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498th Meeting

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ACRST-3224  
for the Committee

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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498TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

FRIDAY,

DECEMBER 6, 2002

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ROCKVILLE, MARYLAND

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The Advisory Committee resumed at the Nuclear  
Regulatory Commission, Two White Flint North, Room  
T2B3, 11545 Rockville Pike, at 8:30 a.m., Dr. George  
Apostolakis, Chairman, presiding.

COMMITTEE MEMBERS:

GEORGE E. APOSTOLAKIS, Chairman

MARIO V. BONACA, Vice Chairman

F. PETER FORD, Member

THOMAS S. KRESS, Member

GRAHAM M. LEITCH, Member

DANA A. POWERS, Member

VICTOR H. RANSOM, Member

STEPHEN L. ROSEN, Member

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1     COMMITTEE MEMBERS: (cont.)

2     WILLIAM J. SHACK, Member

3     JOHN D. SIEBER, Member

4     GRAHAM B. WALLIS, Member

5

6     ACRS STAFF PRESENT:

7     JOHN T. LARKINS, Executive Director

8     SHER BAHADUR, Associate Director

9     SAM DURAISWAMY, Technical Assistant

10    PAUL A. BOEHNERT, Staff Engineer

11    HOWARD J. LARSON, Special Assistant

12

13    ALSO PRESENT:

14    ROBERT J. BUDNITZ, Lawrence Livermore

15    FAROUK ELTAWILA, NRC

16    TOM KING, NRC

17    TAD MARSH, NRC

18    MOHAMMED SHUAIBI, NRC

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## I-N-D-E-X

1		
2	<u>AGENDA</u>	<u>PAGE</u>
3	Opening Remarks - Chairman Apostolakis . . . .	323
4	Status of the Development of the Review	
5	Standard for Power Upgrades	
6	Remarks by Subcommittee Chairman . . . .	325
7	Briefing by and discussions with . . . .	326
8	representatives of the NRC Staff	
9	Proposed Options for Resolving Policy Issues	
10	for Future Non-Light Water Reactors	
11	Remarks by Subcommittee Chairman . . . .	380
12	Briefing by and discussions with . . . .	381
13	representatives of the NRC Staff	
14	Final Draft ANS External Events Methodology:	
15	Remarks by Dana Powers . . . . .	458
16	NRC Briefing and Discussion . . . . .	463
17		
18		
19		
20		
21		
22		
23		
24		
25		

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

8:32 a.m.

CHAIRMAN APOSTOLAKIS: The meeting will now come to order. This is the second day of the 498th meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will consider the following: Proposed ACRS plan for reviewing safeguards and security activities, future ACRS activities, report of the Planning and Procedures Subcommittee, reconciliation of ACRS comments and recommendations, proposed options for evolving policy issues for future non-light water reactors --

MEMBER POWERS: Does that mean we're going to turn them around?

CHAIRMAN APOSTOLAKIS: I don't understand -- revolving policy is actually more accurate, is it not? Draft final ANS external events methodology standard, election of ACRS officers and proposed ACRS reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Sam Duraiswamy is the Designated Federal Official for the initial portion of this meeting. We have received no written comments or requests for time to make oral statements from members

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1 of the public regarding today's sessions. A  
2 transcript of a portion of the meeting is being kept,  
3 and it is requested that the speakers use one of the  
4 microphones, identify themselves and speak with  
5 sufficient clarity and volume so that they can be  
6 readily heard. And I'm pleased to say this is the  
7 last time I read this. Please wipe the tears away.

8 (Laughter.)

9 But there is one thing I want to say since  
10 we are talking about it. First of all, I appreciate  
11 the honor that the members made me by electing me  
12 twice as Chairman, but I would like to point out to  
13 say something that you already know. We have an  
14 excellent staff here. I don't think that a part-timer  
15 like me or anyone else could run a Committee like this  
16 without the help of a superb staff that we have  
17 working for Dr. Larkins, who's not paying attention  
18 right now.

19 MEMBER POWERS: Because he knows all this  
20 stuff.

21 CHAIRMAN APOSTOLAKIS: So I really think  
22 we should recognize this in public, on the record,  
23 because we tend to take it for granted sometimes that  
24 the help we get is the natural thing to do, and it is  
25 not. Everybody's really very dedicated and they're

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1 doing an excellent job supporting the Committee.

2 (Applause.)

3 Okay. Now, we have to make a few changes  
4 in the agenda because of the weather yesterday and so  
5 on. So we'll start with me briefing you regarding the  
6 security and safeguards reviews that we will do. Then  
7 we'll go on to the election and reconciliation of  
8 comments and let's try to finish these things by nine  
9 o'clock, is that all right?

10 MR. BOEHNERT: At nine o'clock, you're  
11 going to have the briefing on the review standard.

12 CHAIRMAN APOSTOLAKIS: Nine a.m., right?

13 MR. BOEHNERT: Yes, sir, 9 a.m.

14 CHAIRMAN APOSTOLAKIS: Okay. Let me start  
15 with the security and safeguards.

16 (Whereupon, the foregoing matter went off  
17 the record at 8:36 a.m. and went back on  
18 the record at 9:09 a.m.)

19 CHAIRMAN APOSTOLAKIS: We're back in  
20 session. The next item is left over from yesterday:  
21 Status of the Development of the Review Standard for  
22 Power Upgrades. The cognizant member is Professor  
23 Wallis.

24 MEMBER WALLIS: Let's move right along.  
25 We have reviewed a handful of power upgrades and we

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1 suggested to the Staff and they came up in a meeting  
2 with a Commission, and there should actually be a  
3 review plan or review standard for these power  
4 uprates. The Staff has been working on it, and  
5 Mohammed is going to tell us the results that he's  
6 produced.

7 MR. MARSH: Good morning. I have a few  
8 opening comments this morning too. My name is Tad  
9 Marsh, and I'm the Deputy Director of the Division of  
10 Licensing Project Management in the Office of NRR.  
11 And good morning and congratulations to our new  
12 Chairman and our new member-at-large. I enjoyed the  
13 parliamentary procedures -- and the Vice Chairman, I  
14 beg your pardon.

15 Before we get to discussions of the review  
16 standard for the extended power uprates, I'd like to  
17 remind the Committee of some of the reasons that led  
18 to this initiative. First, we are experiencing, as  
19 many organizations are, a loss of institutional  
20 knowledge due to retirements and transfers of senior  
21 staff, and we believe that the review standard will  
22 provide a mechanism for retaining some of this loss of  
23 knowledge. Essentially, it will become a legacy file.

24 Second, as a result of this attrition and  
25 this loss of institutional knowledge, we are expecting

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1 a large number of new Staff hires over the next few  
2 years; in fact, we have some very large intern classes  
3 that are coming in. We believe that the review  
4 standards will provide the necessary guidance for use  
5 by these new hires in carrying out the Agency's  
6 mission.

7 Third, much of the current Staff review  
8 criteria is organizationally out of date and review  
9 standards will provide a mechanism for updating this  
10 information. Fourth, we believe that the review  
11 standards will provide sustainable legacy of review  
12 criteria, methods and procedures for the Staff.  
13 Fifth, we believe that the concept of review standard  
14 will make our activities consistent with the vision of  
15 having a centralized and fully operational work  
16 planning center for the purpose of scheduling and  
17 monitoring NRR work.

18 And it's in that context that the review  
19 standard that you're going to hear a lot about will  
20 add efficiency and effectiveness, we believe, to the  
21 review. In the course of going through and  
22 constructing this review standard, which Mohammed will  
23 describe, you'll see that we've looked very carefully  
24 at the underlying standard review plans, generic  
25 letter, information notices and asked ourselves what

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1 needs to be reviewed for the purpose of extended power  
2 uprates. We believe that this effort will add an  
3 efficiency and effectiveness in our reviews.

4 Now, the initial focus of this activity  
5 has been placed on extended power uprates and on early  
6 site permits. Our work in these areas will be a pilot  
7 for many of the Staff in determining the proper  
8 approach to be applied in developing review standards  
9 for other areas. So this then, the EPU review  
10 standard and also the early site permits, is the first  
11 effort, the first chance we've had to really put this  
12 concept in place, and I hope you get a feeling for  
13 what it is and how it will guide us.

14 I also hope you've had a chance to get a  
15 presentation on centralized work planning and how that  
16 organization is working, how they will use review  
17 standards and what this concept will embody.

18 Let me now turn to power uprates and the  
19 timing for this review standard. As you may already  
20 know, we conduct semi-annual surveys of licensees to  
21 obtain information related to expected power uprates.  
22 The results of the last survey, which was conducted in  
23 July of this year, indicate that applications of 20  
24 extended power uprates should be expected over the  
25 next five years. Discussions with vendors indicate

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1 that the number may even be larger. In light of this  
2 information, we believe that the development of the  
3 review standard is timely to help with the review of  
4 these applications.

5 We last briefed the Committee on the  
6 status of the review standard in July this year, and  
7 during that briefing we provided our schedule for  
8 issuing the draft review standard for public comment  
9 by the end of this year. My staff has also briefed  
10 Dr. Kress, Dr. Bonaca and Dr. Larkins and Mr. Boehnert  
11 in October about the status of the review standard.  
12 I'm pleased to say that we have made significant  
13 progress since then and expect to meet our goal for  
14 issuing the draft review standard by the end of this  
15 month. Although the review standard is essentially  
16 complete, however, it is going through official  
17 concurrence process, and NRR Management has not yet  
18 had a chance to review it. The leadership team, which  
19 is made up of the division directors in NRR, is  
20 scheduled to be briefed on this review standard this  
21 Tuesday, December 10.

22 Based on the feedback we received in July  
23 from you, we are proceeding with our plan to issue the  
24 review standard, and we do plan on coming back to  
25 brief you following the public comment period. We are

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1 not seeking a letter from the Committee today but  
2 would welcome, of course, any comments or suggestions  
3 you may have that you'd like to share with us. As  
4 you'll see from the presentation, we have incorporated  
5 comments that we have received from you and welcome  
6 any further comments you may have.

7 With that, I'd like to turn to Mohammed  
8 who will lead us through the presentation.

9 MEMBER LEITCH: Just one question before  
10 you get started.

11 MR. MARSH: Sure.

12 MEMBER LEITCH: The audience for the  
13 review standard is primarily internal, that is for the  
14 reviewers.

15 MR. MARSH: Yes.

16 MEMBER LEITCH: Is it the intention also  
17 to share this document with the licensees?

18 MR. MARSH: Absolutely. Absolutely.  
19 That's public comment period. We've also met with the  
20 industry and got comments from them. But you're  
21 right, this is primarily a Staff review guidance, but  
22 it bears a lot, of course, on what licensees submit  
23 and give to us because it will guide them in scope and  
24 content. So they're anxious about this review  
25 standard; it should help.

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1 MEMBER LEITCH: Okay. Thanks.

2 MR. MARSH: Thank you. Mohammed?

3 MR. SHUAIBI: Thanks, Tad. Again, my name  
4 is Mohammed Shuaibi. I'm the Lead Project Manager for  
5 Power Upgrades at NRR. I apologize about the slides  
6 saying December 5. We were scheduled to come here  
7 yesterday, and unfortunately we couldn't make it.

8 I had a presentation ready to go over some  
9 of the background and other material leading up to  
10 this effort; however, we discussed this quite a bit  
11 last time, and what I propose to do today is to skip  
12 through some of these slides to save some time and get  
13 right to the review standard itself if that's okay  
14 with the Committee. Okay.

15 Turning your attention to Slide Number 8,  
16 we discussed this at great length during the July 11  
17 meeting, and the reason I wanted to bring this back up  
18 again is to inform you of two changes. Two changes to  
19 this diagram. If you notice up at the upper right and  
20 upper left corners, we've added two boxes, one for  
21 inspection guidance and one for a review of past RAIs.  
22 The inspection guidance is there to indicate that this  
23 review standard will provide references in material  
24 for -- to provide inspection guidance or for people to  
25 inspection guidance that exists. The review of past

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1 RAIs, we've conducted a review of past RAIs, and we  
2 wanted to make sure that the review standard  
3 adequately addresses the areas that we've been asking  
4 questions on in the past. And that's about the extent  
5 that I want to discuss this diagram; we discussed it  
6 at great lengths last time. So unless there are any  
7 other questions on this diagram, I'd like to get into  
8 the review standard itself.

9 The review standard is going to be made up  
10 of four sections. The first section is going to cover  
11 procedural guidance for the Staff. The second section  
12 is going to cover technical review guidance or  
13 technical review criteria to be used during the  
14 reviews. The third section will cover the  
15 documentation of power uprate review. And the last  
16 section will be the inspection guidance.

17 What I'd like to do is hand out some of  
18 that material that's going to be in the review  
19 standard. As Tad indicated, this is still being  
20 reviewed by Management, but I'd like to share it with  
21 you just to give you a feel for what it's going to  
22 look like.

23 MEMBER LEITCH: A couple questions that we  
24 wrestle with concerning the license renewal process.  
25 One of those questions is the influence, if any, that

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1 the current standing a licensee has in the reactor  
2 oversight process. Is that at all a factor in power  
3 uprates? In other words, part of the standard, does  
4 it involve looking at the current ROP status of that  
5 particular licensee? Does that have any influence on  
6 the process?

7 MR. SHUAIBI: At this point, no, we don't  
8 have anything in here that goes back to the ROP to do  
9 that.

10 MEMBER LEITCH: The same question, I  
11 guess, relates to material condition of the plant.  
12 This inspection guidance, I guess, is primarily  
13 paperwork guidance. Is there any intention of going  
14 out and looking at the plant to see whether the -- in  
15 other words, does the material condition have any  
16 bearing on the power uprate?

17 MR. SHUAIBI: I guess I'm not sure I  
18 understand the question.

19 MR. MARSH: I think what you're asking, if  
20 I could rephrase it, is if there were material issues  
21 --

22 MEMBER LEITCH: Exactly.

23 MR. MARSH: -- material condition issues  
24 which would bear on the application information. In  
25 other words, a licensee asserts that the flow induced

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1 material degradation is such that it's covered by  
2 existing programs or existing systems, and would we  
3 ask ourselves if that is a statement that bears out by  
4 the material condition in the plant, in other words.

5 MEMBER LEITCH: Say you found very poor  
6 housekeeping practices, for example, and the plant was  
7 just plain not in good material condition, would that  
8 in any way influence the extended power uprate  
9 decision?

10 MR. MARSH: I doubt that aspect, but if  
11 there were corrective action program issues, such that  
12 there are material condition or design issues, then  
13 that would be part of the synthesis, I would think, of  
14 the review. I mean perhaps that's in the inspection  
15 area that we would feed that back into the review  
16 process. Mohammed, am I off on that?

17 MR. SHUAIBI: No. Actually, what we've  
18 done here, and I'll go through some of this a little  
19 bit later, in the documentation area -- I'm not sure  
20 how much this is going to answer your question, let me  
21 know if I need to go back -- in the documentation  
22 area, we do have places that direct the reviewers of  
23 the power uprate to highlight areas that they feel are  
24 important for the inspectors to consider when they  
25 choose what they look at. So that if they have an

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1 area -- materials, degradation issue, flow-assisted  
2 corrosion issue, system pump valve, whatever -- that  
3 doesn't have a lot of margin and they want to point  
4 that out to the resident so that they could consider  
5 it as part of their inspections, we will have a place  
6 in the safety evaluation that directs the inspectors  
7 or that provides that guidance to the inspectors.

8 MEMBER ROSEN: I'm convinced that you'll  
9 look at the margins properly, but I think the thrust  
10 of Graham's question about the condition of the plant,  
11 let me give you another thing to think about. He  
12 asked about housekeeping. Let me ask about, let's  
13 say, main steam line vibration and the guy wants an --  
14 the plant wants an uprate.

15 It seems to me it bears quite a lot on  
16 whether or not you'd be comfortable in uprate if you  
17 went out and found that the main steam lines from the  
18 stops inboard -- the turbine stop valves inboard to  
19 the main steam isolation valves was vibrating rather  
20 significantly compared to what you experience  
21 elsewhere. And one could say that that's clearly --  
22 the forcing function is flow, and we're going to  
23 increase it.

24 Maybe you went out and stood by the  
25 turbine on the turbine deck and felt the whole turbine

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1 moving a little -- the whole deck moving a little bit.  
2 And, clearly, that's kind of driven by the generator  
3 being a little bit off magnetic center or something  
4 like that. You would have concerns about making it  
5 worse. It seems to me that the thrust of Graham's  
6 question is one that really I think came up during  
7 license renewal --

8 MEMBER LEITCH: Exactly.

9 MEMBER ROSEN: -- and by analogy power  
10 uprate. In license renewal, we asked would you extend  
11 this plant's license if you went out and found them in  
12 the red ROP area and the plant heavily degraded  
13 material-wise? I think you'd be derelict if you just  
14 went straight ahead with license renewal under those  
15 circumstances. And so I think the same thing applies  
16 here, maybe in a little bit different way but I think  
17 you really can't and shouldn't blind yourselves to  
18 just this process, we're just looking at this process,  
19 without thinking about the whole thing.

20 MR. MARSH: Synthesizing plant conditions  
21 or things of that sort. I think that's a fair  
22 comment.

23 VICE-CHAIRMAN BONACA: Well, I guess I  
24 don't want to leave without this comment, if you go  
25 back to your Page Number 4. It was an issue we

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1 discussed before; in fact, you listed material  
2 degradation now as a consideration. But one of the  
3 concerns we have then, just looking back at how you  
4 came to that, was this is not a new plant, this is not  
5 a new plant. So when some of the applications for  
6 power uprate do not address the fact that they're not  
7 new plants. I mean you have an evaluation of design  
8 capability toward components, which you do, and it  
9 seems to me that you have to account for aging of  
10 those components in the sense that if their capability  
11 is degraded, right, they would have an impact on your  
12 determination of how much margin you have left in a  
13 component.

14 MR. SHUAIBI: The impact of aging and the  
15 impact of a power uprate on the plant that is being  
16 considered. Material degradation here it's the impact  
17 of the higher fluence on the vessel, the impact of the  
18 increased flow rates on the flow-assisted corrosion,  
19 that type of material degradation issue. That will be  
20 considered as part of this power uprate.

21 VICE-CHAIRMAN BONACA: Lock-up blowdown --

22 MR. SHUAIBI: That's correct.

23 VICE-CHAIRMAN BONACA: -- forces and  
24 components and --

25 MR. SHUAIBI: That's correct. That will

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1 all be considered as part of the review of the power  
2 uprate.

3 MR. MARSH: To the extent that issues have  
4 been communicated to the industry via generic  
5 communications, those are rolled into this review  
6 standard. So it doesn't quite answer the question  
7 because you're in a plant-specific aspect as opposed  
8 to a generic aspect, but many of these issues come up  
9 generically. Those are part of the review the Staff  
10 would go into. But in terms of the plant condition as  
11 it deviates or as it's unique and it differs from the  
12 generic part, that's worth thinking about, so let us  
13 do that.

14 MEMBER ROSEN: Well, yes. I think just  
15 for your own sanity. I mean you can be assured that  
16 certain members of this Committee will ask you how the  
17 plant's doing when you come in for EPU.

18 MR. MARSH: And have asked us, sure.

19 MEMBER ROSEN: Well, you want to be able  
20 to say something more than, "Well, we don't look at  
21 that in this process."

22 MR. MARSH: Right.

23 VICE-CHAIRMAN BONACA: Specifically, on  
24 some of the BWR uprates, I mean we ask questions about  
25 you have a lot of blowdown and then now you're

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1 evaluating the capability of a component versus the  
2 stress imposed by the blowdown on the component. And  
3 there was always an assumption that the component was  
4 as new. I mean you only evaluate increasing the  
5 blowdown forces on a component and you look at the  
6 margin you have there. The question at the time is  
7 the component still as capable as when it was designed  
8 and implemented? Maybe 40 years after implementation  
9 it's not as capable as it used to be, so you should  
10 look at what margin you have. And that involves two  
11 factors: One is the component itself and the  
12 capability, the other one is the increasing blowdown  
13 forces on the component. Just an example of what you  
14 have to look at.

15 MEMBER SIEBER: I think you would hard  
16 pressed to use an application for a change in the  
17 license to cause a licensee to correct some  
18 housekeeping condition. For example, the inspection  
19 and enforcement process is supposed to take care of  
20 that, and if you have bad housekeeping that's a fire  
21 protection issue perhaps or an internal flooding  
22 issue, blocked drains or a sump blockage issue if it's  
23 inside containment and so forth, that's the place  
24 where those things should be take care of.

25 MR. MARSH: To that extent, that's right.

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1 MEMBER SIEBER: And you cannot withhold  
2 approval of an application for a change in the license  
3 for an issue that's not relevant to the matters at  
4 hand in that license amendment.

5 MR. MARSH: Nor should you exclude issues  
6 that are relevant to the review at hand.

7 MEMBER SIEBER: For example, in the case  
8 of the vibrating steam line during extended power  
9 uprate, I think that if there is a real concern, you  
10 know, an inspector probably would not have the tools  
11 or equipment to measure the extent of the vibration,  
12 but they can certainly issue an RAI that asks the  
13 licensee to look at the extent of the vibration and as  
14 to whether that's satisfactory and where they figure  
15 it will go under EPU conditions. I mean that's  
16 probably a fair question to ask.

17 MR. MARSH: But I think that would be the  
18 intent if the Staff were aware of there being an issue  
19 or if it's part of their review guidance in the first  
20 place.

21 MEMBER SIEBER: That's right.

22 MR. MARSH: But the thrust of the question  
23 is are there plant-specific conditions that are there  
24 of which the Staff may be unaware at the outset of the  
25 review that would then drive a question or would drive

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1 an extra effort to look at? And that's the part that  
2 we'll think about. If there are many -- the guidance  
3 that we've got has been thought through a lot to the  
4 extent that it's synthesized generic communication,  
5 synthesized reg guides or issues that have come up,  
6 reactor vessel internal vibration issues, things of  
7 that sort, which are generic, okay, and which we're  
8 now aware of. But it doesn't probe corrective action  
9 issues, it doesn't probe inspection findings, it  
10 doesn't look for that link, as many amendments don't  
11 do. You know, licensing space is -- the link between  
12 licensing space and inspection enforcement space is  
13 not a very tight link. They're basically separate  
14 aspects.

15 MEMBER LEITCH: Perhaps a better --

16 MEMBER SIEBER: What I'm saying is that I  
17 would have a hard time putting something in an ACRS  
18 letter or voting for a letter if it held the licensee  
19 hostage on some kind of an amendment for some issue  
20 that didn't directly bear on that amendment. There's  
21 go to be --

22 MR. MARSH: Right. Oh, right.

23 MEMBER LEITCH: An example of where that  
24 linkage may exist, for example, is suppose a licensee  
25 had a couple of yellow findings in emergency planning.

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1 Would it then be appropriate to issue a license for  
2 power uprate where you were increasing the inventory  
3 of radioactive products?

4 MEMBER SIEBER: Yes.

5 MR. MARSH: Good question. I don't have  
6 an answer.

7 MEMBER LEITCH: Just something to think  
8 about.

9 MR. MARSH: And we will.

10 MEMBER LEITCH: That's an area where there  
11 might be linkage, I guess, is all I'm saying.

12 MEMBER SIEBER: Well, and on the other  
13 hand, the action matrix is supposed to take care of  
14 the yellow findings, and you have to -- that's an  
15 example of holding the licensee hostage, in my view.

16 MR. MARSH: Okay.

17 MEMBER ROSEN: Well, it seems to me that  
18 you did not disagree, Jack -- I'm trying to get the  
19 sense of your disagreement -- you did not disagree  
20 with the example raised of a steam line that was  
21 vibrating and judged to be okay at the current power  
22 level, but that the question is raised --

23 MEMBER SIEBER: But there's no --  
24 additional analysis maybe be required or a test  
25 program to assure its adequacy under uprate conditions.

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1 MEMBER ROSEN: Clearly, your higher power  
2 level you're going to have more forcing function for  
3 the vibration. And they might say -- they could come  
4 back and say --

5 MEMBER SIEBER: I think that's pertinent.

6 MEMBER ROSEN: Yes, and I think so. But  
7 the answer could easily go the other way. They could  
8 easily say at higher velocities, we'll come out of the  
9 resonance we're in and it will be better.

10 MEMBER SIEBER: So that's the way it goes.

11 MR. MARSH: Let me add a little --

12 DR. RANSOM: Am I missing something? I  
13 would think this whole process would start very early  
14 on with an engineering inspection that specifically  
15 looks for is this plant suitable for uprating?

16 MR. MARSH: No, that's not.

17 DR. RANSOM: Why wouldn't you do that?

18 MR. MARSH: No. We don't have that type  
19 of program. This program is driven by the licensee's  
20 amendment request with suitable documentation meeting  
21 the Staff's regulations, and the burden is on the  
22 licensee to give you the information that would allow  
23 us to make a finding of meiculation, not being driven  
24 by an inspection.

25 DR. RANSOM: I think a lot of these points

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1 that are being brought up would be brought out.

2 MR. MARSH: I understand, I understand  
3 that, but just --

4 DR. RANSOM: And I would think that would  
5 go on quite early in the process.

6 MR. MARSH: It's not. At this stage, it's  
7 not part of the process. What we're asking is the  
8 linking between the review of an amendment to  
9 inspection findings or plant conditions as they exist  
10 at the plant, not having been disclosed by a  
11 systematic inspection, which is what you're  
12 describing.

13 DR. RANSOM: Well, the problem I have with  
14 that is you'd be -- the previous inspections would be  
15 from the standpoint is it --

16 MR. MARSH: Material condition.

17 DR. RANSOM: -- does it call for continued  
18 operation under its licensing basis?

19 MR. MARSH: Right.

20 DR. RANSOM: I would think that you'd want  
21 a specific inspection which you began to look is this  
22 really -- is it suitable for uprating?

23 MR. MARSH: Well, there's post-review,  
24 post-approval inspection efforts, okay, but not pre,  
25 okay?

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1 DR. RANSOM: It seems like that's  
2 backwards.

3 MR. MARSH: Well, you're asking the  
4 licensee to assert on the docket that they meet the  
5 regulations. It's up to them to make that assertion  
6 and to prove it to you. So the burden's on them to do  
7 that, and now the Agency is in the position of once we  
8 review that, by questioning, by meeting the  
9 regulations, then after the fact, we'll go and find  
10 out whether that in fact is true, as opposed to  
11 interrupting the review to find out whether the  
12 assertions they've made are incorrect and the level of  
13 knowledge the Staff may have.

14 DR. RANSOM: I'd be surprised that the  
15 applicant wouldn't prefer to actually have you come in  
16 at the initiation of the process and if you have any  
17 real concerns, identify them so that they don't waste  
18 their time.

19 MR. MARSH: It's done through questioning  
20 as opposed to through inspection.

21 MEMBER SHACK: I mean he has to  
22 demonstrate that his plant --

23 MR. MARSH: Absolutely.

24 MEMBER SHACK: -- can take the uprate.

25 MR. MARSH: Right.

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1 MEMBER SHACK: That's the whole point of  
2 his application.

3 MEMBER WALLIS: Well, I think we've made  
4 the point now. I think the Staff knows what the point  
5 is, and they will take it under consideration.

6 MR. MARSH: Yes. I think it's worth  
7 thinking about, the connection between --

8 MEMBER SIEBER: it's a tutorial for us.

9 MEMBER WALLIS: But I'd like to move on,  
10 because we've spent too long on this. I think we've  
11 made the point.

12 MR. MARSH: Thank you. Okay. Mohammed.

13 MR. SHUAIBI: For our procedural guidance,  
14 we decided to go with a graphical representation of  
15 the process. We believe a flow chart is easier to  
16 follow and more useful for the users. The flow chart  
17 that was distributed shows the process for the power  
18 uprate. It shows the -- the green path is the  
19 technical review path. It shows the different steps  
20 in the technical review path. You've got a path for  
21 the environmental assessment, a path for the  
22 proprietary review and a box there for the noticing of  
23 the amendment in the Federal Register. You'll notice  
24 that under each one of those boxes we include a  
25 reference to an office instruction or a guidance

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1 document that gives the reviewer or the project  
2 manager a reference to the guidance that they would  
3 use in completing that step. So this goes back to the  
4 idea of the review standard being a road map document.

5 MEMBER WALLIS: I think in terms of  
6 procedures it's easy to make a road map. When we get  
7 to the next slide, technical review, it's not quite so  
8 clear because it depends a lot of the experience of  
9 the reviewer to raise the right technical questions.

10 MR. SHUAIBI: Let me go to that slide  
11 next. We're going back to Slide Number 4, it's not  
12 allowing me to get this purple slide off the screen.  
13 But I think going to the next slide in your handout,  
14 the technical review guidance is provided in matrices,  
15 not a flow chart, so let me distribute that now.

16 MEMBER WALLIS: Is there anyone who's an  
17 expert on this computer who can release you from your  
18 predicament?

19 MR. SHUAIBI: I can reboot it. It will  
20 allow me to do that, not reboot the computer but take  
21 this off and bring it back.

22 MEMBER WALLIS: Is this an approved  
23 computer for this use?

24 (Laughter.)

25 MR. SHUAIBI: It's an NRC computer.

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1 CHAIRMAN APOSTOLAKIS: What's wrong with  
2 the computer? How come this is not fancy?

3 MEMBER WALLIS: It's Bill Gates trying to  
4 help you is the problem. You've got to go right back  
5 to the beginning and start again every time you get  
6 out of order or something?

7 MR. SHUAIBI: I had to pick up the slide  
8 itself.

9 MEMBER WALLIS: You want to go to 11. Oh,  
10 your numbers are different from my numbers, that's  
11 another problem.

12 MR. SHUAIBI: Well, I had to generate  
13 slides for handouts that are different than the  
14 presentation. The computer automatically takes  
15 figures off the page, that's why the numbers are  
16 different.

17 MEMBER WALLIS: It's helping you again.  
18 Just go on, we need to move on.

19 MR. SHUAIBI: For technical review  
20 guidance, we've developed matrices that cover the  
21 areas that need to be reviewed for a power uprate. It  
22 identifies the responsible NRR review branch, the  
23 guidance to be used when performing the review, and  
24 every matrix has an Attachment 1 with it that would  
25 identify either guidance or areas where the Staff

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1 would do independent calculations. Independent  
2 calculations is something that's come up here with the  
3 ACRS.

4 We've also added a glass column to the  
5 matrix. This was based on the feedback we got in the  
6 last meeting with a couple of the members about having  
7 an acceptance review, a formal acceptance review done  
8 of the application. So we have that last column that  
9 would -- and guidance to go with it that would tell  
10 the reviewers, "Look at these areas and the matrix,  
11 let us know if there's enough information to proceed  
12 with this review."

13 MEMBER WALLIS: I think we're going to be  
14 interested in what you've actually written for this  
15 guidance for independent analysis when you get a final  
16 version of this thing.

17 MR. SHUAIBI: Okay. Every group -- in  
18 developing these matrices and the independent  
19 calculations guidance, we went back to the groups and  
20 asked them, of course, to put that together. Every  
21 group decided the best approach for their portions of  
22 the review. Some groups already know which areas they  
23 want to do independent calculations for, other groups  
24 have criteria that they will use in determining when  
25 to do independent calculations. So the different

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1 matrices will have a different way of doing this. The  
2 last page --

3 MEMBER LEITCH: I'm a little concerned  
4 that we may get a little mixed up between a license  
5 renewal application and extended power uprate running  
6 through our review processes simultaneously. Could  
7 that happen or do you have to do one and then the  
8 other? I guess my concern is if there is an extended  
9 power uprate -- let's think the other way. Say  
10 there's a license renewal application coming along and  
11 in that license renewal application, nil ductility  
12 transition temperature is very close to the margin at  
13 60 years but just barely within the margin, and we  
14 approve that extended power uprate. Then there's a --  
15 I mean we approve the license renewal, I should say.  
16 And then the extended power uprate is coming through  
17 the pipeline for that plant shortly afterwards. Would  
18 you be aware of the license renewal and review it on  
19 the basis of 60 years?

20 MR. SHUAIBI: I think the example that you  
21 gave, I think we would be looking at it for power  
22 uprates. If the plant was going to be going for 60  
23 years, or I guess whatever the plant is licensed for,  
24 we would be looking at that in terms of what the tech  
25 specs have for PTU limits and what the PTS criteria

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1 are and whether they meet that or not. If the plant  
2 decides to go higher than the power level that they're  
3 licensed to, they would have to come back in and  
4 justify those again. It would be a tech spec change  
5 or it would be demonstrating again that they still  
6 meet those.

7 For power updates, we would do it based on  
8 the license power level. In license renewal, if a  
9 plant wants to come in and extend their license, we  
10 would do the review there for license renewal or the  
11 Staff would do the review for license renewal. I  
12 think it would be captured, I don't think it would be  
13 missed. Are we aware that we have both of these  
14 applications at the same time? Of course we're aware  
15 because we have project managers on the plants that  
16 keep track of what licensing actions are in-house.

17 MEMBER LEITCH: Yes. It seems to me the  
18 only potential would be if they were coming through at  
19 the same time and you're reviewing on the basis of 40  
20 years and yet we were taking action on the basis of 60  
21 years, so there could be some confusion there.

22 MR. MARSH: These are very, very big  
23 applications. Each one of them are major  
24 applications, so they require major resources by the  
25 Agency, and it would be closely coordinated. Brown's

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1 Ferry is being faced with this very same issue.  
2 They've got a license renewal and power uprate. They  
3 both are occurring at about the same time. And so  
4 we're aware and in communication with the  
5 organizations and keeping apprised of that.

6 MEMBER SIEBER: It would seem to me,  
7 though, that in the event of either a license renewal  
8 or a power uprate that the PTS rule would not directly  
9 bear on that, because the licensee is required to  
10 report whether the PTS rule is adequately implemented  
11 at their plant. And whether they upgrade or not or if  
12 they extend the license or not, they're required to  
13 take remedial action or shut down if they fall outside  
14 the additional analysis that would occur beyond the  
15 screening criteria.

16 So it would seem to me that it's possible,  
17 even though you may ask for a lot of RAIs, it is  
18 possible that you could renew a license or grant an  
19 upgrade even if the current data on PTS would show  
20 that you would exceed the screening criteria prior to  
21 the end of the license term or whether you had an  
22 upgrade or not. That would be my impression of how  
23 this works, and to try to mingle all of these effects  
24 together when each one is covered by a separate rule,  
25 I think probably is not appropriate. Maybe you can

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1 comment on that, because I think that will help us all  
2 get straight on how you play the game, so to speak.

3 MR. SHUAIBI: Well, I think that's exactly  
4 true because the PTU limits, the PTS criteria I think  
5 those are time-dependent things.

6 MEMBER SIEBER: That's right.

7 MR. SHUAIBI: It's not that we'll have  
8 licensed a plant at 20 percent more power and now the  
9 plant could operate indefinitely and we won't go back  
10 and look at PTS or PTU limits or transition nil  
11 ductility temperatures. We would go back and look at  
12 that, because they have in their tech spec PTU limits  
13 that are only good for so long.

14 MEMBER SIEBER: That's right.

15 MR. SHUAIBI: That are good for what  
16 they've demonstrated to be adequate. Those  
17 temperatures, I believe, in the limiting material are  
18 identified in the tech specs, so I don't see how a  
19 plant could do that.

20 MEMBER SIEBER: Yes. The chart is in  
21 there. The chart's in there.

22 MR. SHUAIBI: Right.

23 MEMBER LEITCH: I can just foresee a  
24 situation occurring downstream where a plant has to  
25 make a decision whether they run at a higher power

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1 level or run for longer time.

2 MEMBER WALLIS: Well, that's up to them.

3 MR. MARSH: And they would have to justify  
4 and meet the regulations and their tech specs that are  
5 in place at the time. And whatever choice they make  
6 they have to justify it, it has to be approved, then  
7 the burden's on us to make sure that their submittals  
8 and their tech specs are being met for whatever the  
9 licensing bases is at the time. So there are -- these  
10 are major overlapping and there are technically  
11 overlapping issues involved in license renewal and in  
12 power uprates and other technical issues as well. We  
13 try to keep -- project managers try to keep aware of  
14 these things by looking carefully at the tech specs  
15 and by the submittals.

16 The extent that licensees meet commitments  
17 is an issue as well. This came out as part of the  
18 Lessons Learned Task Force in Davis-Besse, and it's  
19 something that we're looking at as well. So they may  
20 make commitments on the docket to support a license  
21 renewal or a power uprate submittal which doesn't rise  
22 to the level of being a tech spec. And then to the  
23 extent that that commitment has been met is something  
24 that we're looking at in terms of that effort.

25 VICE-CHAIRMAN BONACA: I have a question

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1 on -- these are technical areas of review.

2 MR. SHUAIBI: That's right.

3 VICE-CHAIRMAN BONACA: Do you require the  
4 licensee to provide you with operating experience, a  
5 description of what happened to that plant in the past  
6 20 years? For example, I'm focusing on BWR and they  
7 may have had a cracked shroud that now is repaired in  
8 some way. There are some plants out there with those  
9 kind of repairs. They're not equivalent to the exact  
10 new component that was originally installed. Spargers  
11 that have been cracked and bolted. I mean there are  
12 many plants out there which have been repaired that  
13 way. Are you asking for the information so that when  
14 the person performs the mechanical evaluation he  
15 understands --

16 MR. SHUAIBI: Well, the licensee is  
17 required by rule to submit full and accurate  
18 information describing the areas that are affected by  
19 this uprate. That's a 50.9 issue.

20 VICE-CHAIRMAN BONACA: Well, this is not  
21 only the uprate. I'm talking about the operating  
22 experiences as far as component performance so that  
23 there is an understanding on the part of the reviewer.  
24 My concern here is that you have a technical person  
25 going through the pressure-temperature limit. He's

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1 checking to see from these guidances here whether or  
2 not it's met, and he just moves on. This plant,  
3 again, is not a new plant, and there is a history of  
4 that, and I've seen personally plants which have those  
5 kinds of repairs that did not restore the original  
6 capability in the components.

7 MR. SHUAIBI: I understand your question,  
8 but I think when we go back to these uprates that --  
9 these extended power uprates are 4,000-hour reviews in  
10 NRR. And while there are a lot of technical people  
11 involved, there are also project people involved,  
12 project managers that are assigned to that plant.  
13 Those project managers are usually on phone calls with  
14 the region on a daily basis getting status of what the  
15 plant has gone through overnight, what the plant is  
16 going through, what sort of inspection activities the  
17 plant has had, what the results of those inspection  
18 activities are.

19 It's the responsibility of the project  
20 manager to keep track of the status of the plant and  
21 the shape of the plant and the material condition of  
22 the plant and that sort of information. The project  
23 manager gets all these inputs and he coordinates all  
24 these -- he coordinates all these reviews and in the  
25 end gets the inputs and generates the safety

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1 evaluation that you see in the safety evaluation that  
2 goes out. So it's not just a technical reviewer  
3 sitting in a cube doing a review, there is also the  
4 project manager that coordinates these things, that is  
5 aware of all these things.

6 VICE-CHAIRMAN BONACA: But you know very  
7 well that your guidance will be read by the licensees  
8 and if you have a section that says request the  
9 licensee to describe the physical conditions, the  
10 operating history, et cetera, et cetera, they will be  
11 paying attention and provide you that information if  
12 you don't.

13 MR. MARSH: Sounds kind of like the first  
14 question we were going to think more about, right,  
15 which is the plant conditions, site-specific issues.

16 VICE-CHAIRMAN BONACA: They are two  
17 different -- I mean one thing is housekeeping, one  
18 thing is --

19 MR. MARSH: Yes. We were construing the  
20 first question as only housekeeping. We were  
21 construing the first issue as plant-specific issues  
22 which may not be part of something generic which is  
23 identified in the guidance. But Mohammed did say  
24 something that's real important: It's up to the  
25 licensee to meet the regulations. They must meet the

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1 regulations. To the extent of the information they  
2 give you to prove that to you, the extent of the  
3 review that you do to assure yourself that they do  
4 meet the regulations is the review process, but they  
5 must meet the regulatory criteria, they must. And if  
6 they have an issue, a vibration issue, a repair issue,  
7 a degradation issue, it's incumbent on them by  
8 regulation to bring the plant into compliance with the  
9 regulations. It's not up to the Agency to make them  
10 do that unless something is broken, some process is  
11 fallen down.

12 MEMBER WALLIS: Can we move on? I want to  
13 see if you can manipulate this computer.

14 MEMBER ROSEN: I don't want to move on out  
15 of technical review and get into documentation --

16 MEMBER WALLIS: Maybe technical is the  
17 most interesting part of this.

18 MEMBER ROSEN: For me. And I haven't  
19 touched on my issue yet, which is what we raised and  
20 there were differing -- I understand differing  
21 professional reviews on this, transient testing.  
22 Where is that covered here?

23 MR. SHUAIBI: We have a section in the  
24 review standard for testing. It covers steady-state  
25 power ascension testing and large transient testing,

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1 which was the issue that was raised. We're developing  
2 a standard review plan specifically to cover testing.

3 MEMBER ROSEN: So that will be in this  
4 technical review guidance section or a reference to  
5 it.

6 MR. SHUAIBI: A standard review plan will  
7 be issued for public comment at the same time as its  
8 review standard. The matrix for the testing group  
9 will have that standard review plan referenced as  
10 their guidance for reviewing all licensee applications  
11 related to testing.

12 MEMBER SIEBER: But that may not solve  
13 your problem, Steve.

14 MEMBER ROSEN: Well, I only want it  
15 addressed. I mean I may or may not agree with what  
16 the matrix says, but at least it's been addressed.

17 MR. MARSH: That was part of the DPV  
18 resolution was that a standard would be developed in  
19 order to decide when there should or should not be  
20 large transient or other types of power ascension  
21 testing. So that was a charge that we were given, and  
22 that is being done or has been done at this stage.  
23 It's a specific tab in that three-ring binder that  
24 Mohammed has there, which is the draft of the review  
25 standard.

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1 MEMBER ROSEN: And that's not something  
2 we're looking at today.

3 MR. MARSH: No.

4 MEMBER ROSEN: So I'm only asking if it's  
5 covered, and your answer is yes.

6 MR. MARSH: Yes, sir.

7 MR. SHUAIBI: Yes. The purpose of today's  
8 meeting is basically a status update on where we are.

9 MEMBER WALLIS: And to learn where you're  
10 going to get the most questions when you come back.

11 MR. SHUAIBI: Right.

12 CHAIRMAN APOSTOLAKIS: We will finish this  
13 by ten o'clock, won't we?

14 MEMBER WALLIS: That is the objective, Mr.  
15 Chairman.

16 MEMBER SIEBER: And that's entirely in  
17 their hands.

18 MEMBER WALLIS: But if the members have  
19 some really pressing questions that are important, I  
20 think they should be permitted to ask them.

21 MEMBER FORD: Well, I have a pressing  
22 question. This format for materials degradation is  
23 very prescriptive and yet materials degradation is a  
24 continuous state of flux of knowledge, especially for  
25 the internals. Where in this document or this

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1 guideline does it take into account that science is  
2 moving forward? We are understanding and coming up  
3 with new problems, potential problems. Would a  
4 reviewer address the state of knowledge?

5 MR. SHUAIBI: I guess I'll address that by  
6 two comments. First, we expect this to be a living  
7 document. We do not expect that once we issue this  
8 review standard that it's done. We will continue to  
9 update it, we will continue to keep it up-to-date with  
10 new information such as the experience we had with  
11 Quad Cities and whatever experience we'll have and  
12 whatever new information is gained through --

13 MEMBER FORD: So that somewhere in this  
14 decision process it tells the reviewer, "Hey, is there  
15 anymore information to come up, scientific or  
16 operation information to come up in the last five  
17 months?"

18 MR. SHUAIBI: I addressed what we're going  
19 to do with this document. The other comment that I  
20 had is we are not limiting the reviewers to what's in  
21 here.

22 MEMBER FORD: Okay.

23 MR. SHUAIBI: As a way of controlling our  
24 reviews we're saying that if there is an area that  
25 needs to be addressed that is not covered in here,

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1 that we would go to Management and identify that and  
2 make sure that we would pursue that through approval  
3 by Management. But we are not limiting the reviewer  
4 to what's in here. If there's an area that needs to  
5 be covered, if there's a plant that has a unique  
6 feature that is not in this review standard, we are  
7 not limited to what's in here.

8 MEMBER ROSEN: For example, if the  
9 guidance was so bold as to require large transient  
10 testing and that transient testing was therefore done  
11 in some unexpected -- the results were obtained, that  
12 would be the kind of thing you'd put in the book,  
13 right?

14 MR. SHUAIBI: That would be as part of it  
15 being an update and a living document if we learn  
16 something new as a result of whether it's transient  
17 testing or whether it's an actual event.

18 MR. MARSH: We just have to ensure that  
19 whatever new thing that we pursue is covered by the  
20 regulations. That means that if it's not, then you  
21 have to go through your approval process, your backfit  
22 process if you're changing scope. If it's within  
23 scope, absolutely, follow it. If it's outside scope,  
24 then you have to -- you have Agency procedures for  
25 that. If large transient tests were done and

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1 something unacceptable occurred, the licensee has to  
2 address that as part of their recovery program, as  
3 part of their complying with the regulations program.  
4 And it gives us the latitude to ask questions about  
5 that to find out how they do meet the regulations  
6 associated with that test.

7 MEMBER WALLIS: Can we move on now or do  
8 we have another question on technical review guidance?  
9 It appears that we can move on if you can make the  
10 computer do so.

11 MR. SHUAIBI: I was going to very quickly  
12 go over some of the material in here just to show you  
13 how it's laid out. The matrix in front of you the  
14 first column identifies the area of the review. The  
15 second column, every matrix, again, because of the  
16 groups that are involved and the way they do the  
17 reviews and the material that's going to be reviewed,  
18 that identifies what's applicable, and in different  
19 matrices you may find different ways of identifying  
20 this. Sometimes it's just applicable to all EPU's  
21 because of the area that's being reviewed. Sometimes  
22 it would be applicable if such a change -- if a change  
23 that would make a difference here was made at the  
24 plant for this power uprate, but that identifies when  
25 that area of review would be done by the Staff.

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1           The next two columns identify the groups  
2       within NRR that do the reviews. The first is a  
3       primary review branch; second are the other groups  
4       that may be involved in doing this technical review.  
5       The next three columns is where we provide the  
6       guidance for the Staff in terms of where they go to  
7       find the information they need to do the review. We  
8       identify the SRP section. SRP sections may identify  
9       -- may discuss more areas than we need for a power  
10      uprate, so the focus of SRP usage column identifies  
11      which areas in the SRP section they need to focus on  
12      when they do the review.

13           The next column identifies other guidance  
14      documents that are out there, generic communications  
15      that we found as part of the work that we did for this  
16      review standard that needs to supplement the  
17      information in the SRP. The next two columns are the  
18      sections in the boilerplate safety evaluations where  
19      those areas would be covered. For consistency, we'd  
20      like future safety evaluations to look the same and  
21      have the same formatting with the same numbering. And  
22      the last column I already discussed, that's the  
23      acceptance review column.

24           MEMBER SHACK: I'm sort of surprised flow-  
25      induced vibrations doesn't deserve a --

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1 MR. SHUAIBI: Flow-induced vibrations is  
2 covered by the Mechanical Group. We're looking at the  
3 materials and chemical engineering area.

4 MEMBER SHACK: So that's under reactor  
5 coolant pressure boundary materials?

6 MR. SHUAIBI: There's another matrix.  
7 This is just one of the matrices.

8 MEMBER SHACK: Oh, this is just one of the  
9 matrices.

10 MR. SHUAIBI: We actually have 11  
11 matrices, and this is a small one compared to some of  
12 the other ones that we have. There's a group that has  
13 40 section or about 40 sections in the SC that they  
14 would have to --

15 MR. MARSH: This is a really -- I hope you  
16 get a chance to look at this document. This is a very  
17 good product. This has each branch, what their areas  
18 are, then there are matrices for acceptance criteria.  
19 It's been a very well laid out structured document, so  
20 I hope you come to that conclusion.

21 MEMBER SIEBER: And the three major  
22 categories are BWRs, PWRs and everybody, right? As  
23 far as I can see here.

24 MR. SHUAIBI: Well, you mean in  
25 applicability?

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1 MEMBER SIEBER: Yes. You don't  
2 distinctive within the PWR, I presume.

3 MR. SHUAIBI: Sometimes --

4 MEMBER SIEBER: Combustion, Westinghouse  
5 and --

6 MR. SHUAIBI: No. Actually, to give you  
7 an example of applicability, sometimes when it's -- in  
8 this case, it's an easy one where it's applicable to  
9 all plants. In some cases, and I'll give you just an  
10 example, flooding, internal flooding, there are  
11 specific criteria that says if these things are  
12 affected, volumes and tanks, or other things that  
13 affect the flooding analysis, that's when we will do  
14 the review.

15 MEMBER SIEBER: Okay.

16 MR. SHUAIBI: Okay. The licensee is to  
17 address that, is to say that there was no impact or  
18 there was no increase in volume. But if they say that  
19 and they demonstrate that, we're not going to do a  
20 detailed review of the flooding analysis, because,  
21 obviously, the old flooding analysis continues to be  
22 bounding. So in some areas, we are more specific than  
23 what you see here.

24 MEMBER SIEBER: Okay. And so the  
25 "applicable to" section could be generic other than

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1 PWR and BWR.

2 MR. MARSH: Right.

3 MR. SHUAIBI: Right.

4 MEMBER SIEBER: Okay. Thank you.

5 MR. SHUAIBI: Okay. If no other  
6 questions, I'll move on to the next slide. The next  
7 slide is a documentation of review. I'll have a  
8 handout. I'll move through this quickly. Consistent  
9 with our office instructions, we wanted to make sure  
10 that we identified the regulatory basis for every area  
11 that we cover, and as I discussed earlier, we wanted  
12 future safety evaluations to have a standard format  
13 and same content or similar content. You'll see in  
14 the handout that's being passed out we have drafted a  
15 generic regulatory evaluation section for every area  
16 covered in the matrices that we have. You have the  
17 section that goes along with the matrix that we handed  
18 out. We have a regulatory evaluation section, we have  
19 a conclusion section as well. The technical  
20 evaluation section will of course be provided at the  
21 time of the review.

22 Now, there will be guidance in the review  
23 standard to say that if a plant is not a GDC plant or  
24 if a plant is not an SRP plant, that you're to go back  
25 and rewrite this using the same format and content

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1 that we've used here to generate a regulatory  
2 evaluation that's similar to what we have here. But  
3 every area will be addressed the way that you see in  
4 this handout. This will give you an idea. In the  
5 past, we've combined certain things and that's led to  
6 some confusion and some feedback on the safety  
7 evaluations. I think this will be more specific in  
8 terms of what areas were covered and how they were  
9 covered.

10 MEMBER ROSEN: Now, Mohammed, just recall,  
11 I'm sure Tad recalls, that the Committee views on  
12 safety evaluation reports in terms of rather than just  
13 stating the conclusion stating the conclusion and  
14 saying why the Staff reached the conclusion, so that  
15 --

16 MR. MARSH: Yes, you bet. Yes. That's  
17 one big gain we hope we're going to get is to steer  
18 the statements that we make towards the bases for  
19 saying why we're saying things as opposed to just it's  
20 okay, it's okay, it's okay.

21 MR. SHUAIBI: One of the reasons why we  
22 did this this way is to address the comment that we've  
23 been getting. This is what you've seen in the past.  
24 The comment that we've received is this is what you've  
25 seen documented in the past. Well, now we've got a

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1 blank section in here that needs to be covered, that  
2 needs to be addressed, that needs to be provided, so  
3 stating that it's acceptable like we have in that  
4 bottom paragraph isn't sufficient anymore. We have to  
5 provide some technical evaluation of what we looked  
6 at, what the criteria were, why it was acceptable.  
7 And then we come to the bottom paragraph that says,  
8 well, therefore it meets the regulations.

9 MEMBER WALLIS: So in some cases this  
10 middle section might be quite lengthy if it needed to  
11 be.

12 MR. SHUAIBI: It could be. It depends on

13 --

14 MEMBER ROSEN: So it wouldn't be here if  
15 it wasn't acceptable.

16 MR. SHUAIBI: In some cases, it may be  
17 lengthy. In other cases where the area may not be  
18 applicable to the plant, the whole section may be  
19 deleted. The number would --

20 MEMBER WALLIS: It would be one sentence  
21 or something.

22 MR. SHUAIBI: That's correct, "This is not  
23 applicable because."

24 MEMBER WALLIS: All right.

25 MR. SHUAIBI: Period.

1 MEMBER ROSEN: Let me amend what I just  
2 said. You wouldn't be at the ACRS unless you thought  
3 it was acceptable, you believed it was acceptable.

4 MR. SHUAIBI: That's correct.

5 MEMBER ROSEN: So all you're asking us is  
6 to agree with you that it's acceptable. And our  
7 question is why do you think it's acceptable.

8 MR. SHUAIBI: Right.

9 MEMBER ROSEN: That's what the dialogue's  
10 about.

11 MR. SHUAIBI: And we're hoping this format  
12 will bring it out in a technical evaluation portion so  
13 that when it comes to you you could look at that  
14 technical evaluation portion and see what was done and  
15 what the Staff thought about when they decided that  
16 this thing was acceptable.

17 MEMBER WALLIS: That might focus our  
18 questions better perhaps too. We might get through a  
19 meeting quicker.

20 MR. SHUAIBI: We hope.

21 MR. MARSH: We want to.

22 MR. SHUAIBI: Let me go to the last  
23 section in the review standard. The last section,  
24 again, references an inspection procedure that was  
25 already written for power uprates. It also refers

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1 back to the safety evaluation. I handed out only a  
2 section of the safety evaluation. There's a section  
3 in there that talks about recommended areas for  
4 inspection, and this section in the review standard  
5 refers the reviewer and the inspector back to the  
6 safety evaluation or it provides a link to the safety  
7 evaluation that would have a discussion of what areas  
8 were recommended as part of the review that we went  
9 through.

10 In terms of schedule, I think Tad already  
11 covered this. We are on track to issue the draft  
12 review standard for interim use and public comment by  
13 the end of the year, that's the end of this month.  
14 The review standard currently has not reviewed by  
15 Management. We hope to have that done very soon.

16 MEMBER WALLIS: When it goes out for  
17 public comment it will come automatically to us, so if  
18 we want to do our reading, we can do it.

19 MR. SHUAIBI: We will -- that's correct.  
20 We will send you a copy and we also plan on coming  
21 back and briefing you.

22 MEMBER WALLIS: Will this be a CD or a  
23 pile of paper?

24 MR. SHUAIBI: We could do it either way.

25 MEMBER ROSEN: Yes, do a CD.

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1 MEMBER WALLIS: Do a CD.

2 MR. SHUAIBI: Okay.

3 MR. MARSH: We could do that. I think we  
4 could do that, right? We can do that.

5 MR. SHUAIBI: Yes, we can do that. And  
6 the last bullet on here -- of course, we'll come back  
7 to ACRS after the public comment period for the  
8 official review of the review standard. The last  
9 bullet on here says that final issuance will be early  
10 2004. Of course, there's a lot of uncertainty here.  
11 If we don't get a lot of comments, it could be  
12 earlier; if we get a lot of comments, we'll have to go  
13 back and look at the schedule.

14 MR. MARSH: What we don't show in this  
15 schedule, though, is the CRGR review. We will have to  
16 go through the CRGR in this as well.

17 MR. SHUAIBI: That's correct. And the  
18 last slide is I think you've seen most of these words  
19 before and basically we are nearing completion on this  
20 review standard and hope to have it done by the end of  
21 the year.

22 MEMBER SIEBER: Does this review standard  
23 or any other initiative right now proclaim what the  
24 power uprate level will be submitted to ACRS for  
25 review? You know, we had customarily had not reviewed

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1       --

2                   MR. MARSH:       Measurement   uncertainty  
3       uprates or stress power uprates, things of that sort.

4                   MEMBER SIEBER:   Yes, stretch up to five  
5       percent.

6                   MR. MARSH:   Right.

7                   MEMBER SIEBER:   Understand there's a rumor  
8       floating about that folks would like something  
9       different than five percent.

10                  MR. SHUAIBI:   I think this goes back to --  
11       I had discussed with Paul Boehnert possibly revising  
12       the five percent or changing the five percent to go to  
13       stretch and extended where we would come to the  
14       Committee for extended power uprates. I've indicated  
15       to Paul that I will need to discuss this. I got some  
16       feedback, initial feedback that it may not be a good  
17       idea. I'm not really sure. I think maybe we could  
18       explain a little better what we meant by that. Our  
19       definition of stretch power uprate I believe is the  
20       intent -- I believe it meets the intent of why the  
21       five percent was established. I think five percent  
22       was based on the power uprate being within the  
23       original design capacity of a plant, and our  
24       definition of stretch is exactly that.

25                  MEMBER SIEBER:   On the other hand, if you

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1 go to like eight percent and you look at the last  
2 plant that did that, which was ANO 2, the way they did  
3 it was to change steam generators. Everybody I think  
4 now that's looking at steam generator change-out in  
5 PWRs is looking to increase heat transfer surface,  
6 which automatically gives you as much as eight  
7 percent. I would not be favorably impressed if those  
8 kinds of uprates bypassed ACRS scrutiny. On the other  
9 hand, if you don't change the plant at all except  
10 perhaps put a leading-edge flow meter in there, then  
11 I don't think that that's particularly pertinent to us  
12 because we reviewed the leading-edge flow meter as an  
13 entity and understand its improved accuracy and --

14 MEMBER WALLIS: I think what will happen  
15 is this proposal will come to us --

16 MEMBER SIEBER: It's not clear to me that  
17 it will if it gets hidden in a Staff --

18 MR. BOEHNERT: Well, in fact, if I may  
19 comment. Based on our discussions, I had suggested to  
20 Mohammed that the Staff come to the Committee and make  
21 its case, present the case and let you guys decide  
22 what you think. I think that's the way to handle  
23 this. You may be -- like Jack said, some of them you  
24 may think is okay, some you may not, but I think you  
25 need to give it consideration. Commenting also on the

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1 five percent issue, I think it was also, besides what  
2 Mohammed said about being a stretch case, I think  
3 there was also the Committee had some consideration  
4 about risk impact and felt at the time that five  
5 percent was about what they were willing to pass on  
6 without a detailed review. Now, again, maybe you'll  
7 think different later, but anyway --

8 MEMBER SIEBER: I'm not aware of any  
9 stretch cases that went beyond five percent so far.

10 MR. SHUAIBI: We don't have any that have  
11 gone beyond five percent at this point. When we do  
12 surveys, Tad indicated we do surveys twice a year, we  
13 get information on power uprates and until this point  
14 we've been saying five percent and above. When we  
15 internally keep track of which ones we expect to be  
16 extended. We're basically marking anything that's  
17 over five percent extended. But we have had  
18 discussions with a licensee that's going to be  
19 submitting a power uprate of about six and a half  
20 percent in the near future, and their discussions they  
21 say that they are not going to be making changes to  
22 the plant, many changes to the plant. The types of  
23 changes that fit under the stretch they're not the  
24 types of changes that you would see when we came in  
25 here with ANO or when we came in here with some of the

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1       boilers where they were going 15, 20 percent.

2               MEMBER POWERS:   It seems to me offhand  
3       that that's really the criterion rather than an  
4       absolute magnitude of the power uprate: Are we making  
5       significant changes?   I know it's a little more  
6       difficult to characterize what a significant change  
7       rather than a nice number, but I mean it's yourself  
8       willing to trust your judgment.

9               MR. MARSH:   It just seems like we should  
10       maybe put some words around this.

11              MEMBER WALLIS:   Yes.   Then come back to  
12       us.

13              MR. MARSH:   Yes.   The same way we try to  
14       put words around when we would do a confirmatory  
15       calculation or when we would do something. We need to  
16       wrap some thoughts around this.   If there's  
17       significant plant changes or there's significant  
18       change in risk or there's well beyond the licensing  
19       bases which requires significant new calculation or  
20       new technologies, new methodologies, something we can  
21       --

22              MEMBER POWERS:   I'd be careful about how  
23       much new because new is a little bit in the eyes of  
24       the beholder, what a change is.   But it seems to me  
25       that you guys are pretty good at judging whether

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1 something is like one of these one and a half to two  
2 percent -- I mean it might happen to be eight percent  
3 power change but it's like that in the magnitude of  
4 plant change versus something where I'm really having  
5 to worry about stuff.

6 MR. MARSH: You know, I just think we need  
7 to write something down, because we're going to go  
8 away and you're going to go away and there's going to  
9 be new people coming, and we need to have some  
10 thoughts so we can guide other people. We're going to  
11 get wrapped in other jobs and maybe miss a mark.

12 MEMBER WALLIS: I think also we need to  
13 see your thoughts written down so if we approve it, we  
14 know what we approved.

15 MR. SHUAIBI: Right. And that's the  
16 action I took back from my discussions with Paul. We  
17 discussed this, and I explained to Paul that we will  
18 do that. Right now we're focusing on getting this  
19 review standard done, so it's a little bit on the back  
20 burner. Once we're done with this review standard, we  
21 may put together, of course go through Management  
22 concurrence and approval, and then send it over to you  
23 for your consideration, but that's the approach that  
24 we're taking.

25 MEMBER SIEBER: That would satisfy my

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1 concern.

2 MEMBER POWERS: It seems to me that minor  
3 changes -- it's just kind of a waste of your time to  
4 prepare to come here, it wastes our time to listen to  
5 it, especially since you've kind of got those in  
6 better shape because of you're doing so many. And I,  
7 quite frankly, am willing to trust your judgment.

8 MR. MARSH: I appreciate that, of course.  
9 We need to write some thoughts down, I think, because  
10 there will be others who will need a plan beyond us,  
11 and so I think it's worthwhile doing.

12 MEMBER WALLIS: No, I think I agree that  
13 you would.

14 MR. MARSH: Yes. We'll be glad to.

15 MEMBER WALLIS: So we don't need to  
16 discuss it anymore, perhaps. Are we ready to finish,  
17 Mohammed? No more questions? I pass it back to you.

18 MR. MARSH: Can I say something?

19 MEMBER WALLIS: Sure.

20 MR. MARSH: I want to thank you for your  
21 time, and I sincerely appreciate the comments and the  
22 feedback and the discussions that we had, I really do.  
23 That helps us in our thinking, that helps us in coming  
24 up with the right kind of a product, and it's  
25 worthwhile conversation that we have. I appreciate

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1 that. We're excited about this product. This is new,  
2 and as such, it won't be -- you know, there will bumps  
3 along the way as we implement this.

4 One thing we've asked ourselves and  
5 continue to ask ourselves, is this going to be more or  
6 less work in the end? Is this going to be a reduction  
7 in Staff effort or increase in Staff effort? Is this  
8 going to require more or less hours worth of work? We  
9 don't know the answer to that at this point. Isn't  
10 our goal, of course, to have a more efficient and  
11 effective program, but anytime we write down our  
12 guidance that we have been using and try to systemize  
13 it, it will probably be a greater effort at the end.  
14 So I wouldn't be surprised if schedules are impacted  
15 and Staff hours are impacted while this thing gets  
16 implemented and gets rolled out.

17 But we're very excited about the structure  
18 of that document, and Staff has got a lot of effort to  
19 put it together in a nice cogent way, color-coding  
20 things, and it's well thought out. So we really  
21 appreciate your comments and your thoughts. We'd be  
22 glad to come back in this forum if you want or if you  
23 want to discuss it individually, we'd be glad to do  
24 that too. So thank you very much.

25 MEMBER WALLIS: Thank you too.

1 CHAIRMAN APOSTOLAKIS: Okay. We'll recess  
2 until 10:30.

3 (Whereupon, the foregoing matter went off  
4 the record at 10:13 a.m. and went back on  
5 the record at 10:30 a.m.)

6 CHAIRMAN APOSTOLAKIS: Back in session.  
7 The next item is proposed options for resolving policy  
8 issues for future non-light water reactors.

9 Dr. Kress.

10 MEMBER KRESS: Thank you. That was all  
11 the introduction I was going to make. I think Farouk  
12 wants to make a few words before we start, so I'll  
13 turn it over to him.

14 MR. ELTAWILA: Okay. Thanks, Mr.  
15 Chairman. I'm sorry that I'm not going to be here.  
16 I have another meeting, and because of the snow and  
17 things like that, we doubled the meetings today. But  
18 what I would like to just bring one point to your  
19 attention which is related to three of the items that  
20 -- policy issues that Tom is going to address today.  
21 The three policy issues that we're talking about is  
22 the selection of the event selection, which is going  
23 to be on PRA and the source term associated with these  
24 accident scenarios and the option whether we use a  
25 confinement or a containment.

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1           What we would like to do as they are  
2 presented right now in the draft paper that you have  
3 in front of you, they are presented as separate  
4 issues, but in reality we are planning to deal with  
5 them as an integral -- as a single issue with three  
6 subissues associated with them. You make the  
7 selection of the scenarios and you look at the  
8 associated source term, and this on that you determine  
9 whether you need a confinement or containment to  
10 mitigate the consequences of that accident. So we are  
11 not going to be presenting them as a single issue, but  
12 they are going to and integral issue, and I hope that  
13 Tom will be discussing that in more details today, but  
14 that's the direction that we are heading towards right  
15 now. That's all the opening remarks I have, so I  
16 apologize for leaving.

17           MR. KING: Okay. Thanks, Farouk. For the  
18 record, my name's Tom King. I'm with NRC's Office of  
19 Research and have been working for the past six months  
20 or so on the subject we're going to talk about today.  
21 This is really a follow-up to a briefing we had given  
22 you at your October full Committee where we talked  
23 about what the issues were and what some of the  
24 options were for the resolution. We did not get into  
25 recommendations. What's happened since then is we

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1 have had a public workshop, we have had a lot more  
2 internal discussions.

3 CHAIRMAN APOSTOLAKIS: I don't understand  
4 the title, "Technical-Related Pulse Issues." What  
5 does that mean?

6 MR. KING: Well, I put the word  
7 "technical-related" in to distinguish from the other  
8 paper that's gone to the Commission several months ago  
9 on legal and financial policy issues.

10 CHAIRMAN APOSTOLAKIS: So it's just  
11 technical policy issues.

12 MR. KING: Yes. The paper we talked about  
13 last October was the SECY-02-0139 that had gone up in  
14 July and laid out the seven issues for Commission  
15 information. It was an information paper. Those  
16 issues resulted from our pre-application work to date  
17 on PBMR and GTMHR, but recognized that there's also  
18 other non-light water reactor work going on elsewhere  
19 in the world, particularly that associated with the  
20 Generation IV Program.

21 The purpose of the paper that we're  
22 working on today and we're going to talk about today  
23 is to get the Commission to give some guidance, some  
24 direction on these seven issues. Those issues we  
25 think are key to the licenseability of future non-

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1 light water reactors and consistent with the  
2 Commission's advance reactor policy statement. Even  
3 though we don't have any applications in front of us,  
4 the idea is to get early feedback to designers so that  
5 they can prepare their applications and know what the  
6 ground rules are, as well as have the Staff know what  
7 the ground rules are.

8 MEMBER ROSEN: It's more than just their  
9 application isn't it? It starts so they can prepare  
10 their designs. I mean this impacts their design, not  
11 just the application.

12 MR. KING: Yes, their designs. Their  
13 designs, their research programs and all the things  
14 that go along with it, that's right. That's right.

15 The scope of the issues is reactor design  
16 and operation. We have not identified to date any  
17 fuel cycle issues, and security is being handled  
18 separately, recognizing that security issues may  
19 impact some of these things.

20 As Farouk said, many of these issues are  
21 linked, and we'll talk about that linkage --

22 MEMBER KRESS: Were these options  
23 presented at the workshop you talked about?

24 MR. KING: Yes.

25 MEMBER KRESS: Okay. And you had lots of

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1 industry participation?

2 MR. KING: We had 19 non-NRC participants.  
3 One of those was from Green Peace, the rest were from  
4 industry or reporters. Industry National Labs was --

5 CHAIRMAN APOSTOLAKIS: When was this  
6 workshop?

7 MR. KING: It was October 22, 23. And  
8 what I'll do is as we hit the issues, I'll summarize  
9 the feedback we got at the workshop on each of the  
10 issues.

11 I also recognize that these issues  
12 resulted from non-LWR pre-application work, but some  
13 of these issues, depending on what the Commission  
14 decides, could have a bearing on future light water  
15 reactors as well, and I'll mention that where that's  
16 a possibility as we hit the various issues.

17 Four of the issues had been looked at  
18 previously by the Commission back ten years ago when  
19 we were doing pre-application work on the light water  
20 reactors. What this paper does is revisit those  
21 issues because things have changed in the past ten  
22 years. The major changes have to do with the emphasis  
23 on risk-informed regulation, which was kicked off with  
24 a PRA policy statement in '95 and also the  
25 Commission's strategic plan, which lays out goals for

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1 the Agency. So we think it's appropriate to revisit  
2 those.

3 The schedule is we owe the paper to the  
4 Commission at the end of this month. We provided you  
5 with a draft of that paper, stamped it pre-decisional  
6 because it is still under review, still going through  
7 concurrence. And there are probably some changes that  
8 are going to take place before the final paper goes  
9 up. Farouk talked about one maybe trying to package  
10 three of the issues together, and I'll talk about  
11 another one, modify somewhat our recommendation on one  
12 of the issues.

13 We're here today to talk about the  
14 background and the issues, the key questions that we  
15 looked at in reviewing the issues, the options, the  
16 feedback at the workshop and the recommendations. We  
17 are requesting a letter from the Committee at this  
18 point after this meeting or as soon as you feel you're  
19 able to write one. So that is a difference from the  
20 October meeting, which was just an information status  
21 briefing.

22 Okay. In looking at the issues, we sort  
23 of laid out some ground rules or general guidelines  
24 that we followed. We wanted to make sure that in  
25 recommending a position on these issues that we were

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1 consistent with the safety goal policy, which states  
2 that the population around a site should be consistent  
3 or the risk to the population around a site should be  
4 consistent with the safety goal policy. We wanted to  
5 take a risk-informed performance-based approach  
6 wherever we could. We wanted to recommend resolution  
7 of these issues on a technology-neutral basis  
8 recognizing that they could have implications for LWRs  
9 We considered the Commission's strategic plan which  
10 has performance goals in it and the previous  
11 Commission guidance. And we also considered  
12 practicality. We don't want to recommend something  
13 that's just too resource-intensive or too complicated  
14 to implement.

15 Okay. Now what I'd like to do is go  
16 through the issues one by one in the order they were  
17 listed on the earlier slide, starting with what we  
18 call expectations for enhanced safety.

19 MEMBER KRESS: Do they come out of a  
20 policy statement or events to reactors?

21 MR. KING: They come out of really three  
22 things that I've listed here, the first three sub-  
23 bullets. The first one was the severe accident policy  
24 statement, which said that for future plants we expect  
25 a higher standard of severe accident safety

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1 performance than prior designs. Then a year later the  
2 advance reactor policy statement came out, which said  
3 we expect future designs to have enhanced safety  
4 features, but it also went on and said we are -- as a  
5 minimum, the level of safety of advanced designs  
6 should be the same as current designs. So it said we  
7 have an expectation but we're not making that a  
8 requirement. The SRM Staff requirements memo that  
9 implemented the safety goals also basically said that  
10 same thing.

11 MEMBER KRESS: Maybe you'll cover it but  
12 let me ask you about the last bullet, about the  
13 expectation that it has the same degree of protection  
14 for current iteration LWRs. If you look at existing  
15 plants, there is a spectrum on distribution of risk  
16 statuses if you count CDF and LERF, or status with  
17 respect to prompt fatalities. When you make a  
18 statement like we want the advanced plants to have the  
19 same level of protection --

20 MR. KING: As a minimum.

21 MEMBER KRESS: -- as a minimum, does that  
22 mean that it has to be as good as the worst one, the  
23 mean, or the best?

24 MR. KING: No. I think the way that's  
25 been interpreted is, and that actually gets to the

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1 last bullet here, we had that same question when we  
2 went through the ALWR design certifications. We had  
3 to implement these policies when we did those. We've  
4 derived a core damage frequency goal and a large early  
5 release frequency goal from the safety goals that have  
6 been applied to today's plants and were applied during  
7 the ALWR design certifications. So my view on that  
8 question is what we're shooting for is the goals that  
9 we've derived from the safety goals that apply to  
10 today's plants. We're not looking at the whole  
11 spectrum and looking at the worst one.

12 MEMBER KRESS: Even though the ALWR  
13 exceeds those.

14 MR. KING: Yes.

15 MEMBER KRESS: We're not shooting for the  
16 ALWR as a --

17 MR. KING: Not as a requirement. Remember  
18 what the reactor policy statements says, "Hey, we  
19 expect safer designs." The ALWR has come in and said,  
20 "We're giving you safer designs, and here's all the  
21 things we've done to improve the designs and here's  
22 what it's done to core damage frequency and so forth."  
23 The Staff looked at that. Where there were some areas  
24 that they felt maybe because of additional uncertainty  
25 or concerns, they may have added a few extra things,

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1 but they didn't turn around -- we didn't turn around  
2 and change the entire body regulations to now raise  
3 the bar to this new level of safety that the designers  
4 were offering up. We accepted it with some additional  
5 enhancements, and for those particular designs we  
6 codified that in the design certification rulemakings.  
7 But we haven't made generic changes across the board  
8 in the regulations to raise the bar for everybody  
9 else. So that's the process on the ALWRs.

10 MEMBER WALLIS: So on these safety goals  
11 I think I understood in past discussions of safety  
12 goals that these are not requirements, these are some  
13 sort of thing which you aim at and hope to achieve.  
14 But it would seem to me that was a very strange way to  
15 set a goal, but that seemed to be the way they were  
16 interpreted. There were requirements and then there  
17 were goals, and you sort of strove to get somewhere  
18 close to the goal, but all you had to do is really  
19 satisfy some requirements which are considerably less.  
20 So they don't really tell you what you're going to  
21 require.

22 MR. KING: It's not as simple as that.  
23 The safety goals have shown up in various places.  
24 They've shown up in the regulatory analysis  
25 guidelines, which are what were used to set new

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1 regulations or to change regulations. They've shown  
2 up in the ALWR design certifications as part of the  
3 review criteria that the Staff used in looking at  
4 those designs. Do they meet the safety goals? That  
5 was one way to see --

6 MEMBER WALLIS: So it became a requirement  
7 rather than one of these goals that you don't quite  
8 reach but you hope to get close to?

9 MR. KING: The goals were used to help  
10 establish a basis for new requirements, either through  
11 the regulatory analysis guideline approach, which  
12 affects the regulations and the reg guides, or through  
13 the design certification process.

14 MEMBER KRESS: Tom, when I asked this same  
15 question once to a different set of people from the  
16 Staff, I got an answer that went like this, and I  
17 wonder what your reaction to it is, that if it didn't  
18 meet the safety goals, some plant that they were  
19 either looking to make a change in the licensing basis  
20 or new license or whatever, if it didn't meet the  
21 safety goals, to quote -- now I'm quoting, "This would  
22 put into question the presumption of adequate  
23 protection." That was the answer I got from them.

24 MR. KING: No.

25 MEMBER KRESS: Is there any validity to

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1 that?

2 MR. KING: That's not consistent with the  
3 way we're using safety goals or I think the way the  
4 Commission intended safety goals. The safety goals  
5 are supposed to define where you stop regulating, how  
6 safe is safe enough, not the minimum in terms of  
7 regulations. So I guess I would take issue with that  
8 statement.

9 MEMBER WALLIS: It's a very strange kind  
10 of safety goal. I've said this before, but I mean for  
11 the public to understand that strange idea that you  
12 have a safety goal but you don't really meet it, it's  
13 something where you stop regulating, it's the wrong  
14 end of the scale. You've got to set the minimum  
15 standard. I don't really care where you stop with  
16 anything, it's the minimum standard I care about.

17 CHAIRMAN APOSTOLAKIS: You don't really  
18 stop regulating, I don't think.

19 MR. KING: Well, we can always say, yes,  
20 we make some judgments based upon uncertainties and so  
21 forth, but some people might think it's really beyond  
22 the safety goals. But the intent is to stop there.  
23 You may disagree with some of the numbers or some of  
24 the judgments that are --

25 CHAIRMAN APOSTOLAKIS: But we stop even

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1 for plants that are above the goals.

2 MEMBER WALLIS: Yes, but the guy who's  
3 next to the plant doesn't care. He wants to know what  
4 the minimum standard is.

5 MR. KING: If you're looking at existing  
6 plants, you're looking at backfit, and the safety  
7 goals give you, through the reg analysis guidelines,  
8 give you some guidance on should you backfit or not.  
9 There's some criteria. And, in effect, if you're not  
10 making a substantial improvement in safety, you're not  
11 going to pass the backfit test, and the safety goals  
12 have been used to help define what that substantial  
13 improvement in safety is. So you can say, well, some  
14 existing plants may not meet the safety goals but may  
15 not also pass the backfit test, so they're caught in  
16 a position where, yes, they don't meet the safety  
17 goals, but it's not cost beneficial or they're close  
18 enough that it doesn't make sense to make them spend  
19 money to do anything else.

20 For future plants, you know, we're not  
21 talking backfit, we're talking forwardfit. It's  
22 easier to design safety in in the beginning, so we're  
23 not going through the backfit process on future  
24 plants, but we are still using the goals through the  
25 subsidiary objectives that have been developed to help

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1 define a gauge as to how safe do these things have to  
2 be?

3 MEMBER WALLIS: If they're the same safety  
4 goals and the old plants' requirements are based on  
5 them, how are you going to get any kind of enhanced  
6 safety?

7 MEMBER SIEBER: Well, it seems to me that  
8 where you go from a goal to a requirement is in the  
9 certification process, and to get to the design that  
10 is acceptable for the certification process, that's  
11 where you apply the safety goals. Now, the safety  
12 goals came after the designs of the current generation  
13 of plants, and so some plants make it and some don't.  
14 Most of them do make it, and so you're stuck with  
15 that, and since they were all designed under a  
16 deterministic system of regulations, they meet  
17 adequate protection standards, even if they don't meet  
18 the safety goals. So it seems to me where the  
19 regulatory punch comes is in the certification  
20 process. Is that a good way to look at it or not?

21 MR. KING: I think that's a good way to  
22 look at it. And, again, it gets back to these policy  
23 statements where the Commission has said, "The way  
24 we're going to get enhanced safety is we're going to  
25 put the burden on the industry to come forward and

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1 volunteer it."

2 MEMBER KRESS: As a practical matter, I  
3 can't imagine somebody will come forth with something  
4 that doesn't meet --

5 MR. KING: No design has come forward and  
6 said --

7 MEMBER KRESS: Yes. And I don't think  
8 they will.

9 MR. KING: No.

10 MEMBER KRESS: But just as a hypothetical  
11 statement, what if one did come forth and had a CDF  
12 greater than ten to the minus four or a LERF greater  
13 than ten to the minus five? I think the regulatory  
14 system would really question that very strongly.

15 MR. KING: I do too.

16 MEMBER KRESS: And I just don't think it  
17 would get certified, even though there's no such  
18 requirement in the regulations, but I just don't think  
19 it would get through anyway.

20 MR. KING: I tend to agree with you, and  
21 you'd pull out these policy statements and say, "What  
22 are you guys doing? We told you 15 years ago that we  
23 don't want to see that approach anymore and you're not  
24 following it." So I agree with you, they'd have a  
25 tough time.

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1 MEMBER KRESS: I don't think it's a  
2 problem because I can't imagine anybody coming forth  
3 with one that won't well meet the safety guidance.

4 MR. KING: No. I mean you look at the  
5 advanced designs, whether they're the HTGRs or the  
6 Generation IV, all of them have as goals enhanced  
7 safety and all of them are promoting enhanced safety,  
8 not just because they want to make us happy but  
9 because it makes their investors happy, investment  
10 protection. High reliability means better economic  
11 performance and so forth, so they do it for a number  
12 of reasons, so I really don't think it's a -- from a  
13 practical standpoint it's an issue.

14 CHAIRMAN APOSTOLAKIS: Before the reactor  
15 safety study the estimates -- I mean if you go to  
16 conferences and find the proceedings and look at the  
17 numbers that people were coming up with for  
18 unavailability of safety systems and so on, we're  
19 talking about estimates that were about two orders of  
20 magnitude lower than what is accepted now and has been  
21 supported by data. So people were a little more  
22 optimistic in the beginning. In fact, one of the  
23 lessons from the reactor safety study is that people  
24 were a little shocked when they were told that the  
25 core damage frequency is about once every 10,000

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1 years. They thought it was much, much lower than  
2 that.

3 Are we going to have the same thing here?  
4 I mean we start with ten to the minus seven as being  
5 optimistic again, and then we build one of those and  
6 with time we learn that it's not ten to the minus  
7 seven but it's ten to the minus five? I mean we can  
8 figure out now -- I mean I remember when we were  
9 looking at the AP600 the numbers were very low, people  
10 tried very hard. They couldn't find a failure mode  
11 that would raise that number. They couldn't find  
12 anything. But on the other hand, there were things  
13 like digital I&C, there were all sorts of controls and  
14 -- who knows? Are we going to have a repetition of  
15 this historical fact and learn from experience?

16 MR. KING: I have no doubt we're going to  
17 learn from experience and people are going to find out  
18 the reliabilities they put forth in their PRA maybe  
19 don't turn out to be as good. I think that's a  
20 fundamental question on how you implement whatever  
21 your safety goals or criteria are for future plants.

22 CHAIRMAN APOSTOLAKIS: Is that influencing  
23 your thinking at all when you develop these?

24 MR. KING: Yes. Yes. It has gone through  
25 our thinking.

1 MEMBER KRESS: It has something to do with  
2 defense-in-depth.

3 MEMBER ROSEN: I think you need to look at  
4 history again to answer your question. Remember that  
5 one important person in the history of nuclear power  
6 said that paper reactors are always cheaper to build,  
7 you can build them quicker, and safer than real  
8 reactors.

9 MR. KING: So one of the questions is how  
10 do you compensate for that? Do you require additional  
11 testing, put more stringent goals on so that maybe  
12 that compensates for some of these areas where you  
13 really don't know as you much as you'd like?

14 VICE-CHAIRMAN BONACA: But you would  
15 expect that the same situation would happen as normal  
16 coolant reactors which is you learn from experience,  
17 you're improving them and you're bringing them back to  
18 where they really were expected to be on paper.

19 MR. KING: Yes.

20 VICE-CHAIRMAN BONACA: But that the  
21 experience we've had.

22 MR. KING: But that's also part of the  
23 risk-informed process. Remember, one of the five  
24 elements is the feedback element, and when you're  
25 using a PRA to help certainly guide your design and

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1 guide your operation, as you learn from experience,  
2 you can feed that back in and see what it means. So  
3 I think there's a way to try and accommodate that. I  
4 agree with you, initially, you're going to have some  
5 surprises probably.

6 Let me say one other thing that applies to  
7 all these issues. These are pretty fundamental  
8 issues. We're not trying in this paper to figure out  
9 how to implement all the details that go along with  
10 each of these issues. What we're trying to do is get  
11 the first step in front of the Commission to make a  
12 decision do we go this way or do we go that way? And  
13 depending on that decision, then we can go and start  
14 developing details. And whether that has to do with  
15 defining defense-in-depth or figuring out what the  
16 right criteria are for event selection, you won't find  
17 that in this paper. What you'll find is just trying  
18 to get the direction from the Commission.

19 CHAIRMAN APOSTOLAKIS: We haven't even  
20 discussed the options for the very first issue yet.  
21 It's been 25 minutes.

22 MEMBER KRESS: He'll get to that.

23 MR. KING: Okay. I'll speed it up. First  
24 issue has to do with enhanced safety, how do we handle  
25 that? And, again, the things we looked at in going

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1 through this issue we were we're going to have  
2 additional plants, both possibly on a site as well as  
3 nationwide, how do we factor that into looking at the  
4 level of safety we need? What's the Commission's  
5 performance goal to maintain safety? It probably  
6 means don't raise the bar, generically, but we still  
7 need to look at what do we want to do for future  
8 plants?

9 That third bullet has to do with getting  
10 back to the question of would it make sense to raise  
11 the bar in some areas to account for larger  
12 uncertainties? An example being maybe we ought to  
13 stress prevention more because we know less about  
14 severe accidents on some of these new technologies.  
15 And then the implications for LWRs.

16 Okay. The options we looked at, and I  
17 think these are -- we talked about these before -- are  
18 basically three. Let's continue to do like we did on  
19 the ALWR design certification process, we're expecting  
20 applicants will come in with designs with enhanced  
21 safety. We would codify that applicant-proposed  
22 enhanced safety feature in the design certification or  
23 if it's a COL through some license condition, and then  
24 we may add some additional things on there if we feel  
25 through engineering judgment the uncertainties were

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1 large enough to warrant that.

2 CHAIRMAN APOSTOLAKIS: Now, the goals, as  
3 they have been stated, are in terms of rates, aren't  
4 they? One-tenth of one percent of the accident rate,  
5 right?

6 MR. KING: Yes, reactor year basis,  
7 usually.

8 CHAIRMAN APOSTOLAKIS: And this refers now  
9 to a particular site or to the nation? What I'm  
10 getting at is if the NEI and DOE are thinking about  
11 the future and it turns out to be true and we're going  
12 to start building reactors again, crazy, would that  
13 affect the enhanced safety part, the fact that now you  
14 have many more reactors than you thought you would  
15 have, because your criteria are in terms of per year  
16 probabilities rather than absolute?

17 MR. KING: Yes. There's two aspects --

18 CHAIRMAN APOSTOLAKIS: I think you address  
19 it somewhere else, don't you? But I think here it's  
20 probably relevant here too.

21 MR. KING: Yes. It comes up in this issue  
22 in the next slide or two. There's two issues:  
23 There's a modular plant issue where you've got maybe  
24 eight or ten smaller reactors that add up to one big  
25 reactor in terms of electrical production. The

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1 designers have all proposed that they will account for  
2 the integrated risk for those eight or ten modules so  
3 that the integrated risk is equivalent to one big  
4 plant. So I think that's --

5 CHAIRMAN APOSTOLAKIS: But that's at the  
6 site.

7 MR. KING: At the site.

8 CHAIRMAN APOSTOLAKIS: How about  
9 nationwide?

10 MR. KING: Nationwide, I think at this  
11 point there's nothing being proposed because of  
12 additional plants nationwide. My view is all these  
13 future designs, whether they're modular or big plants,  
14 we expect them to be safer. And if you look at the  
15 ALWRs, they're probably an order of magnitude safer,  
16 if you're looking at CDF or LERF. So if you start to  
17 add one or two additional ones on a site, it's a small  
18 incremental risk for that site. If you start to add  
19 them nationwide, yes, I mean if you have 1,000 plants  
20 nationwide, you might want to start to rethink things.  
21 But I think from a near-term practical standpoint, I  
22 don't think it's an issue we need to worry about right  
23 now.

24 MEMBER KRESS: The quantitative safety  
25 goals are all on an individual risk basis, and it

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1 wouldn't account for nationwide in the totals.

2 MR. KING: Right. And today they don't  
3 account for multiple units on a site either.

4 MEMBER KRESS: That's right.

5 MR. KING: I mean we have some sites that  
6 have three units on them when we did --

7 CHAIRMAN APOSTOLAKIS: The question is  
8 whether that's appropriate.

9 MR. KING: Yes. Our view is, at this  
10 point, if you have a three-unit site and you add Unit  
11 4 and 5 but Unit 4 and 5 are of an order of magnitude  
12 safer than the units that are there, it's not a  
13 problem.

14 MEMBER KRESS: It doesn't add much to it.

15 MR. KING: No. It doesn't add much. Like  
16 in Reg Guide 1.174, we said ten percent change  
17 increments were okay.

18 MEMBER KRESS: In principle, the prompt  
19 fatality safety goals say on a LERF there ought to be  
20 a site criteria. But practically speaking, it's not  
21 going to change much if you add one or two or more  
22 plants. I guess if you started getting ten or more on  
23 a site, which is not likely, you'd have a problem.  
24 But practically speaking, it's not going to be a  
25 problem.

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1 MR. KING: Our view in this paper is  
2 that's not a near-term problem.

3 MEMBER KRESS: I think that's a valid  
4 view.

5 MR. KING: The other options are raise the  
6 bar generically in terms of level of safety. And the  
7 third option is we may want to require some additional  
8 testing or oversight in areas where we do have large  
9 uncertainty to deal with those. So those are sort of  
10 the three areas we looked at.

11 Advantages, disadvantages, certainly  
12 requiring enhanced safety can compensate for less  
13 experience and compensate for the integrated risk,  
14 multiple units situation. Disadvantages, the big one  
15 I see is it results in a set of dual regulations,  
16 which, you know, is a practicality issue.

17 MEMBER KRESS: We shouldn't worry too much  
18 about that sub-bullet issue, just the second one.

19 MR. KING: Right, right. So that leads to  
20 what are we going to recommend, and what we're going  
21 to recommend, and this is modified a little bit from  
22 what's in the draft paper, but it still is let's use  
23 a process similar to what we used on the ALWR  
24 certifications, because we do expect all these designs  
25 are going to come in with enhanced safety in their

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1 proposals. The modular designs should account for  
2 integrated risk modules, they're all saying they're  
3 going to do that. And let's not worry at this point  
4 about the incremental risks from additional plants on  
5 a site because it's going to be in the near term a  
6 small factor. We think this is practical, it's  
7 certainly is consistent with the ALWR approach, so  
8 we're not getting into a dual regulation type  
9 situation.

10 MEMBER KRESS: Now, the ALWR approach does  
11 allow you to think about areas of high uncertainty --

12 MR. KING: Yes.

13 MEMBER KRESS: -- and you might want to do  
14 something like that. So that's implied in that  
15 statement.

16 MR. KING: Yes, yes. And from an  
17 implementation standpoint, if the Commission agrees  
18 with this direction, then through this framework  
19 effort that's underway to develop a framework --

20 MEMBER KRESS: Option 3?

21 MR. KING: Well, this would be the follow-  
22 on to Option 3, developing a framework for future  
23 plants, would be the way to implement this process.  
24 That's where you would develop risk metrics and  
25 criteria for non-LWRs and talk about how you would

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1 look at each design and apply the framework to each  
2 design. So those are sort of the implementation  
3 issues that would need to be dealt with as a follow-on  
4 activity.

5 Okay. Defense-in-depth, second issue. We  
6 talked before about -- defense-in-depth is talked  
7 about in a lot of places but it's not really defined.  
8 Dr. Powers pointed out it was talked about in Appendix  
9 R, and, yes, it is in terms of fire protection. We  
10 found one other place in the regulations it's  
11 mentioned too, and that's in the siting regulations.  
12 Part 100.1 where it says -- it basically makes the  
13 statement that siting away from densely populated  
14 areas is an element of defense-in-depth. So those are  
15 the two places we found in the regulations.

16 The Commission's white paper on risk-  
17 informed performance-based regulation had a short  
18 definition. To me it read more like a goal of  
19 defense-in-depth, and I thought it was a pretty good  
20 goal.

21 MEMBER KRESS: Yes. It was more like a  
22 goal of defense-in-depth.

23 MR. KING: Right. So in looking at this  
24 issue, you know, the key questions we thought were  
25 would it make a sense to develop a description of

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1 defense-in-depth? What value would it have? And,  
2 basically, the answer was we think it would have some  
3 value. It would certainly help implement all these  
4 places where we talk about the defense-in-depth  
5 philosophy or preserving defense-in-depth would add  
6 some consistency and transparency as to what we mean.  
7 It would be something we could put in the regulatory  
8 analysis guidelines because that's a document that's  
9 sort of weak when it comes to defense-in-depth and I  
10 think should be certainly a key factor in making  
11 regulatory decisions. And a good definition of  
12 defense-in-depth could form the foundation for this  
13 new licensing framework depending on --

14 CHAIRMAN APOSTOLAKIS: I think what you're  
15 going to end up with is more like on the next slide,  
16 that you have a description of what defense-in-depth  
17 means for programmatic issues and so on. Because it's  
18 really a philosophy, and I don't know how you define  
19 a philosophy. It's difficult to come up with a three-  
20 line definition of a philosophy, but I think what you  
21 do here with the key questions and give an example is  
22 probably the best way to do it.

23 MR. KING: Yes. This paper hasn't settled  
24 in on what defense-in-depth is, what that description  
25 would be, but at least the way the version that you

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1 have in front of you has a couple of examples in to  
2 give the Commission an idea of if we go ahead and  
3 develop such a description, here's sort of the scope  
4 and depth of what we're talking about developing.  
5 We're not talking about a three-line definition, we're  
6 talking about laying something out that has a little  
7 more meat in it.

8 CHAIRMAN APOSTOLAKIS: Yes. Stay away  
9 from the conditions --

10 MR. KING: Yes, yes.

11 CHAIRMAN APOSTOLAKIS: It's better to do  
12 something like this with examples and descriptions.

13 MR. KING: Yes. But if the Commission  
14 says, "Yes, go do that," then we're going to have to  
15 decide, okay, what is in that description, and we sort  
16 of listed at a high level here some of the key  
17 elements that we will need to consider for putting in  
18 that description, and that can include programmatic  
19 items, physical features, is it a process just to  
20 treat uncertainties like NEI has proposed, exactly  
21 what's in there? So the paper tries to give the  
22 Commission an idea that, hey, we're going to wrestle  
23 with these. If you say, "Go do that," that's the  
24 stuff we're going to wrestle with.

25 And we also say maybe the reactor

1 cornerstones would be a good structure to start with  
2 because we already have the oversight process that's  
3 laid out in that fashion, and it might be nice to  
4 start laying out other things in that fashion. So we  
5 would look for some feedback from the Commission  
6 whether they like that idea or not.

7 Okay. The options we considered are let's  
8 not do anything, let's just continue case by case.  
9 Let's develop the description. It would have -- we're  
10 not sure exactly what it will have yet, but it could  
11 have some elements in it that are independent of the  
12 PRA, just some givens and some things that everybody  
13 has to do as well as maybe some probabilistic type  
14 criteria. And then the third option --

15 CHAIRMAN APOSTOLAKIS: Is there any reason  
16 why the ROP cornerstones cannot be or could not be a  
17 description?

18 MR. KING: In the argument against that?

19 CHAIRMAN APOSTOLAKIS: Yes.

20 MR. KING: The only argument I could see,  
21 and it's just a hypothetical now, is if we actually  
22 get into trying to describe defense-in-depth and we  
23 find some better way to do it. At this point, I don't  
24 -- I haven't thought any better way to do it.

25 MEMBER KRESS: Well, the cornerstones are

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1 just a framework. They're too limited because they  
2 don't get into the questions of things like how do you  
3 allocate risk among sequences or how do you allocate  
4 among the cornerstones, what do you about  
5 uncertainties related to those? So it's a framework  
6 --

7 MR. KING: Yes. The cornerstones are not  
8 the definition, but they may provide the structure of  
9 the seven top-level elements.

10 MEMBER KRESS: They provide structure --  
11 they're just incomplete as a DID.

12 CHAIRMAN APOSTOLAKIS: I didn't mean that  
13 they were complete, but it seems to me that having  
14 those four -- I think there are four -- cornerstones,  
15 we talk about accident initiation, protecting the  
16 pressure boundary, safety systems, emergency planning,  
17 are there any designs where these things don't apply?  
18 I mean these are very high level.

19 MR. KING: Yes, but the cornerstones go on  
20 and talk about --

21 CHAIRMAN APOSTOLAKIS: And the moment you  
22 say that you have to worry about these four things,  
23 you have placed a major defense-in-depth element in  
24 your analysis.

25 MEMBER KRESS: I don't disagree with that.

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1 CHAIRMAN APOSTOLAKIS: In fact, this is  
2 what's missing I think from 1.174, is it not? My  
3 colleague here on the left has complained that some of  
4 the decisions we're making based on delta CDF and  
5 delta LERF do not really reflect the intent of the  
6 regulations. If you went back to these four  
7 cornerstones, perhaps you would manage to do a better  
8 job, right? The regulation are not there just to  
9 protect the core damage. Of course they are there for  
10 core damage but other things as well.

11 MR. KING: Yes, yes. But recognize the  
12 cornerstones also have three other elements too. They  
13 have the radiation protection of the worker, of the  
14 public, and of safeguards and security.

15 CHAIRMAN APOSTOLAKIS: Sure.

16 MR. KING: Which at least the intent in  
17 developing this defense-in-depth description would be  
18 bring those in as well because they're important.

19 MEMBER KRESS: Yes. And somewhere in  
20 there you have to address the structureless view of  
21 just what if we're wrong in following deterministic  
22 analysis and converse analysis, what do we do then?

23 CHAIRMAN APOSTOLAKIS: Well, he will come  
24 to that, he will come to that. Are you asking  
25 yourself, "What if I am wrong," every five minutes?

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1 MEMBER SIEBER: But when you go back to  
2 the certification process --

3 CHAIRMAN APOSTOLAKIS: How often should he  
4 ask that, Mr. Powers?

5 MEMBER POWERS: Well, I think the  
6 appropriate times to look at that is after you've  
7 developed the major elements of your structures. The  
8 problem you get into with defense-in-depth in a risk-  
9 informed regulatory structure is the same one we  
10 identified in the development of what became Reg Guide  
11 1.174, that uninhibited defense-in-depth  
12 considerations can be applied at too low a level and  
13 they trump any considerations of risk. And our  
14 suggestion has always been that defense-in-depth  
15 should be applied at the higher levels. And the  
16 question of what if I'm wrong is a high-level question  
17 over the overall structure, not about individual  
18 pipes, individual meters, diagnostics and things like  
19 that, because our general feeling is that these points  
20 of quantitative analysis are legitimately applied to  
21 those questions. Whereas the major omissions are  
22 things that we just don't know about right now.

23 CHAIRMAN APOSTOLAKIS: So the cornerstone  
24 level would be --

25 MEMBER POWERS: Well, I think that is

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1 exactly the level to start thinking about these  
2 things. I mean --

3 CHAIRMAN APOSTOLAKIS: Well, by accepting  
4 the cornerstones in fact you have, as I said earlier,  
5 put a level of defense-in-depth there, because you say  
6 now you have --

7 MEMBER POWERS: See, the difference is  
8 that -- maybe there is no difference here. It is a  
9 different view of what the cornerstones are maybe  
10 between structuralists and rationalists there, though  
11 they're both very happy with cornerstones.

12 CHAIRMAN APOSTOLAKIS: I think they are.

13 MEMBER POWERS: But, yes, they -- and I've  
14 never come up with a nice way to articulate this  
15 difference between high-level and low-level  
16 application of defense-in-depth, but it's very clear  
17 to me, it was very clear to the whole Committee ion  
18 the discussion of what became Reg Guide 1.174 that the  
19 trumping issue always became -- arose because you  
20 applied defense-in-depth at too low a level. And so  
21 now what isn't at too low a level I think that's  
22 something you just have to mandate, because I haven't  
23 found a way to just describe it succinctly to  
24 somebody. But render under PRA that which PRA does  
25 well, render under defense-in-depth that which

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1 defense-in-depth does well.

2 CHAIRMAN APOSTOLAKIS: Whatever that may  
3 be.

4 MEMBER POWERS: Well, I think it does very  
5 well in protecting us against things that we simply  
6 don't anticipate. That's where it's served us well  
7 over the last 50 years. And so you want to use it  
8 that way and --

9 MEMBER KRESS: So you would necessarily  
10 put a containment around the gas-cooled --

11 CHAIRMAN APOSTOLAKIS: They will address  
12 this.

13 MEMBER POWERS: You know, when you come  
14 down to the wrestling between containment and  
15 confinement, I would surely look to have a barrier  
16 there.

17 MEMBER KRESS: Let's ask the question of  
18 no barrier at all.

19 MEMBER POWERS: Well, that's where I would  
20 tend to come in and say I don't really care what your  
21 calculations show, because there's this issue of what  
22 if you're wrong, okay? Now, you ask me what kind of  
23 barrier do I put in, containment or confinement --

24 MEMBER KRESS: That's a different issue.

25 MEMBER POWERS: -- you know, that's where

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1 your quantitative analyses come up, and I have written  
2 a justification for confinements in DOE sites as  
3 opposed to containments, so I can't say I throw out  
4 containments -- or confinements automatically. They  
5 have advantages over containments, they have  
6 deficiencies over containments. But I would tend to  
7 say, okay, make that a part of your quantitative  
8 analysis, but the existence of a barrier there is part  
9 of defense-in-depth.

10 MR. KING: I can envision other things  
11 where you may just want to say, regardless of what  
12 your PRA says, "I want two independent ways to shut  
13 the reactor down. Don't give me a design that just  
14 has one way." Have some fundamental things like that  
15 as part of your defense-in-depth.

16 MEMBER KRESS: I think you could say that  
17 about emergency cooling, "Give me at least two ways to  
18 diverse emergency cooling."

19 MR. KING: Yes, yes.

20 MEMBER KRESS: Same thing with electric  
21 power coming in, "Give me several sources." I think  
22 those are defense-in-depth you can almost just mandate  
23 without --

24 CHAIRMAN APOSTOLAKIS: But you can use a  
25 rationalist approach to see whether those things make

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1 sense.

2 MEMBER KRESS: You can see how good they  
3 are, but I think you just mandate those.

4 MEMBER POWERS: I think what I would do,  
5 Tom, is I would say the quantitative analysis is what  
6 you do to say do we need to two sources of electrical  
7 power or do I need three?

8 MEMBER KRESS: And how reliable do they  
9 have to be?

10 MEMBER POWERS: Well, I mean that's what  
11 they do is they go through the reliability and what  
12 not. But going below two it doesn't matter what your  
13 analyses are, because I know you haven't take into  
14 account everything.

15 MR. KING: I think those are the kinds of  
16 discussions where you get into a condition that says  
17 go develop a description.

18 MEMBER KRESS: Now, your recommendation,  
19 is that B or C?

20 MR. KING: The recommendation is  
21 either/or. It's develop a description.

22 CHAIRMAN APOSTOLAKIS: Where is the  
23 recommendation?

24 MR. KING: The bottom of Page 11. The  
25 workshop -- everybody in the workshop was unanimously

1 in favor of developing a description. What that  
2 description would be there was some discussion about,  
3 but that's an issue for the next phase of this  
4 activity.

5 MEMBER KRESS: I'm sure people would like  
6 to see defense-in-depth articulated to the point that  
7 they have some expectations of what's going to be  
8 imposed on them. A good description would probably do  
9 that for them.

10 MR. KING: Yes. And back on the previous  
11 issue, the workshop -- I forgot to mention the  
12 workshop summary there. All the industry  
13 representatives agreed with the recommendation to  
14 follow the ALWR process. The only disagreement came  
15 from the public interest group, Greenpeace, which  
16 liked the middle option of raising the level of  
17 safety, requiring a higher level of safety across the  
18 board. So that was the workshop results on that.

19 Anyway, what we're recommending to the  
20 Commission is let's go forward and develop a  
21 description or a policy statement of defense-in-depth,  
22 and we'll do that through the normal public process  
23 like we develop policy statements.

24 VICE-CHAIRMAN BONACA: You said C, right?

25 MR. KING: B or C. We're not sure --

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1 VICE-CHAIRMAN BONACA: You're not sure,  
2 okay.

3 MR. KING: Both B and C talk about  
4 developing a description or policy.

5 VICE-CHAIRMAN BONACA: One of them is  
6 process.

7 MR. KING: Yes. But we're not  
8 distinguishing at this point which way. We've tried  
9 to give an example in the draft paper of both options  
10 just to give the Commission a feel for what we mean by  
11 this.

12 MEMBER WALLIS: Do you have a feel for how  
13 long this description is going to be?

14 MR. KING: How many pages?

15 MEMBER WALLIS: Is it going to be one  
16 sentence?

17 MR. KING: No.

18 MEMBER WALLIS: One paragraph?

19 MR. KING: No. I would -- I mean --

20 MEMBER WALLIS: Is it going to give  
21 examples?

22 MR. KING: Well, the paper has two  
23 outlines in it, one that goes with Option B and one  
24 that goes with Option C. And the outline for the  
25 Option B is about a page and a half, so I would

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1 envision a policy statement would be ten pages or so  
2 for that. I mean maybe it's five pages, maybe it's  
3 ten pages. It's not 100 pages, but it's --

4 MEMBER WALLIS: But you're looking at a  
5 really thorough description.

6 MR. KING: Yes. That's what I'm looking  
7 at. Okay. And I guess I'd like the Committee's views  
8 on whether it's useful to put those examples or  
9 outlines in there.

10 CHAIRMAN APOSTOLAKIS: I think we have  
11 conflicts here. On the one hand, people want to have  
12 flexibility, high-level goals be left alone, try to  
13 meet them and so on. But then I have found that  
14 consistently the industry wants the NRC to explain in  
15 detail what the NRC wants. Even 1.174 was criticized  
16 as not being restricted enough when at the same time  
17 they were complaining that the Agency is very  
18 prescriptive. I am afraid that by doing this,  
19 especially if it's a policy statement, of course it  
20 would depend a lot on how it's stated, but this is a  
21 philosophy, this is an approach. I think it's going  
22 to go against risk informing the regulations if you  
23 describe it too much.

24 MR. KING: So your view is maybe a page.

25 CHAIRMAN APOSTOLAKIS: Yes. Give a few

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1 examples where it will work well, what we mean by it  
2 and so on. But that doesn't mean you have to do this  
3 in the future plants. To go down to saying, "I need  
4 two sources of electric power and this and that," I'm  
5 a little uncomfortable with that. We're back to  
6 prescribing everything.

7 MEMBER POWERS: Absolutely not, George.  
8 I mean that's the whole point, that you don't  
9 prescribe it at the levels of analysis.

10 CHAIRMAN APOSTOLAKIS: You said below two  
11 is non-negotiable. Two or three, I can look at the  
12 numbers --

13 MEMBER KRESS: But these are for very  
14 limited functions that we all know are real safety  
15 functions for nuclear power plants. You want to shut  
16 down the power, you want to have emergency cooling,  
17 you want to have electrical power coming in, and you  
18 want to be able to get rid of the long-term decay  
19 heat. Everybody agrees --

20 CHAIRMAN APOSTOLAKIS: I'm not sure I want  
21 to go beyond that and say we need two --

22 MEMBER KRESS: Well, you may not have to  
23 go further than that just for those.

24 CHAIRMAN APOSTOLAKIS: Anyway, I think  
25 there is a downside to developing descriptions and

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1 policy statements.

2 MEMBER KRESS: Well, I think we've gone  
3 through this debate and argument for years on how much  
4 DID is necessary and how much is sufficient and when  
5 can we arbitrarily impose it on plants, and I think  
6 the more of a description and the more of a definition  
7 we give, the better we're going to put that in a box  
8 at least and let people know what it is, and then  
9 could make an arbitrary --

10 CHAIRMAN APOSTOLAKIS: But, you know, Tom  
11 said we have to be practical with these things. I  
12 have yet to see anyone from the Agency or from the  
13 industry who did not treat defense-in-depth with  
14 respect. As a practical matter, it's really ingrained  
15 in what we do, the way we think. So trying to define  
16 it --

17 MEMBER KRESS: AP600 certainly didn't like  
18 us putting spray in their containment.

19 CHAIRMAN APOSTOLAKIS: That's an  
20 individual --

21 MEMBER KRESS: Well, but it's an example.  
22 I mean you can find examples --

23 CHAIRMAN APOSTOLAKIS: But that's a matter  
24 of judgment there. I mean it's not --

25 MEMBER SIEBER: On the other hand, if you

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1 make something very prescriptive, you're really tying  
2 the hands of the designer.

3 CHAIRMAN APOSTOLAKIS: That's my problem.

4 MEMBER SIEBER: And it would seem to me to  
5 avoid tying the hands of the designer you're better  
6 off being more conceptual in nature and then doing the  
7 analysis as the design evolves to determine what  
8 elements of defense-in-depth really make a difference  
9 and which ones do not.

10 VICE-CHAIRMAN BONACA: But I thought the  
11 concept of implementing successive, what is it, layers  
12 of protection, which is I think we all could agree  
13 with that, that's a first step, and I think below that  
14 you can put some other criteria on the type that is  
15 general enough. It doesn't even tell you that you  
16 have to use PRA or you don't have to use PRA.

17 CHAIRMAN APOSTOLAKIS: I think that we  
18 call the pragmatic approach in that paper, which for  
19 some reason people don't pay much attention to, does  
20 a lot of what we're discussing. You apply defense-in-  
21 depth when the PRA has problems. Let's not forget  
22 that. You apply defense-in-depth --

23 MEMBER POWERS: That's a particular  
24 philosophy you have, and that's not one that --

25 CHAIRMAN APOSTOLAKIS: I think it's very

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1 consistent with what you said earlier. At the lower  
2 levels if there is something that's missing, you apply  
3 defense-in-depth. At the higher levels, you don't  
4 look at the PRA, you say, no, I want these things, the  
5 structure of these.

6 MEMBER SHACK: Yes. We're talking about  
7 what things we want, George.

8 MEMBER WALLIS: George, if I could --

9 CHAIRMAN APOSTOLAKIS: I think we all  
10 agree that the cornerstones are a very good starting  
11 point.

12 MEMBER WALLIS: George, if I'm going to  
13 apply this defense-in-depth, I need to know what it  
14 is.

15 MEMBER KRESS: Absolutely.

16 MEMBER WALLIS: And if I'm going to  
17 regulate how people apply it, I need to know and they  
18 need to know what it is.

19 MEMBER KRESS: You need to know how to  
20 quantify it and put limits on it.

21 MR. KING: We don't have to decide today  
22 what this description contains, but the question for  
23 today is should we try and develop a description?

24 MEMBER WALLIS: Yes, you should. If you  
25 find you can't you may fall back to the one-paragraph

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1 description.

2 MEMBER ROSEN: I come down on the side of  
3 wanting to have a description, but I am alarmed by the  
4 idea that it would be ten pages long at this level.

5 MEMBER KRESS: That's triple-spaced.

6 MEMBER ROSEN: It comes off almost like a  
7 procedure, and that would be conflict to the  
8 objectives that I would see.

9 MR. KING: The ten pages is Tom King's  
10 view on what this thing would say and how long it  
11 would take to say it. It may be one page, I don't  
12 know where we're going to end up, but that's next  
13 year's discussion.

14 MEMBER ROSEN: And Steve Rosen's view is  
15 that if it takes ten pages to say it, you're at too  
16 low a level and you're not abstracting enough.

17 CHAIRMAN APOSTOLAKIS: There are certain  
18 things that --

19 MEMBER ROSEN: And you're tying the hands  
20 too much.

21 CHAIRMAN APOSTOLAKIS: They are topical in  
22 nature and they cannot be constrained by a single  
23 definition.

24 MEMBER KRESS: I think we better get on to  
25 the next issue.

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1 VICE-CHAIRMAN BONACA: In what we know as  
2 a deterministic world in the past 20 years, there is  
3 a lot of examples of application of PRA to apply  
4 defense-in-depth. I really disagree with this  
5 divergence of the two things. I mean you can go back  
6 15 years and see designs that were being implemented  
7 and the questions that came about, auxiliary feedwater  
8 trains, how many should you have? Well, PRA gave a  
9 lot of insights and I am convinced the NRC always  
10 looks at that that way too. So I'm saying that there  
11 is some insights that come from experience that this  
12 document could benefit from.

13 MEMBER KRESS: I still believe defense-in-  
14 depth needs to be tied somehow to the uncertainties  
15 that you get out of the PRA analysis. I'm not sure  
16 what that tie is.

17 MR. KING: If you look at what -- IAEA and  
18 INSAC have taken a stab at the finding, and they've  
19 put two or three pages of description together, so  
20 it's not all a paragraph.

21 MEMBER POWERS: Tom, I think that the tie  
22 is at best conceptual in nature, because though  
23 there's often words about we've completely  
24 characterized the uncertainties in this PRA, it's not  
25 done, it's not doable.

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1 MEMBER KRESS: And when I say it ought to  
2 be tied to the uncertainties, I implied that that has  
3 to be recognized, that character, that you can't  
4 really quantify fully the uncertainties, you can only  
5 do part of them. And that has to enter into your  
6 concept some way.

7 MEMBER POWERS: I think that's where this  
8 what if I'm wrong question comes about is that I'm  
9 quite certain that any analysis done with PRA or  
10 otherwise has left something out that I just don't  
11 know, and so now you're asking what if I'm wrong. The  
12 difficulty with it is it's too facile of a question to  
13 ask and you ask it at too low a level. And so I think  
14 you're running into something that's very akin to the  
15 growing possibility, is that you can't set up a  
16 completely unarbitrary political system here, that  
17 you've got to establish a constitution that just  
18 mandates and restricts certain things or --

19 MEMBER KRESS: That's why I say you use  
20 the uncertainties in the PRA where you can.

21 CHAIRMAN APOSTOLAKIS: It's an  
22 uncertainty, Tom, that we never deal with, and that  
23 uncertainty is the one that I mentioned earlier. Look  
24 back in 1970, all the papers, unavailability of  
25 auxiliary feedwater system ten to the minus six. Ten

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1 to the minus six was the magic number. Now it's two  
2 orders of magnitude greater than that. Why? We  
3 missed common cause failures, we missed this, we  
4 missed that. It's this kind of uncertainty that we  
5 are not dealing with, the uncertainty of the new.  
6 See, I can't find a way to raise the number that the  
7 AP600 gives me, but I know it's a new design.

8 MEMBER WALLIS: But "what if I'm wrong"  
9 doesn't help.

10 CHAIRMAN APOSTOLAKIS: But that's where  
11 you say --

12 MEMBER WALLIS: But "what if I'm wrong"  
13 doesn't help you at all. If I go out here and I push  
14 the button to bring the elevator, I assume that  
15 there's a high probability it will come, and worrying  
16 about whether I'm wrong when I do that and all the  
17 things I do every day based on the probability of  
18 various things is silly. I only worry about big  
19 things about where I'm wrong.

20 CHAIRMAN APOSTOLAKIS: It's also for new  
21 designs. The elevator is not a new design.

22 MEMBER WALLIS: Then I don't have to worry  
23 anymore. I don't keep asking. I don't keep asking  
24 about when I'm wrong.

25 CHAIRMAN APOSTOLAKIS: No, but when you

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1 send a new spacecraft to the moon, then you should ask  
2 that question.

3 MEMBER WALLIS: Well, that's because --

4 MEMBER WALLIS: You have some reason to be  
5 unsure. But most of the time you know pretty well.

6 CHAIRMAN APOSTOLAKIS: I think if you look  
7 back at history, I repeat, it supports the view that  
8 if you have a new design, you really can't figure out  
9 everything.

10 MEMBER WALLIS: That's true.

11 MEMBER ROSEN: I think you're absolutely  
12 naive to think otherwise.

13 MEMBER SIEBER: Let me ask a fundamental  
14 question before we try to develop the description for  
15 you. Which of the three options will you concentrate  
16 on in developing the description, A is probably out of  
17 it, but B or C? One is process and the other one is  
18 what I think of as the element.

19 MR. KING: Yes. I don't think --

20 MEMBER SIEBER: And that determines what  
21 the description looks like, to me.

22 MR. KING: I don't think we know yet, and  
23 this paper is not intending to lean one way or the  
24 other. All the paper is intending to get from the  
25 Commission is direction to go develop such a

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1 description, and then we'll consider B, we'll consider  
2 C, we'll consider any other bright ideas that people  
3 have.

4 MEMBER SIEBER: On the other hand, it  
5 seems to me that we have discussed here a little bit  
6 of both B and C. For example, when we say you have to  
7 have two different power sources or you have to have  
8 so many barriers between fission products and  
9 somebody's nose, those are physical requirements.  
10 Beyond that, though, you need some overarching set of  
11 requirements that says when you put this whole thing  
12 together here's the risk and here's the uncertainty  
13 and here's all the things we've done to minimize the  
14 uncertainty and fit this into the context of where we  
15 want to be in risk base. And so I think there's a  
16 little bit of that here.

17 MEMBER KRESS: We'd better move on to the  
18 next issue.

19 MR. KING: All right.

20 MEMBER SIEBER: Yes, let's.

21 MR. KING: Five issues in 30 minutes, all  
22 right.

23 MEMBER KRESS: That's easy enough.

24 CHAIRMAN APOSTOLAKIS: Well, what you need  
25 to do is to go to your recommendations.

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1 MEMBER KRESS: Could be.

2 CHAIRMAN APOSTOLAKIS: Let's go to the  
3 accommodations and say why you're recommending a  
4 particular option. I don't see how else you can do  
5 it.

6 MEMBER KRESS: But he asks such wonderful  
7 questions on each one of those.

8 CHAIRMAN APOSTOLAKIS: He can raise them  
9 as he discusses the accommodations.

10 MR. KING: All right. Third issue, use of  
11 international codes and standards.

12 MEMBER KRESS: Let me ask you about that  
13 before we get into it.

14 MR. KING: Okay.

15 MEMBER KRESS: When I think of codes and  
16 standards I'm thinking of things like the ASME codes  
17 and ISO 9000. Some people think of safety standards  
18 and safety goals and risk acceptance criteria. What  
19 are we talking about here?

20 MR. KING: We're talking about the design  
21 codes --

22 MEMBER KRESS: Design codes.

23 MR. KING: -- maybe some programmatic  
24 codes like ISO 9000 and possibly some safety  
25 standards, particularly the IAEA safety standards,

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1 because all of those are being used to some degree in  
2 these advanced designs, and we're going to be faced  
3 with having to deal with those at some point. And  
4 this issue really deals with do we want to deal with  
5 that in a reactive mode or do we want to deal with  
6 that in a proactive mode. And the recommendation is  
7 let's figure out a way to deal with that in a  
8 proactive mode so we can, one, have some influence on  
9 what these standards say if they're still being  
10 written, and, two, be prepared to deal with them when  
11 the application comes in, and, three, let's use them  
12 to help our infrastructure and efficiency standpoint.  
13 So that's really the recommendation.

14 MEMBER ROSEN: The issue is also some, all  
15 or one. I mean are you talking about all  
16 international standards?

17 MR. KING: No, no. And, again, it's the  
18 ones -- certainly the ones that are going to be  
19 proposed in an application we need to look at, but  
20 also where our infrastructure doesn't have a standard  
21 to deal with, particularly use the HTGRs as an  
22 example, you know, graphite structures that were  
23 manufactured, we don't have any standards in our reg  
24 guides or anywhere else that deal with what's an  
25 acceptable design code for graphite.

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1 MEMBER ROSEN: How about INSAC IV on  
2 safety codes, just as an aside.

3 MR. KING: I'll skip that one. So the  
4 idea is not everything but where it improves our  
5 efficiency and where we know we're going to have to  
6 deal with it in the future. And to me, the  
7 implementation issue is let's figure out a way to go  
8 identify those and get some resource on reviewing or  
9 participating in the development of those standards.  
10 I think the issue -- certainly, one of the issues for  
11 the Commission is what's this going to take in  
12 resources, and that's a key thing, because you can't  
13 start and stop this kind of thing. If you're going to  
14 do it --

15 CHAIRMAN APOSTOLAKIS: But don't the  
16 Germans have the DIN system, D-I-N, so they have a --  
17 like we have the ASME here producing all sorts of  
18 codes, they have the DIN.

19 MR. KING: The Germans have some  
20 standards, and they have some HTGR standards.

21 CHAIRMAN APOSTOLAKIS: So what do we do  
22 now? We want to check whether their standards apply  
23 to us or we look only for standards for which there is  
24 no American counterpart? I don't know.

25 MEMBER SIEBER: I think that what will

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1       happen is that some foreign reactor vendor will come  
2       in and say, "I want to certify my design and it's  
3       built to these standards, ISO 9000 or what have you,"  
4       and now you're going to have the job of reconciling  
5       the standards that it was designed to and built to to  
6       our standards and perhaps adopt or convert, as the  
7       case may be.

8               CHAIRMAN APOSTOLAKIS: Yes, but that's his  
9       problem. Why should we do that?

10              MR. KING: I mean it's our problem.

11              MEMBER SIEBER: I'm not sure that it's his  
12       problem.

13              MR. KING: Well, you mentioned a couple of  
14       things. We have a Management Directive 6.5 that gives  
15       the Staff direction to go use consensus standards  
16       wherever it's practical to do that, and they --

17              CHAIRMAN APOSTOLAKIS: I thought that was  
18       domestic consensus standards.

19              MR. KING: No. There's a sentence in  
20       there that says they make no distinction between  
21       domestic and international standards.

22              CHAIRMAN APOSTOLAKIS: Oh.

23              MEMBER ROSEN: That's in response to the  
24       OMB Circular --

25              MR. KING: Right.

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1 MEMBER ROSEN: -- A-119?

2 MR. KING: Right.

3 CHAIRMAN APOSTOLAKIS: Correct. But  
4 that's very different from what Jack was just saying.

5 MR. KING: So as a matter of Commission  
6 policy, we're already expected to go take that  
7 approach wherever we can. So this is a way of saying  
8 to the Commission we need to do that for these future  
9 non-LWRs, not just because of the Management Directive  
10 but because we're going to get some applications that  
11 have this stuff in it. And the pre-application  
12 reviews are a good way to start to identify those, and  
13 that's another advantage of doing these pre-  
14 application reviews.

15 But in addition to that, we need to look  
16 at where do we want to have something on the books,  
17 because we don't have anything to deal with some of  
18 these non-LWR high-temperature materials, graphite,  
19 whatever it is, and how we actually go about  
20 identifying those I think is something that's part of  
21 the implementation. This paper doesn't say how we're  
22 going to do that other than we're going to have to  
23 look at the pre-application reviews and we're going to  
24 have to figure out what's the best way to go do that.

25 MEMBER SIEBER: It would seem to me that

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1 if you're going to certify a design that utilizes  
2 foreign standards, that you're going to have to adopt  
3 a rule similar to 50.55(a) where the Staff has  
4 analyzed the standards and finds that it's adequate  
5 for the purpose intended, and before you invoke it as  
6 part of the certification process. That's the way I  
7 would see it.

8 MR. KING: That's one way to do it.  
9 Another way to do it is to codify through the  
10 certification process. Another way to do it is put it  
11 in the -- there's a reg guide that implements 50.55(a)  
12 that has a whole bunch of standards in it. I think  
13 the trend is to get the standards out of the  
14 regulation and into the reg guide and we could put  
15 some of these things into the reg guide. So there's  
16 different way to do it.

17 MEMBER SIEBER: Yes, but they all amount  
18 to the same thing. You have to do the work --

19 MR. KING: We have to do the work.

20 MEMBER SIEBER: -- to understand the  
21 standard and see whether it's applicable and then  
22 endorse it somehow.

23 MR. KING: Yes.

24 MEMBER SIEBER: Okay.

25 MR. KING: And maybe participate in the

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1 development of the standard so it's, one, we  
2 understand it better and, two, that it does what we  
3 want it to do.

4 MEMBER SIEBER: That's right.

5 MR. KING: So all of that's wrapped up in  
6 there.

7 MEMBER SIEBER: And that's a good idea.

8 MR. KING: Yes. So what we're  
9 recommending is let's go do that. We have to work out  
10 the details to figure out how to do it, but that's the  
11 recommendation.

12 MEMBER SIEBER: Okay. Let's go do that.

13 MR. KING: All right. Fourth issue, now  
14 we're into the issues that were looked at ten years  
15 ago. I'll just go right to the recommendation. This  
16 has to do with --

17 CHAIRMAN APOSTOLAKIS: Yes. That's very  
18 good.

19 MR. KING: What, jumping right to the  
20 recommendation?

21 CHAIRMAN APOSTOLAKIS: Yes. Page 18,  
22 right? You say you want to go to the recommendation?

23 MR. KING: Yes.

24 MEMBER WALLIS: I think we should read the  
25 disadvantages or probablistic approach first.

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1 CHAIRMAN APOSTOLAKIS: Look at the  
2 recommendation. The rest is just --

3 MR. KING: I'll mention on the previous  
4 issue the workshop participants were in favor of us  
5 going ahead and taking the proactive approach, so  
6 there wasn't any disagreement there.

7 MEMBER KRESS: Let me ask one context  
8 question here. Is it the assumption here that for  
9 these new plants there will be a set of design basis  
10 accidents, and you're dealing with now how to select  
11 those?

12 MR. KING: For the pre-application review  
13 so far, they've all taken that approach, and this is  
14 a method and approach to how you select those.

15 MEMBER ROSEN: Why do you call them design  
16 basis events?

17 MEMBER KRESS: Because they'll define the  
18 licensing basis then.

19 MEMBER SIEBER: Well, you design features  
20 into the plant to prevent design basis events from  
21 having a safety impact on the public. The problem is  
22 that when you do a PRA, what you end up finding as the  
23 risky parts of the plants are the severe accident  
24 things, which go beyond design basis. And the reason  
25 why that happens is because when you define the design

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1 basis events, you design at an impact.

2 MEMBER KRESS: Yes. I don't think there's  
3 anything wrong with that.

4 CHAIRMAN APOSTOLAKIS: And that's why you  
5 have a safety goal.

6 MEMBER SIEBER: I don't either. On the  
7 other hand, why not start with a clean piece of paper  
8 and do a probablistic assessment to define what the  
9 design basis events ought to be?

10 MEMBER KRESS: I think that's what he  
11 says.

12 CHAIRMAN APOSTOLAKIS: That's what he  
13 says.

14 MEMBER KRESS: Yes. I think that's  
15 exactly what he's proposing.

16 VICE-CHAIRMAN BONACA: Let me ask you a  
17 question, and I agree with this anyway, but I have a  
18 question. First of all, clearly, here you're talking  
19 about the event selection, they are not going to be  
20 anymore sooner events bounding because that's not the  
21 issue anymore. So I mean in the conditional accident  
22 analysis, you define the concern with some possible  
23 effect in the plant, activity insertion, for example.  
24 You found the bounding event. You did make it even  
25 more bounding by assuming ejection with very high

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1       ejection rate, very fast ejection rate, and that's how  
2       you got to bounding the particular effect. You're not  
3       talking about doing that, you're talking about  
4       identifying an event and making it -- okay. So you're  
5       going on a best estimate.

6               CHAIRMAN APOSTOLAKIS:   Well, he's not  
7       saying where he's going.

8               VICE-CHAIRMAN BONACA: Well, I'm trying to  
9       understand it. And the other issue that I would like  
10      to touch on is take the PTS rule, for example, or the  
11      change we're doing right now. We eliminated as  
12      important events to be considered for those changes  
13      steam line breaks because we gave credit to the  
14      operators for preventing steam line breaks from  
15      causing the limiting overcooling. So therefore the  
16      steam line breaks are out of the table for that  
17      particular thing. How shall we treat the operator  
18      action here in plants that are new, new designs? We  
19      don't know really exactly how they'll respond.

20              MR. KING: Yes. What you're talking about  
21      is uncertainty. Again, the PRA is going to make  
22      assumptions on human performance and operator actions.  
23      If you don't believe it, that's where the engineering  
24      judgment and the deterministic overlay on what the PRA  
25      tells you is going to come into play. So this paper

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1 doesn't lay out a detailed process as to how you do  
2 that, but it says that's the concept behind this.

3 VICE-CHAIRMAN BONACA: I understand. I  
4 guess I mean details, but they're very important  
5 details and the devil is in the details.

6 MR. KING: I agree. I agree. Again, in  
7 1993, what the Commission approved was a process that  
8 said let's deterministically said pick the design  
9 basis accidents and then let's take a PRA and see if  
10 we missed anything. What we're proposing now is  
11 something that flips that around and says let's start  
12 with a PRA and then where we feel we've got  
13 uncertainties in the PRA, incompleteness or whatever,  
14 let's then use our engineering judgment and supplement  
15 what the PRA says. So this goes beyond what the  
16 Commission said in '93. The real question I think for  
17 the Commission is does it go beyond the PRA policy  
18 statement, because the PRA policy statement says use  
19 PRA to complement the traditional deterministic  
20 approach. What does complement mean? Does complement  
21 mean --

22 CHAIRMAN APOSTOLAKIS: That has to change.

23 MEMBER ROSEN: And that's what he's  
24 proposing.

25 MEMBER KRESS: He's proposing to change.

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1 CHAIRMAN APOSTOLAKIS: I would propose  
2 that you rephrase the first bullet. The first bullet  
3 should be rephrased, I think. It's not --

4 MR. KING: Which one?

5 CHAIRMAN APOSTOLAKIS: "Larger  
6 uncertainties make PRAs less useful." I mean the  
7 whole idea of a PRA is to look at uncertainties, not  
8 the way the industry is doing them now but that's a  
9 way .

10 MEMBER KRESS: Well, I think what he means  
11 there is the difficulty in characterizing the  
12 uncertainties for the non-LWRs.

13 MR. KING: What I meant is --

14 CHAIRMAN APOSTOLAKIS: Yes. But that  
15 difficulty exists regardless of whether you do a PRA  
16 or not.

17 MEMBER KRESS: No, it's more difficult --  
18 yes, but it's more difficult --

19 CHAIRMAN APOSTOLAKIS: It's difficult to  
20 quantify.

21 MEMBER KRESS: Yes. That's what --

22 CHAIRMAN APOSTOLAKIS: That's what you  
23 should say, that it's difficult to quantify.

24 MEMBER KRESS: But I think whether you use  
25 the deterministic approach supplemented by PRA or PRA

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1 supplemented by the deterministic, you end up at the  
2 same place.

3 MR. KING: Maybe.

4 MEMBER KRESS: Yes. And, you know, I  
5 don't think it matters whether -- let's say you select  
6 a set of design basis events just from judgment on  
7 what can go wrong and judgment on the frequency of  
8 them and say we'll look at this and then we'll impose  
9 an arbitrary source term based on the type of reactor  
10 it is, we'll impose a single failure criteria and the  
11 other kind of stylized things we do, and the you have  
12 a design based on that. Maybe you have to use the PRA  
13 and see if you meet your uncertainties, your defense-  
14 in-depth, your safety goals or whatever you have. If  
15 you don't, you have to select -- do something more in  
16 design basis space. So you would end up the same way  
17 either way you go, but it just makes sense to me to  
18 have the design basis accidents first because that's  
19 what the designer designs to.

20 MR. KING: Well, I agree with that.

21 MEMBER ROSEN: Not true. My new vision is  
22 the designer designs to the PRA. He does a PRA and  
23 says this is unacceptable, and then he puts in more of  
24 --

25 MEMBER KRESS: But you have to have a

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1 design before you do a PRA.

2 MEMBER ROSEN: You can lay out the  
3 conceptual design.

4 MEMBER KRESS: Well, in any case, I think  
5 they're iterative.

6 CHAIRMAN APOSTOLAKIS: It is iterative.

7 MEMBER KRESS: And you can't say these are  
8 the design basis accidents --

9 MEMBER ROSEN: I think it's iterative.

10 MEMBER KRESS: -- because you have to  
11 iterate.

12 MEMBER ROSEN: I agree, I think it's  
13 iterative, but I think this is a fundamental  
14 improvement to the way we do business.

15 MEMBER KRESS: Oh, I do too.

16 MEMBER ROSEN: And it's a very high time  
17 that we start to do and think this way and that I  
18 don't think you'll end up in the same place. I think  
19 you'll end up in a better place with this.

20 MEMBER KRESS: Well, you may end up in the  
21 same place.

22 VICE-CHAIRMAN BONACA: You'll end up in  
23 the same place because you'll iterate.

24 MEMBER ROSEN: You won't spend money  
25 needlessly, that's Jack's point, is that there will

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1       lots less false starts and going in the wrong  
2       directions. But my point is more than that, you'll  
3       end up not just half independent, you won't end up in  
4       the same place. You'll end up in a place in the  
5       design space that's better because you'll have  
6       considered all the things and made rational choices  
7       along the way about what's likely and what's not.

8               MEMBER SIEBER: Well, you spend the money  
9       where you make the biggest impact on --

10              CHAIRMAN APOSTOLAKIS: We seem to agree  
11       with what Tom is proposing so we might as well move  
12       on.

13              MEMBER WALLIS: Not just it's the  
14       regulators, it's the designer of the reactor has to do  
15       this.

16              MR. KING: Yes.

17              MEMBER WALLIS: Has to do the PRA as part  
18       of the design process. Of course. That's where it  
19       has the biggest effect, it seems to me.

20              MEMBER KRESS: So since we're regulating  
21       that a PRA has to be part of the process, which is  
22       interesting, we ought to move on to the next --

23              MR. KING: All the industry  
24       representatives at the workshop agreed with this  
25       approach. The public interest groups said, no, they

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1 don't trust PRA. That was basically the bottom line.  
2 And there are a number of implementation issues  
3 associated with this. It brings PRA more into the  
4 licensing basis, so you've got the PRA quality  
5 documentation.

6 CHAIRMAN APOSTOLAKIS: Is there another  
7 name? Aren't you the public interest group?

8 CHAIRMAN APOSTOLAKIS: You're a public  
9 interest group.

10 CHAIRMAN APOSTOLAKIS: You're a public  
11 interest. In fact, you have responsibility, actually.  
12 You don't just talk. You are -- the NRC is the public  
13 interest group here.

14 MR. KING: So if I work on this on my  
15 retirement time, I'm a public interest person, right?

16 (Laughter.)

17 CHAIRMAN APOSTOLAKIS: Well, I just don't  
18 know that we have to call those public interest  
19 groups. Special interest groups. I'm sorry, that's  
20 the way it is. You are the public interest group.

21 MEMBER POWERS: More risk-averse non-  
22 owners.

23 (Laughter.)

24 MR. KING: All right. Source term.

25 MEMBER SIEBER: Do it right unless you're

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1 too tired and then do it inter-boundary way.

2 MR. KING: Well, again, this is an issue  
3 the Commission looked at ten years ago. What they  
4 approved was let's use scenario-specific source terms  
5 for licensing decisions, the two key ones being siting  
6 and containment performance. Again, there was some  
7 caveats that went with that in the sense that, hey, we  
8 better make sure we have sufficient understanding of  
9 fuel and plant performance and fission product  
10 transport before we go ahead and do that, which puts  
11 a burden on the licensee as well as the Staff to  
12 understand how those things perform.

13 It also said the events selected for  
14 source term evaluation should bound design-dependent  
15 uncertainties, that's fine, and severe accidents.  
16 Now, they didn't mean severe accidents in the sense of  
17 core melt, they met severe accidents in the sense of  
18 some low probability events that would bound these  
19 uncertainties. Now, Commissioner Rogers in the SRM in  
20 '93 did question this as is this really practical to  
21 do, but the SRM itself approved this.

22 To me the fundamental question is -- and  
23 we're recommending let's retain that guidance and the  
24 details in terms of conservative analysis and level of  
25 confidence and so forth will be an implementation

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1 issue. To me the fundamental question on the source  
2 term is for LWRs the source term is based upon an in-  
3 vessel core melt, you know, a severe accident, severe  
4 core damage type event. Should that be considered a  
5 fundamental element of defense-in-depth that we always  
6 want for siting decisions and containment decisions,  
7 do we want to assume severe core damage? To me that's  
8 the policy issue for the Commission to wrestle with.  
9 They wrestled with it ten years ago, and we're  
10 recommending that keep that position, but that's what  
11 I see as the heart of the issue.

12 MEMBER KRESS: Now, when you talk about a  
13 reactor-like prism, a big pool of molten salt, I mean  
14 molten liquid metal, when you're talking about a  
15 source term here and stuff has to get out of that  
16 liquid metal before it goes into containment --

17 MR. KING: Do you give credit for the --

18 MEMBER KRESS: Yes, yes.

19 MR. KING: -- for the scrubbing or  
20 whatever you want to call it?

21 MEMBER KRESS: Yes. Do you allow credit  
22 for those kind of design features?

23 MR. KING: Yes. That's an implementation  
24 issue, and this paper doesn't deal with that. But the  
25 same with an HTGR, the graphite's going to retain

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1 some, some is going to plate out on the vessel walls  
2 and so forth. How much credit you give for that, I'm  
3 not sure.

4 Now, the workshop did not have a consensus  
5 on this issue. There were some industry folks who --  
6 some industry folks suggested that maybe we ought to  
7 develop the equivalent of NUREG 1465 for HTGRs, that  
8 the Commission ought to just come out and say,  
9 "Develop one bounding source term for HTGRs and that's  
10 what we use." Others agreed with this recommendation.  
11 So there wasn't a -- I can't say there was a consensus  
12 in the workshop on this.

13 MEMBER POWERS: I'll bet you that if we  
14 have several gas-cooled reactors, that in the course  
15 of doing ordinary regulatory analysis that you will  
16 find a 1465-like source term becomes necessary just to  
17 carry out business. I mean it will be a regulator's  
18 tool. I don't know that you need to bring it up here  
19 in this, but I'll bet you that's the way it turns out,  
20 that you just need something to tell you what happens  
21 in an accident to kind of evaluate options and stuff  
22 like that.

23 MR. KING: Yes. You may be right.

24 MEMBER POWERS: It will naturally evolve  
25 that you just need something to conduct conversations

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1 with people rather than relying on some computer code  
2 calculation and uncertainty bars this big and things  
3 like that.

4 MR. KING: Yes. I mean Fort St. Vrain  
5 used an adaptation of the old TID source term on  
6 timing and some retention, but it was basically severe  
7 core damage.

8 MEMBER POWERS: I mean you just need to do  
9 it just to be able to talk, because you trip over  
10 uncertainty bars and things like that. You know, when  
11 you come down to quantify it, you come back to your  
12 specific calculations.

13 MEMBER KRESS: I still think you've got a  
14 lot of difficulties, because you could end up with a  
15 WASH-740 source term. You've got all these fission  
16 products in there, you might as well use all of them.  
17 I mean that's a bounding source term. So you've got  
18 to decide where to stop.

19 MR. KING: Yes. Do you assume the  
20 graphite --

21 MEMBER KRESS: And that ought to have  
22 something to do with the design concept on top of the  
23 reactor head.

24 MR. KING: That's the idea behind going  
25 with this scenario specifically.

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1 MEMBER KRESS: And you'll have to look at,  
2 I think, frequencies and probabilities also.

3 MR. KING: If you want to add realism and  
4 give credit to the designer and give him some  
5 incentive to reduce core damage likelihood, then this  
6 is the approach that would do that.

7 MEMBER KRESS: But I agree with Dana, you  
8 may end up with some sort of a source term, but it  
9 will have to be reactor type specific.

10 MR. KING: Okay. Next issue, containment  
11 versus confinement. I'll say up-front there was no  
12 consensus at the workshop on this, absolutely none, so  
13 I'll just leave it at that. This was an issue the  
14 Commission, again, looked at ten years ago. They  
15 basically came out and said, "Okay, we're not going to  
16 require a pressure retaining containment building.  
17 We're going to develop some performance criteria."

18 MEMBER WALLIS: What's wrong with  
19 pressure? You're trying to retain fission products.

20 MR. KING: Well, that's the idea of  
21 pressure retaining --

22 MEMBER WALLIS: Well, I know, but I mean  
23 retaining pressure is -- there's nothing wrong with  
24 pressure per se.

25 MR. KING: No, no. It -- leak-tight maybe

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1 is a better way to say it, leak-tight.

2 MEMBER WALLIS: Right. That's better.

3 MR. KING: Okay. What the Commission said  
4 ten years ago was, "Here are some performance criteria  
5 that you can use. One, whatever building you have,  
6 you have to be able to show you can meet your release  
7 limits." But, two, it said, "Okay, you need to  
8 postulate a core damage event and then for 24 hours  
9 following the onset of that core damage event the  
10 building has to maintain that leak rate that's assumed  
11 in the analysis. In other words, the building can't  
12 have a hole develop in it. And then after 24 hours,  
13 you can take measures to reduce the pressure inside  
14 but don't have any uncontained release of  
15 radioactivity. Basically, you have a vent system, you  
16 can have a filter system to help reduce stress on the  
17 building, but the building can't fall apart."

18 What we're proposing, and, again, the  
19 fundamental question for the Commission is should a  
20 leak-tight building be a fundamental aspect of  
21 defense-in-depth or not? What we're proposing is to  
22 supplement that guidance. We're proposing let's  
23 retain some set of performance criteria that will  
24 guide you as to whether you need pressure-retaining  
25 building or whether you can get away with a

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1 confinement-type concept. But let's not automatically  
2 assume we have to go to a core damage event. Let's  
3 use the results of the event selection and source term  
4 process to decide what the challenges are. And as  
5 Farouk said, these things are linked, so this is the  
6 linkage.

7 But then add another criterion that says,  
8 okay, if you're coming in with a confinement building,  
9 you ought to take a look at whether if you did add a  
10 leak-tight building, a containment-type building,  
11 would it really make a substantial improvement in  
12 safety? And if so, then maybe we ought to consider --

13 MEMBER WALLIS: The definition of that  
14 substantial may be the same as in the regulatory  
15 analysis definition?

16 MR. KING: Yes. And Reg Guide 1.174, the  
17 ten percent change. If it's greater than a ten  
18 percent change for whatever metric you're using, LERF  
19 or --

20 MEMBER WALLIS: This concerns me a bit,  
21 because when I looked at the SAMDAs for AP600 I came  
22 to the conclusion that the containment building was  
23 worth about \$1,400 in terms of the ten to the minus  
24 seventh and things they were predicting. Then the  
25 conclusion would be it's not worth building, and yet

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1 we did. They do have a containment building for  
2 AP600, so this doesn't seem quite consistent with that  
3 logic.

4 MEMBER ROSEN: Well, maybe the numbers are  
5 incorrect.

6 MEMBER WALLIS: Because you didn't believe  
7 their numbers or something where the defense-in-depth  
8 and all that stuff comes in.

9 MEMBER KRESS: Are safeguard issues likely  
10 to override this?

11 MR. KING: I don't know. This is not a  
12 security issue. To me whether you have a leak-tight  
13 building or a confinement building, either one can be  
14 strong to prevent or protect against external events,  
15 so from a security -- I mean I don't know where the  
16 security issues are going to end up, and they could  
17 have some impact on this, but this, to me, I think you  
18 can deal with the security issues separate from making  
19 the leak-tight versus non-leak-tight decision.

20 MEMBER POWERS: Tom, when I look at  
21 disadvantages of pressure retaining buildings and  
22 think about this issue, the uncontrolled pressurized  
23 release of radioactivity emerges as a disadvantage of  
24 the containment design. You can bust it and build up  
25 all that pressure, you get a heck of a release.

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