources.

7 DR. LEVENSON: Yeah, yeah, yeah, but
8 that's because of hydrogen production from the
9 plastics in those same drums, which is not necessarily
10 relevant to this.

11 MR. GRIMM: The only way I can address
12 that is to say that for the sealed source program,
13 we're trying to get an exemption for some of the
14 packaging requirements related to nondestructive assay
15 and head space gas analysis. I don't know if that's
16 actually going to allow us to increase the Curie
17 loading on the individual drums.

18 It's important to point out, and I haven't
19 quite gotten to this on my slide yet. We've designed
20 and are getting ready to procure a new container to
21 deal with neutron sources, and it takes the basic WIPP
22 pipe component drum, and because most of the sources
23 are special form certified, we don't need the fire
24 proofing and cushioning in the drum. So we've removed
25 that, and we've replaced it with neutron shielding.

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1 The neutron shielding is hydrogenous
2 material. So I suspect the same hydrogen generation
3 issues will arise.

4 DR. LEVENSON: Yeah, although neutron
5 shielding is a different problem, but for those that
6 aren't neutron sources, have you looked at all at the
7 RH packaging as opposed to the regular basic WIPP
8 packaging? Because there's -- you can put a zillion
9 Curies into an RH packaging as opposed to the regular
10 basic WIPP packaging.

11 You know, you can put a zillion Curies
12 into an RH package.

13 MR. GRIMM: No, we have not specifically
14 looked at that.

15 In effect, given the volumes we have, even
16 if you packaged them according to the WIPP criteria as
17 we understand them, it's only going to amount to 1,200
18 drums. It's a blip on the screen of the disposal
19 capacity at WIPP.

20 If you read the recent proposed rulemaking
21 on storing activated metals with spent fuel, you'll
22 see that that waste stream only amounts to something
23 like three percent of the volume of spent fuel. So
24 volumetrically the greater than Class C problem is not
25 that big.

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1 DR. LEVENSON: Your 18,000 sealed sources,
2 that does not include those owned by DOE?

3 MR. GRIMM: It does not.

4 DR. LEVENSON: Okay. So the DOE sources
5 double that number or triple it?

6 MR. GRIMM: When it comes --

7 DR. LEVENSON: Where do you categorize all
8 of the batteries coming out of the weapons being
9 disassembled? Are those DOE owned or are they
10 military?

11 MR. GRIMM: They are DOE owned.

12 DR. LEVENSON: Because there's almost that
13 many of those.

14 MR. GRIMM: Yeah. I know. It's a lot.

15 And I've only recently become aware that
16 those are a similar issue.

17 Finally, the last driver, which isn't
18 apparently that big a driver, is direction from the
19 Secretary of Energy to accelerate the project. Like
20 I said, this came out a year ago. There was no
21 specific guidance how to do that. We were dealing
22 with roughly a \$6 million a year project. We issued
23 an over target budget request for an additional two
24 million to accomplish this, and we got four million
25 take away next year instead.

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1 So that's how seriously the secretarial
2 direction was taken.

3 The approach that we're taking in DOE
4 Albuquerque to manage the sealed sources project, like
5 I said, it was to talk source processing because of
6 all the problems that I pointed out. The cost limited
7 capability. You know, bringing in 80 to 100 a year is
8 not going to address 18,000 quickly enough as we
9 foresee.

10 The safety concerns for storage and
11 processing within the facilities there. We were
12 generating problematic waste streams. They had no
13 procedures to separate defense sources from DOE non-
14 defense sources, from license greater than Class C
15 sources. So the waste streams they were generating
16 were commingled, which is not a good thing to do.

17 What I don't point out here is being an EM
18 funded project, we were pretty much an unwelcomed
19 tenant in the plutonium facility at Los Alamos, which
20 is geared towards doing defense research and
21 development with plutonium. Instead, we wished to
22 switch our strategy to doing proactive recovery and
23 storing these things as waste, which we've now started
24 doing at least with the PU-238 sources.

25 We've been working with NRC for two years

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1 now to conduct a series of pilot projects to bring in
2 larger quantities of americium sources. Instead of
3 getting a request for one source here or two sources
4 there, we've been dealing with 50 or 60 a year mainly
5 to help NRC resolve some of its problems or perceived
6 problems with licensees that they are less confident
7 in, but also to allow the team doing the work at Los
8 Alamos to exercise their procedures and work out the
9 kinks that it would take to bring in large numbers of
10 sources every year.

11 We had a large number of administrative
12 hurdles that we had to leap at Los Alamos to do this.
13 We were going to the waste management facility at Los
14 Alamos with a new work scope, something they hadn't
15 addressed before. So it created what DOE calls an
16 unresolved safety question or a USQ.

17 That was resolved. The determination was
18 negative, and we were authorized from the safety
19 purpose to go ahead and store these things as waste at
20 Los Alamos.

21 We had to do a NEPA analysis to address
22 doing storage instead of processing. In 1995, LANL
23 developed an EA to address the processing of sources.
24 The word "waste," the word "greater than Class C
25 waste" was never uttered once in the EA.

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1 So when we went to the Los Alamos DOE
2 folks about NEPA, about managing these things as
3 waste, it took them quite a while to shift gears into
4 thinking of this as a waste management project instead
5 of a materials management project. It took us about
6 two years just to get the EIS analyzed and find that
7 we were already doing activities that were within the
8 scope analyzed in the existing EIS.

9 And then finally, the biggest hurdle as it
10 turned out is the safeguards analysis for storing
11 significant quantities of americium and Plutonium 239
12 as waste. Our strategy was to scatter the PU-239 in
13 all the drums of the other sources so that they would
14 be an impossible theft target.

15 The headquarters safeguards folks didn't
16 like that plan, and they told us to plan on storing
17 americium all by itself, and they would approve
18 unlimited quantities to have termination of safeguards
19 approved. And they're prepared to terminate
20 safeguards on PU-239 if there's a disposal site for
21 it, which means only the defense related sources which
22 can go to WIPP.

23 That's not going to solve our problem for
24 the non-defense PU-239, and we have yet to figure out
25 how we'll address that part of the problem.

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1 What are our priorities?

2 First, interact with NRC according to the
3 MOU and deal with emergency requests for assistance.

4 Secondly, deal with the highest health and
5 safety risks, and to us that means the smallest
6 licensees, the licensees that have one to ten actinide
7 sealed sources.

8 Deal with the low health and safety risks
9 as budget resources and other efficiencies allow.

10 Most of the larger licensees have the
11 physical infrastructure and financial resources to
12 continue storing their sources safely. That's why
13 it's a lower priority.

14 Then to put these things into safe storage
15 configurations at DOE sites, LANL for the actinide
16 sealed sources. Another site which is to be
17 determined some time this coming winter for the
18 Strontium 90 sources according to an EA that's being
19 completed at headquarters right now.

20 Then managing DOE owned sealed sources as
21 our capabilities allow us to.

22 To work on the greater than Class C waste
23 disposal analysis, and then addressing other issues
24 related to greater than Class C management.

25 This is a diagram of the multi-function

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1 container I mentioned. This is the drum that replaces
2 the fire proofing and cushioning from the approved
3 WIPP pipe component drum; puts in a smaller pipe
4 component, only six inches instead of 12, and fills
5 the annulus with neutron shielding. It would be water
6 extended polyester or high density polyethylene or
7 something like that.

8 The transuranic waste program at Carlsbad
9 has dubbed this the S-100 container, and it's been
10 included in the Tru-Pak II SAR revision for use, for
11 shipping in the Tru-Pak II. That's Rev. 19. I
12 believe it's here at NRC in review right now.

13 I've been told that there are no issues
14 with the approval of this. The SAR revision has held
15 up on other issues.

16 DR. LEVENSON: There shouldn't be a
17 hydrogen problem with that drum. The hydrogen problem
18 arises from alpha bombardment of the plastic, and with
19 a metal pipe in between, there is no alpha --

20 MR. GRIMM: You're right.

21 DR. LEVENSON: -- bombardment. So there
22 should be no hydrogen.

23 Let me just point out that the hydrogen
24 issue was largely a red herring DOE self-invented,
25 which has partially gone away, and I would hate to see

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1 another one self-invented.

2 MR. GRIMM: I understand completely, and
3 I agree.

4 This, by the way, is the waste management
5 facilities at Los Alamos. These are all of the fabric
6 covered domes that they use for storing all of the
7 transuranic waste while it's being stored awaiting
8 characterization and shipping to WIPP.

9 DR. LEVENSON: Let me ask a generic
10 question. You've mentioned a couple of times the
11 Albuquerque office policy, et cetera.

12 MR. GRIMM: Yes.

13 DR. LEVENSON: Does that mean that other
14 sites might have other policies?

15 And the context of my question is recently
16 involved in some discussions at what seemed like
17 lunacy to me, but at Hanford they're talking about
18 opening up some of the sealed cesium and strontium
19 sources and dumping that stuff back into the high
20 level waste tanks as a way of disposing of them.

21 I wondered whether this idea of don't do
22 any processing, which I think is a good idea, that
23 you're doing, is that a --

24 MR. GRIMM: There are different factions
25 in DOE. I think it's mainly the actinide chemists who

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1 like doing processing because --

2 (Laughter.)

3 MR. GRIMM: -- it's fun and interesting
4 work, and it makes the lab a lot of money.

5 DR. LEVENSON: The cesium and strontium
6 sources at Hanford aren't actinide. So --

7 MR. GRIMM: Yes, I understand.

8 How our strategy interfaces with other
9 site strategy, I can't really address that.

10 DR. LEVENSON: Yeah, this is not a central
11 strategy. This is your strategy for you school.

12 MR. GRIMM: That's correct. Now, when the
13 MOU with NRC was published in the Federal Register,
14 many DOE sites, especially their transportation and
15 materials management folk came unglued because the MOU
16 doesn't specify exactly how DOE is going to manage its
17 work. It basically says DOE will take the sources.

18 Every DOE site in the country thought that
19 meant them. The MOU didn't spell out that we were
20 already planning this activity to take place with
21 actinides at Los Alamos. So that kind of gives you an
22 idea of what the culture is like at the DOE
23 facilities.

24 They all claimed, "Well, we don't have
25 NEPA coverage for that," or, "we don't have safety

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1 authorization." There's always reasons not to
2 participate in these things.

3 MR. LARKINS: Joel, your photo there on
4 the source raises a question in my mind. Did the fire
5 raise any concerns for the storage?

6 MR. GRIMM: You bet it did. The wildfire
7 in Los Alamos a little over a year ago came to about
8 here. I know it's difficult to see in this
9 photograph, but this is a finger like mesa of volcanic
10 rock from the Hannas Mountains, and it's got canyons
11 dissecting it toward the Rio Grande, and all of the
12 LANL facilities are sited on these little mesas.

13 When the fire encroached on the lab
14 property, it largely moved down the canyons because
15 that's where all the trees and brush were. These
16 domes are covered with one hour rated fabric. With
17 the millions of dollars LANL got from Congress for
18 Cerro Grande fire response, they're planning on
19 replacing them all with two-hour rated fabric. I
20 don't know what that means with regard to how safe the
21 waste is inside, but that fabric doesn't really
22 represent much of a fuel load. So I don't know how
23 hot one of these domes could burn.

24 All of the containers inside, I should say
25 most of the containers inside are steel drums. The

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1 sealed sources are doubly encapsulated in stainless
2 steel and tantalum. So I don't think the sealed
3 sources present much of a source term for fire
4 release.

5 Many of the nuclear facilities at LANL
6 that had glove boxes and other special nuclear
7 material processing duct work have decommissioned some
8 of those, and those large metal items are stored in
9 big, fiberglass reinforced plywood boxes. Those do
10 have a fire loading and the potential for releases
11 during a wildfire scenario.

12 This was identified as one of the biggest
13 risks to the waste management area at LANL some years
14 ago when the new EIS was published, and in response,
15 the lab has removed a lot of the trees and brush from
16 around the waste management facilities to try to
17 prevent that scenario from happening.

18 But this is the specific reason that the
19 town of Whiterock was evacuated during the fire,
20 because this is just two miles maybe from Whiterock,
21 which is behind the airplane taking the picture.

22 Okay. What's our current status on this
23 work? We did the safety analysis I told you about
24 that said we were within the scope of operations at
25 the waste management facilities. We finished the NEPA

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1 assessment last fall. We continue to have problems
2 with safeguards.

3 We've solved it for PU-238, but not for
4 the other actinides. We have an EA in progress here
5 at headquarters to select the storage site for the
6 strontium sources. There are nine sites on the list.

7 Do you want to hear them? Los Alamos,
8 Sandia, Hanford, NTS. Those appear to be the top
9 runners at this point, but INEEL, Savannah River, Oak
10 Ridge, Pantex, and Kansas City were also considered.

11 Okay. Now, it just so happens that Sandia
12 and Oak Ridge already have some of these things. So
13 I was kind of interested to see that Oak Ridge fell
14 off the list, but that's NEPA.

15 Finally, we're dealing with the Conference
16 of Radiation Control Program Directors. This is a
17 consortium of state regulatory agencies for
18 radioactive materials licensing and other radiation
19 regulation at the state level. They are one of our
20 larger stakeholders on this because the state
21 regulatory agencies have the most to gain by seeing
22 orphan sources removed from their states.

23 We're working on giving them a grant of
24 \$100,000 to augment some other federal cooperative
25 agreements they have to work on hiring brokers to go

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1 state to state and get cesium 137 sources out of
2 people's hands and into disposal or recycling.

3 Do you have any idea how hard it is to get
4 a grant out of DOE to another organization? I've been
5 working on it for four months.

6 Now, to continue discussing our current
7 progress, the PU-238 pacemakers and heat sources, that
8 recovery work got underway in December. This is a
9 team of LANL folks who went to a facility outside of
10 Philadelphia in December. They had about 60 medical
11 pacemakers. It was Arco Nuclear, Atlantic Richfield
12 Company. This involved getting all of the sources out
13 of their storage containers, which were just in a
14 wooden tool shed out behind the building.

15 Reading model numbers and serial numbers,
16 and documenting all that, doing external swipes, and
17 then packaging them in special nuclear material cans
18 to go into WIPP pipe component drums, and they're
19 stored like they could go to WIPP if we were allowed
20 to take these to WIPP at this point.

21 And we now have something like 1,500 of
22 these in 100 drums in storage at Los Alamos.

23 So let me conclude by talking about what
24 the NRC can do. I think the biggest risk to our
25 planning and development in this project is associated

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1 with what is the scope of this project really going to
2 become. Do all 18,000 of the greater than Class C
3 sources that DOE Idaho has projected really exist out
4 in the license sector? And if they do, we need to get
5 the other 12,000 onto our database for planning and
6 budgeting purposes.

7 We're on the Web. DOE Albuquerque has its
8 own federal Web site for this project, but the LANL
9 folks who do all of the operations work also have a
10 Web site, and most significantly about this, this Web
11 site provides licensees with a Web page where excess
12 and unwanted sealed sources can be registered with Los
13 Alamos to help us improve that database information.
14 And it's also got a lot of nice pictures of LANL
15 facilities and glove boxes and hot cells and things
16 like that.

17 And that's the end of my presentation on
18 sealed sources.

19 DR. WYMER: Okay.

20 MR. GRIMM: Anymore questions?

21 DR. WYMER: Thanks very much, Joel.

22 I think it's clear to me that when you're
23 looking for risks in the nuclear arena, you don't look
24 to reactors. You look to sealed sources.

25 I have a specific question. A lot of

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1 utilities that are decommissioning reactors, and there
2 aren't so many as there were thought to be at one
3 time, but those that are decommissioning will probably
4 leave the internals inside the reactor containment
5 vessel and maybe pour concrete and grouting around it,
6 and then the whole package, the containment vessel
7 plus the internals, will be disposed of.

8 And that certainly can be considered to be
9 greater than Class C waste rather than high level
10 waste. Those things are big. You won't put them in
11 the Yucca Mountain repository.

12 What are you going to do about those?

13 MR. GRIMM: Well, I know that at least two
14 utilities have shipped their reactor vessel to
15 disposal sites: Trojan --

16 DR. WYMER: Yeah, I know that.

17 MR. GRIMM: -- and Yankee Rowe, I think,
18 western Massachusetts.

19 I went to a meeting on low level waste
20 management last fall and saw an interesting "what I
21 did on my spring break" slide show by one of the
22 employees at Yankee Rowe about moving that reactor
23 vessel down to Barnwell, and I don't remember if those
24 reactors or those vessels had the internals removed or
25 not.

1 DR. WYMER: Trojan did have it removed I
2 know.

3 MR. GRIMM: I think Yankee Rowe did not.
4 So in that situation it comes down to can the utility
5 use NRC's Curie averaging criteria to demonstrate that
6 they're not greater than Class C waste.

7 DR. WYMER: And I think if it's just the
8 vessel itself without the internals, you could
9 probably volume average it down to a Class C or less.

10 MR. GRIMM: Right.

11 DR. WYMER: But if you leave the internals
12 in, it's not so clear, but you're really not
13 addressing that problem at the moment.

14 MR. GRIMM: No.

15 DR. GARRICK: What fraction, just to pick
16 up on that, what fraction of the greater than Class C
17 waste would you consider to be activated materials?
18 I'm not talking about sealed sources or anything
19 that's --

20 MR. GRIMM: Volumetrically activated metal
21 is a much larger waste stream than sealed sources.

22 DR. GARRICK: How about Curie-wise?

23 MR. GRIMM: I would have to look at one of
24 those Idaho reports or the Yucca Mountain appendix.
25 The numbers are in there. I've got it in my bag. We

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1 can address that now or --

2 DR. GARRICK: But the activated materials
3 is a big part of this problem, isn't it?

4 MR. GRIMM: Yes, I believe it's bigger
5 than the sealed sources.

6 DR. GARRICK: Yeah. Does that --

7 MR. GRIMM: But the sealed sources are
8 much longer lived.

9 DR. GARRICK: Yeah. Is there any action
10 from an administrative point of view that could be
11 taken that would make the management of GTCC waste
12 much simpler?

13 Administrative, an example would be
14 reclassification of the waste or redefining Class B
15 waste or doing something of that nature.

16 If a large fraction of this waste is just
17 beyond Class C, for example, one might think about
18 changing the classifications.

19 MR. GRIMM: Right. It's interesting to
20 note that DOE's definition of true waste, waste with
21 actinides over 100 nano-Curies per gram is identical
22 to Part 61's definition of actinide greater than Class
23 C waste. The only difference is in the half-lives
24 designating the waste.

25 I think NRC's criteria says actinides with

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1 half-lives over five years, and DOE's definition says
2 actinides with half-lives over 20 years. That's not
3 that big a gap.

4 The sealed sources problem would go away
5 if we removed the defense designation from WIPP and if
6 we removed the Low Level Waste Policy Amendments Act
7 requirement to have an NRC license for the disposing
8 of this stuff.

9 There are people in the true waste program
10 who have approached Capitol Hill on that topic. If
11 something's going to happen and when it would happen,
12 I have no idea.

13 As I said in my first presentation, we've
14 got a policy or an assumption that activated metal is
15 going to remain managed along with the spent fuel.
16 Now, I'm not all that well connected with the Yucca
17 Mountain project. So I don't know if they'd agree
18 with me on that fate for activated metal.

19 Does that answer your question?

20 DR. GARRICK: Un-huh.

21 DR. WYMER: Any other questions from the
22 committee?

23 DR. LEVENSON: I have one that's kind of
24 a generic question. You talked about the retrieval of
25 the sources and all of that. Do you have a role or

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1 any responsibility in attempting to locate and recover
2 lost sources that somebody knows they've lost, et
3 cetera?

4 MR. GRIMM: We rely on the regulatory
5 agencies that license those entities to inform us when
6 they've got a problem that requires our assistance.
7 Now, that said, that only addresses the so-called --
8 the small E emergencies when I talk about them.

9 The sealed source project itself doesn't
10 necessarily respond to those emergencies. Now, DOE
11 and several other federal and state agencies do have
12 this thing called the radiological assistance program.

13 In the DOE sector, it was designed mainly
14 to deal with accidents involving nuclear weapons, but
15 they're also equipped to respond to any accident
16 involving any radioactive material.

17 A case in point, the damaged source in
18 Beaumont, Texas six years ago was stabilized and
19 packaged by a team from the Pantex plant. Now,
20 they're not responsible for taking the material off of
21 people's hands. They're simply responsible for
22 stabilizing the material and reducing contamination at
23 the site of the accident.

24 In this case, the LANL sealed source team
25 arrived and took that damage source off their hands.

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1 DR. WYMER: Any questions from the staff
2 here?

3 CHAIRMAN HORNBERGER: I have just one
4 quick one, a clarification, Joel. I infer from what
5 you said, again, because of your budget problems that
6 the work on evaluating potential sites or even the
7 NEPA work is going to be deferred or put on hold, on
8 the back burner or whatever.

9 MR. GRIMM: Right. At the federal level,
10 and we can continue interactions with DOE staff and
11 NRC staff, when it comes to paying contractors to do
12 technical analyses, start preparing NEPA documents, I
13 believe virtually nothing will happen in fiscal year
14 '02.

15 There's something like \$300,000 in the
16 budget request for this, and really that's just going
17 to get the public interaction and scoping process
18 underway. That won't accomplish anything toward
19 developing technical criteria and alternative site
20 selection or anything like that.

21 DR. WYMER: Well, this is a very big,
22 important issue, especially the sealed source problem.
23 So if we have a few minutes left, I'm going to ask if
24 there's any comments, questions, observations from the
25 audience.

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1 (No response.)

2 MR. GRIMM: Thank you.

3 DR. WYMER: Thank you very much for a very
4 good and well informed presentation, Joel. Thank
5 you.

6 MR. GRIMM: You're welcome.

7 CHAIRMAN HORNBERGER: Thanks very much,
8 Joel.

9 We are going to take a 15 minute break
10 now. We are finished with the recording part of the
11 session.

12 (Whereupon, at 2:25 p.m., the Advisory
13 Committee meeting was adjourned.)

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CERTIFICATE

This is to certify that the attached proceedings
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