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NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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RISK ASSESSMENT

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

JUNE 29, 2000

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This transcript had not been reviewed, corrected and edited and it may contain inaccuracies.

1 UNITED STATES OF AMERICA  
2 NUCLEAR REGULATORY COMMISSION  
3 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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5 RELIABILITY AND PROBABILISTIC RISK ASSESSMENT  
6  
7  
8

9 Nuclear Regulatory Commission  
10 Room T-2B3  
11 Two White Flint North  
12 11545 Rockville Pike  
13 Rockville, Maryland  
14

15 Thursday, June 29, 2000  
16

17 The committee met, pursuant to notice, at 8:30  
18 a.m.

19 MEMBERS PRESENT:

20 GEORGE E. APOSTOLAKIS, Chairman  
21 THOMAS S. KRESS, ACRS Member  
22 JOHN D. SIEBER, ACRS Member  
23 MARIO V. BONACA, ACRS Member  
24 ROBERT E. UHRIG, ACRS Member  
25 WILLIAM J. SHACK, ACRS Member

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

[8:30 a.m.]

1  
2  
3 DR. APOSTOLAKIS: The meeting will now come to  
4 order. This is the second day of the meeting of the  
5 Advisory Committee on Reactor Safeguards, Subcommittee on  
6 Reliability and Probabilistic Risk Assessment.

7 I am George Apostolakis, Chairman of the  
8 subcommittee.

9 ACRS members in attendance are Mario Bonaca, Tom  
10 Kress, William Shack, Jack Sieber, and Robert Uhrig.

11 The purpose of this meeting is to discuss the  
12 status of risk-informed revisions to 10 CFR Part 50,  
13 including proposed revision to 10 CFR 50.44 concerning  
14 combustible gas control systems, issues in the Nuclear  
15 Energy Institute letter dated January 19, 2000, option  
16 three, and public comments related to the advanced notice of  
17 proposed rulemaking on 10 CFR 50.69, and Appendix T, option  
18 two.

19 The subcommittee will gather information, analyze  
20 relevant issues and facts, and formulate proposed positions  
21 and actions, as appropriate, for deliberation by the full  
22 committee.

23 Michael T. Markley is the Cognizant ACRS Staff  
24 Engineer for this meeting.

25 The rules for participation in today's meeting

1 have been announced as part of the notice of this meeting  
2 previously published in the Federal Register on May 16,  
3 2000.

4 A transcript of the meeting is being kept and will  
5 be made available as stated in the Federal Register notice.  
6 It is requested that speakers first identify themselves and  
7 speak with sufficient clarity and volume so that they can be  
8 readily heard.

9 We have received no written comments from members of the  
10 public. However, Mr. Bob Christie, of Performance  
11 Technology, Incorporated, has requested time to make a  
12 presentation concerning proposed revision to 10 CFR 50.44.

13 I will remind the audience here that we wrote a  
14 letter to the Chairman, dated October 12, 1999, on primarily  
15 option two, but also option three.

16 We will now proceed with the meeting and I call  
17 upon Ms. Cynthia Carpenter, NRR, to begin.

18 MS. CARPENTER: I thank you very much. Tom  
19 Bergman, who is one of the co-leaders of the risk-informing  
20 Part 50 effort, is going to start off and then we'll have  
21 our speakers.

22 DR. APOSTOLAKIS: Good. Thanks.

23 MR. BERGMAN: Yes, just quickly. As you noted, we  
24 are here to present on option two, which is risk-informing  
25 the special treatment requirements. We gave the committee

1 three handouts this morning, one which is the slides. We  
2 got a late comment letter, we've provided that to you, and  
3 we gave you a copy of our user needs memo, in addition to  
4 the material provided several weeks ago.

5 The presentation, we have two new presenters for  
6 us. They've both been on the core team since its inception.  
7 The first is Mohammed. He will be presenting the section on  
8 the ANPR comments. Mohammed Shwaibi. He's been with the  
9 agency for eight years, about both Region III and six years  
10 here at headquarters of the eight.

11 In terms of option two, Mohammed, he led the  
12 effort to develop the criteria and methodology for selecting  
13 the rules in option two. He drafted the ANPR and he is  
14 leading our evaluation of the comments we received.

15 Joe Williams will be presenting preliminary staff  
16 views on treatment and he'll also cover the status and  
17 schedule. He has been with the agency for ten years in the  
18 Division of Licensing Project Management, mostly with Browns  
19 Ferry, and 11 years in the industry.

20 In terms of option two, he is the PM for our pilot  
21 program. He's our principal interface with the South Texas  
22 exemption and he is leading the review of the NEI guideline  
23 on categorization and treatment, as well as the peer  
24 certification process.

25 And you all know Mike Cheek. He'll be addressing

1 the portions on categorization and PRA peer certification  
2 process.

3 MR. SHWAIBI: Good morning. My name is Mohammed  
4 Shwaibi, and, as Tom indicated, I'll be talking about the  
5 ANPR comments today.

6 As you know, the ANPR was published on March 3.  
7 There was a comment period of 75 days, which ended on May  
8 17. In response to the ANPR, we received 11 comment  
9 letters, which included over 200 comments. We received six  
10 letters from licensees and industry groups, two letters from  
11 law firms, one letter from a consulting firm, one letter  
12 from a professional society, and one from a member of the  
13 public.

14 The comments were divided into four major  
15 categories. I'll be talking about categories that related  
16 to the approach that we took. We described in the ANPR  
17 comments that were related to the categorization process in  
18 Appendix T, comments related to treatment, and comments  
19 related to the pilot program that was presented in Appendix  
20 T -- I'm sorry -- in the ANPR.

21 With regard to approach, we received comments that  
22 were in general agreement with the list of rules that were  
23 identified, with a proposal that the risk-informing of the  
24 rules be taken in a phased approach.

25 The proposal was to risk-inform the rules that

1 were special treatment type rules, such as 50.49 EQ rules,  
2 seismic qualification, and those types of rules, and the  
3 administrative rules, such as reporting, documentation, be  
4 done in a later phase, and to break up the tech spec rule in  
5 Appendix R and fire protection as a separate and parallel  
6 effort.

7 We were told to be performance-based in the  
8 approach that we take, make sure that the resulting rules  
9 are optional and allow for selective implementation for both  
10 the resulting rules and systems at the plant.

11 We were told that the resulting rules should  
12 provide for limited NRC prior review and approval and that  
13 we should apply the backfit rule to option two.

14 DR. APOSTOLAKIS: Now, when you say that you  
15 received these comments, you have here 11 different letters.

16 MR. SHWAIBI: Yes.

17 DR. APOSTOLAKIS: Were they unanimous in these  
18 recommendations?

19 MR. SHWAIBI: I'm sorry?

20 DR. APOSTOLAKIS: Were they unanimous in the  
21 recommendations? I mean, all 11 asked that the thing be  
22 selective, the subject of selective implementation?

23 MR. SHWAIBI: Pretty much, yes. With regard to  
24 selective implementation, they were pretty unanimous.

25 MR. BERGMAN: For those that commented on it, to

1 qualify that.

2 MR. SHWAIBI: Yes.

3 MR. BERGMAN: Where there was a comment on  
4 selective implementation, most of the commenters didn't  
5 address all the questions in the ANPR. But for those that  
6 did, they were supportive of selective implementation.

7 DR. UHRIG: By selective implementation, do you  
8 mean voluntary? That is, the utility has the option, or is  
9 this the NRC's selectivity?

10 MR. SHWAIBI: No. It's the utility would have the  
11 option.

12 DR. UHRIG: Have the option.

13 MR. SHWAIBI: Yes.

14 DR. UHRIG: Then why would you apply the backfit  
15 rule?

16 MR. SHWAIBI: Well, one of the commenters did  
17 indicate that we ought to apply the backfit rule so that the  
18 Commission can have a full understanding of what we're  
19 requiring in the proposed rule or in the final rule. They  
20 said that we should not bypass the backfit rule just because  
21 it's voluntary.

22 DR. UHRIG: Is that standard procedure? I thought  
23 it was not.

24 MR. SHWAIBI: I don't believe.

25 MR. BERGMAN: We have not decided how to address

1 each individual comment. We'll be doing that as part of our  
2 August paper.

3 DR. UHRIG: My comment was intended -- is this the  
4 procedure within NRC? I thought if a rule was voluntary,  
5 you did not apply the backfit rule.

6 MR. BERGMAN: That is true. That is how we've  
7 done it in the past and I believe that's what was said.

8 DR. UHRIG: Then why would this be different?

9 MR. BERGMAN: We haven't decided how we will  
10 address it. We have a commenter who has proposed that we  
11 apply the backfit rule. Whether or not we'll accept that  
12 comment we have not decided.

13 MR. SHWAIBI: This is just a summary of the  
14 comments that were provided. We don't have positions yet on  
15 them.

16 DR. KRESS: By selective implementation, I thought  
17 you meant they could choose which of the rules they want to  
18 go by and which ones they didn't.

19 MR. SHWAIBI: That's correct. The comments were  
20 provided on selective implementation with regard to the  
21 rules and selective implementation with regard to systems at  
22 the plants. That is, a licensee could select which rules  
23 they want to implement and then they could also select which  
24 systems at the plant they chose to apply the risk-informed  
25 approach to.

1 Moving on to the categorization of Appendix T. We  
2 received comments that the Appendix T that was in ANPR was  
3 unduly detailed, prescriptive and burdensome.

4 DR. APOSTOLAKIS: Can you give us an example of  
5 what people felt was burdensome?

6 MR. CHEOK: I think one quick example of that,  
7 George, is that we had asked for all SSCs to be identified  
8 and what the current requirements for those SSCs are, and I  
9 think that one of the comments was that's asking too much  
10 for the SSCs, since there are thousands of them.

11 DR. APOSTOLAKIS: But didn't South Texas do this?

12 MR. CHEOK: In a sense, they did, yes.

13 DR. APOSTOLAKIS: Yes.

14 MR. CHEOK: I think when we wrote Appendix T, the  
15 idea was that there was going to be minimal staff review and  
16 approval. I think industry may be backing up a little bit  
17 instead of maybe there should be some kind of a submittal  
18 and, you know, when we make the submittal, we would like the  
19 rules to be less prescriptive, because then whenever they  
20 want to change the process, it's not allowed because it's  
21 not in the rules or the regulations.

22 DR. APOSTOLAKIS: Is this related to a  
23 recommendation I saw somewhere that Appendix T be eliminated  
24 and replaced by a regulatory guide?

25 MR. CHEOK: That's related to that recommendation,

1 yes.

2 DR. APOSTOLAKIS: And how does the staff feel  
3 about this?

4 MR. CHEOK: We are open to that recommendation.  
5 The material in Appendix T can either reside there or it can  
6 reside in another document, like a reg guide or an industry  
7 document, which the staff endorses.

8 DR. APOSTOLAKIS: So this is still to be decided.

9 MR. CHEOK: It's still be decided.

10 DR. APOSTOLAKIS: And the unduly detailed, can you  
11 give an example of a detail that shouldn't be there?

12 MR. SHWAIBI: I could provide you some examples.  
13 We have a list of examples.

14 DR. SHACK: Just coming back, while you're at it,  
15 I thought there was some discussion whether, if you put it  
16 in a reg guide, you had to do more review and approval,  
17 whereas if it was in the rule, you had less review and  
18 approval, and that was the justification for making it part  
19 of the rule in the first place.

20 MR. CHEOK: That's correct. And like I said, I  
21 think industry is backing off a little bit and they feel  
22 that they would like the flexibility.

23 DR. SHACK: Okay. So they have the flexibility.

24 MR. CHEOK: And perhaps maybe make a limited form  
25 of review, what they call a template type review.

1 DR. APOSTOLAKIS: A what kind of review?

2 MR. CHEOK: A template; in other words, an agreed  
3 upon five-pager or something.

4 DR. APOSTOLAKIS: Okay.

5 MR. BERGMAN: The unduly detailed example would be  
6 the precise makeup of the IDP. It was spelled out in the  
7 draft Appendix T included in the ANPR.

8 DR. APOSTOLAKIS: I'm really curious myself about  
9 the IDP, because we are performing unduly detailed reviews  
10 of the PRA part and then we are turning over the results to  
11 the IDP, and they are pretty much free to do whatever they  
12 please.

13 I think we are spending our resources reviewing  
14 something that can't be reviewed because it has some  
15 quantitative elements in it, whereas the IDP is just the  
16 deliberative process.

17 So at some point in the future, we really have to  
18 think about it very hard. Maybe there ought to be some  
19 general guidelines regarding the conduct of the  
20 deliberation, because we worry about little things here and  
21 there, the significance of other -- sensitivity of  
22 importance measures of various things, and then we're taking  
23 the results and saying now you guys do what you like with  
24 those.

25 Well, it's not like that, but.

1 MR. CHEOK: I think the staff is working with the  
2 industry on the guidance document and how the IDP should  
3 deliberate, and hopefully we'll come up with something  
4 that's acceptable to everybody.

5 MR. SHWAIBI: I think the comments were mostly to  
6 take the details and put them in the guidance document.  
7 They want to be able to -- some of the things that were  
8 pointed out were as advances in technology occur, we want to  
9 be able to take advantage of those without having to go back  
10 to rulemaking.

11 And if you lock them in in Appendix T or in the  
12 rule, that would make it hard to do. You'd have to go  
13 through rulemaking, and those were some of the comments on  
14 the level of detail that needs to be included in the  
15 appendix and in the rule versus the level of detail that  
16 could be included in a guidance document or a reg guide.

17 DR. APOSTOLAKIS: I don't understand the second  
18 bullet. What is the consensus PRA standard, the ASME and  
19 the ANS?

20 MR. SHWAIBI: In the proposed --

21 DR. APOSTOLAKIS: Can you move up the microphone a  
22 little bit?

23 MR. SHWAIBI: I'm sorry.

24 DR. APOSTOLAKIS: Good.

25 MR. SHWAIBI: In the proposed Appendix T, I

1 believe it was identified that the PRAs would have to meet  
2 the consensus standard, ASME, ANS, whichever one would be  
3 available at the time. It was expected, I guess, that they  
4 would be available at the time.

5 DR. APOSTOLAKIS: I wonder the people who wrote  
6 this had seen the standard.

7 MR. CHEOK: The people who wrote this, and you're  
8 looking at him, has not seen the standard at the time.

9 DR. APOSTOLAKIS: Wait a minute. You are not the  
10 public.

11 MR. CHEOK: You mean the comments.

12 DR. APOSTOLAKIS: Yes.

13 MR. CHEOK: All right.

14 DR. APOSTOLAKIS: You're not public. I mean, it's  
15 such a high level document, that I don't understand what it  
16 means, that it should not be accepted as the only method.  
17 It's not even a method.

18 MR. CHEOK: I think the intent of the thing is  
19 maybe we should look at other avenues; for example, the PRA  
20 certification that's being forwarded to the staff to look at  
21 and that the ASME standards should not be the only way.

22 That is a public comment that we have to address.

23 DR. APOSTOLAKIS: It's really such a high level  
24 document, that I don't know that it cannot be the only  
25 acceptable method. Basically, it tells you to do fault

1 trees and event trees.

2 Why is it important to minimize the levels of the  
3 risk significance?

4 MR. SHWAIBI: I'll give you what was provided in  
5 the comments. It was suggested that with the different  
6 levels of risk significance, you would need to come up with  
7 different treatment requirements for those levels and that  
8 would just be too complex.

9 DR. APOSTOLAKIS: South Texas didn't.  
10 Essentially, they have four categories or something.

11 MR. WILLIAMS: South Texas has four levels of risk  
12 significance, but really only two types of treatment.

13 DR. APOSTOLAKIS: That's right.

14 MR. WILLIAMS: Because the high safety significant  
15 and medium safety significant are treated essentially the  
16 same.

17 DR. APOSTOLAKIS: Exactly. So in essence, they  
18 have two categories.

19 MR. WILLIAMS: Yes.

20 DR. APOSTOLAKIS: So I don't understand that  
21 comment either, or there is a concern that there might be  
22 different --

23 MR. SHWAIBI: Different levels of treatment.

24 MR. RUBIN: I'm Mark Rubin, from the PRA Branch.  
25 Just one quick data point. South Texas, originally, in the

1 GQA submittal, you may remember, had an intermediate  
2 category. So perhaps the public comment was reflecting  
3 that. Allowing too many categories gets too complex, and I  
4 think South Texas concluded that and they went back to a  
5 single cut point.

6 DR. APOSTOLAKIS: And what's a functional  
7 categorization?

8 MR. SHWAIBI: Yes. In the ANPR, the way that  
9 categorization was discussed was to bin structures, systems  
10 or components, and that comment was saying that we ought to  
11 look at the functions that these components will be  
12 providing and those functions.

13 So in other words, you're dividing -- you're  
14 taking the different functions of a component and binning  
15 them into the different bins. You will be taking the  
16 different functions that a component will be providing.

17 Instead of binning all of the functions of the  
18 same component in one class, in one safety class or one risk  
19 class, you could take the different functions of that  
20 component and bin those functions into the different  
21 classes.

22 So a component could have functions in different  
23 classes.

24 DR. APOSTOLAKIS: And then you would go with the  
25 most stringent category or you would have it targeted?

1 MR. BERGMAN: We'd target by function.

2 MR. SHWAIBI: You will address the functions or  
3 the attributes that give you the function that ended up in  
4 the different bins.

5 DR. APOSTOLAKIS: I wonder how you would do that?

6 MR. BERGMAN: George, I think this is a lesson  
7 learned from the maintenance rule. The maintenance rule was  
8 written on an SSC basis, as well, but most licensees  
9 implemented it with a function-based approach, which, after  
10 we observed it, we concluded it was a very good way to  
11 tackle the problem.

12 In South Texas, in a meeting a couple months ago,  
13 they pointed out that they've looked at something like  
14 22,000 components, but those components only fill 500  
15 functions.

16 So by taking the function-based approach, it does  
17 appear to simplify the problem somewhat. They're just  
18 saying consider allowing us that flexibility to tackle the  
19 problem using either approach, component-based or  
20 function-based.

21 DR. APOSTOLAKIS: I guess it's not clear to me. I  
22 thought it would make the process more complicated. So  
23 you're not taking -- the way you described it, Mohammed,  
24 you're taking one component that may have three functions.

25 MR. SHWAIBI: That's correct.

1 DR. APOSTOLAKIS: So you categorize -- now,  
2 instead of categorizing one component, now you have three  
3 functions to categorize.

4 MR. SHWAIBI: That's correct.

5 DR. APOSTOLAKIS: So that makes it more complex.

6 MR. SHWAIBI: That's correct.

7 DR. APOSTOLAKIS: We were just told that it's  
8 actually simpler.

9 MR. BERGMAN: Because there only may be, take the  
10 example, 500 functions. You may have 50 components, all  
11 fulfill the same function.

12 DR. APOSTOLAKIS: I see.

13 MR. BERGMAN: So especially when you get into the  
14 monitoring aspects, you're monitoring functions, which is  
15 typically what you look at anyway, are you injecting enough  
16 water, are you maintaining the bus voltage, and when you  
17 fail to meet that condition, then you track down to figure  
18 out what's causing the inability to fulfill the function.

19 But when you look at your plan, it's easier to  
20 look at it from a functional perspective.

21 DR. APOSTOLAKIS: But eventually you would have to  
22 go to the hardware.

23 MR. BERGMAN: You always have to end up going to  
24 the hardware.

25 DR. APOSTOLAKIS: Because there may be an

1 intermediate step that makes it a bit easier.

2 MR. BERGMAN: Right. As long as stuff works, it's  
3 easier from a function-based. When you have a lot of stuff  
4 breaking, you're ultimately back at components anyway.

5 MR. SHWAIBI: I think if you go back to our  
6 four-box diagram, one of the comments said that if you have  
7 a component that ends up in box one or RISC-1, ends up as a  
8 RISC-1 category, yet it does not need to be environmentally  
9 qualified because of the functions that it provides, it  
10 should not have to meet the 50.49 environmental  
11 qualification criteria.

12 You could take the environmental qualification  
13 parts, and maybe that is lower safety significant.

14 DR. APOSTOLAKIS: But, still, it's new to me, so  
15 bear with me for a minute.

16 I'm categorizing the function of a particular  
17 component for a function that is needed for the safety of  
18 the plant.

19 MR. BERGMAN: It's kind of both. I think the  
20 example that Mohammed brought up is very good. You're  
21 looking at the functions and you'll have RISC-1 functions  
22 and you say which components fulfill that function and the  
23 function, though, may only be applicable for, say, seismic  
24 reasons, but not the rest of EQ.

25 So right now, if you do a component, if it has any

1 -- if it's safety-related for any reason and it's  
2 safety-significant for any one reason, the entire SSC and  
3 all the functions its performed remain subject to all the  
4 special treatment rules.

5 If you go on a function-based approach, you would  
6 only need to apply those special treatment rules for those  
7 functions that are both safety-related and  
8 safety-significant.

9 So it does allow a little bit more flexibility.

10 DR. APOSTOLAKIS: There could be a downside,  
11 though. I remember a complaint from South Texas was that if  
12 a function is in the box RISC-1, then automatically all the  
13 components supporting that function were RISC-1. Do we have  
14 the same problem here?

15 MR. BERGMAN: Oh, you definitely could. There's a  
16 balancing between -- it makes your approach to the component  
17 much more complicated and I think South Texas has concluded  
18 if it's high for any reason, just throw the whole thing in  
19 high and just keep dealing with it the way you deal with it  
20 today rather than trying to pare away at it.

21 So it's a comment we've got. Like you said, how  
22 it plays out, we don't know. They're just asking for the  
23 flexibility. I don't think even utilities will know till  
24 they actually get implementation which approach is  
25 necessarily better.

1 MR. REED: Utilities still may want to do it on  
2 specific circumstances. The component that comes to mind  
3 for the examples, for me anyway, is the RHR pump. For ECCS,  
4 it may come out, for that low head pump, maybe come out low  
5 safety significant, let's say, but for mid-loop, it may come  
6 out mid or high or for achieving maintain safe shutdown  
7 condition, it may come out high or medium.

8 You would want to treat it appropriately for  
9 mid-loop or achieving maintain safe shutdown condition,  
10 those functions as high or medium.

11 ECCS now, which is a lot of what the best  
12 treatments are focused on on that particular component,  
13 while they're not doing anything for you, you know what I'm  
14 saying. So there may be a few where they want to split it  
15 apart, but like Tom said, it does get complex.

16 It simplifies the categorization process, because  
17 you're categorizing, say, 500 things and then you're mapping  
18 components into that, if you will, but in the end, when you  
19 come down to the component and you've got this thing in  
20 different boxes, in a sense, based on its functions, that  
21 gets complex and I think that's where South Texas said we're  
22 simplifying this.

23 So if it's got anything that's high, it's high for  
24 everything.

25 DR. APOSTOLAKIS: The example you just gave

1 considered two different modes of operation.

2 MR. REED: Yes.

3 DR. APOSTOLAKIS: In which case, the PRA is  
4 different, the measures are different, everything is  
5 different. That's not what I understood by function or  
6 categorization. I understood that for the same mode, the  
7 same importance measures and so on, instead of going  
8 directly to a component and asking what is its role, in  
9 general, you are looking at specific functions that it  
10 supports, and for some of these functions, it may be RISC-1  
11 and for others it can be something else.

12 But for the same mode, if you change the mode of  
13 operation, then you're changing the importance measure. So  
14 it doesn't surprise me that --

15 MR. REED: Yes. Actually, change mode and  
16 actually change internal and external events, too. I did  
17 the whole thing there. I think we've got to consider the  
18 whole gamut, actually. I don't know.

19 DR. APOSTOLAKIS: They are talking about, in one  
20 mode, having different functions and categorizing those. Is  
21 that the intent of this bullet?

22 MR. SHWAIBI: I'm not clear if the comment is  
23 actually talking about one mode. I think the comment was to  
24 allow the flexibility to do this. It's not specific as to  
25 for one mode, you would need to do it. But I would imagine

1 that if you were doing --

2 DR. APOSTOLAKIS: Now, you changed the mode of  
3 projection. Why?

4 MR. SHWAIBI: It just went off. I guess it was a  
5 screen saver. It went off.

6 DR. APOSTOLAKIS: Okay. That's better. Why does  
7 it say random access? Shouldn't it be alliatory access?  
8 Okay, Mohammed, go on. You're kind of slow today.

9 MR. SHWAIBI: I guess move on to the last bullet,  
10 then.

11 DR. APOSTOLAKIS: Yes.

12 MR. SHWAIBI: That we need to address the use of  
13 results from PRAs or tools with different levels of  
14 conservatism or uncertainty.

15 DR. APOSTOLAKIS: That's a mystery to me what it  
16 means. Can you elaborate?

17 MR. SHWAIBI: Yes. The intent of the comment here  
18 is that we have different tools that we're using for  
19 categorizing. For shutdown, we have certain tools, for  
20 seismic, for fire, and for internal events, and we don't  
21 want the conservatisms and uncertainties in one tool to mask  
22 significance that would come out from another tool.

23 We don't want, for example, our shutdown tool to  
24 drive a component into the low bin when it should be high  
25 for the internal event scenarios.

1 DR. APOSTOLAKIS: So how would you handle this?

2 MR. SHWAIBI: I think that's already --

3 DR. APOSTOLAKIS: It sounds like a research  
4 project, to me.

5 MR. CHEOK: I think in Appendix T, what we say is  
6 that if you do have a PRA model for fires, for, let's say,  
7 low power and shutdown, that you take the importance  
8 measures and you treat them both cumulatively and  
9 individually, and you need to look at the results, both sets  
10 of results, and categorize your SSCs based on both sets, not  
11 just the cumulative results.

12 DR. APOSTOLAKIS: By cumulative, you mean PRA as  
13 one.

14 MR. CHEOK: Consider all the cut sets into one.

15 DR. APOSTOLAKIS: And then you separate out, say,  
16 the fire and see what happens.

17 MR. CHEOK: Right, and low power and shutdown,  
18 because they do tend to be maybe more conservative and they  
19 might skew the results.

20 DR. APOSTOLAKIS: Okay, sir.

21 MR. SHWAIBI: Moving on to treatment. We have  
22 comments that suggested that any additional treatment for  
23 safety significant attributes should be determined by the  
24 licensees and that they should rely on existing licensee  
25 programs. Those would be in the RISC-1, RISC-2 boxes.

1 DR. APOSTOLAKIS: What happened then to the declaration that  
2 risk-informing the results may, in fact, lead to additional  
3 requirements?

4 MR. SHWAIBI: Again, this was the comment. We're  
5 still addressing it. We don't have a response to that yet.

6 DR. APOSTOLAKIS: I think Mr. Riccio would like  
7 this. Okay.

8 MR. SHWAIBI: For LSS SSCs, commercial programs  
9 provide sufficient treatment, was the comment on those.

10 DR. APOSTOLAKIS: Somebody asked the question on  
11 Tuesday, which I will ask you now.

12 MR. SHWAIBI: Yes.

13 DR. APOSTOLAKIS: What is a commercial program?

14 MR. SHWAIBI: We're in the process of trying to  
15 learn what that is, trying to understand what it is.

16 MR. BERGMAN: We'll talk about that a little bit  
17 later.

18 MR. SHWAIBI: The rulemaking should eliminate  
19 existing commitments for LSS SSCs, was another set of  
20 comments. Any existing commitments would be eliminated.

21 DR. APOSTOLAKIS: Now, a matter of terminology  
22 again. Low safety significance is what used to be called  
23 low risk significance.

24 MR. SHWAIBI: Low safety significant SSCs, here,  
25 what we're basically talking about is the RISC-3 box. Any

1 commitment --

2 DR. APOSTOLAKIS: I understand that. I mean the  
3 terminology. Safety significance is the former risk  
4 significance.

5 MR. CHEOK: Yes.

6 DR. APOSTOLAKIS: Yes. And why the change in  
7 terminology?

8 MR. CHEOK: I think for a while now we have been  
9 using low safety significance to be consistent throughout  
10 the whole agency. I think we have been using LSS and HHS  
11 for the last three years or so, since we were implementing  
12 the maintenance rule.

13 DR. APOSTOLAKIS: So something can be  
14 safety-related and of low safety significance.

15 MR. CHEOK: Right.

16 MR. SHWAIBI: And, finally, that the risk-informed  
17 -- a risk-informed change process should be included in the  
18 new rule. This is where we recognize 50.59 may not be  
19 sufficient and we need to include something other than  
20 50.59.

21 DR. APOSTOLAKIS: Change process?

22 MR. SHWAIBI: Change control process, yes.

23 Finally, on pilot programs, we received comments  
24 that the final rule should not be backfit on pilot plants  
25 that have reviewed and accepted processes for categorization

1 and treatment.

2 In addition, we received comments that since STP  
3 has already demonstrated that they can categorize and  
4 provide treatment for different types of components, that  
5 there is no need for other pilot plants to do the same.  
6 This is where, in the ANPR, it was suggested that pilot  
7 plants would need to include passive components, active  
8 components, mechanical, electrical and all types of  
9 components, and the commenter was saying that there is  
10 really no need to do that, since South Texas would have  
11 demonstrated that.

12 If there are no comments, I'll turn it over to Joe  
13 Williams. I think he's next.

14 MR. WILLIAMS: I'm Joe Williams. I'm the project  
15 manager for the review of the NEI guideline documents.

16 What we have here, first of all, is we have three  
17 guidance documents. Two of them are actually part of what  
18 will be a single document.

19 First of all, NEI submitted NEI-0002 in April of  
20 this year. That provides their peer certification process.  
21 They have also provided their categorization guidance for  
22 option two application. That was submitted in March of this  
23 year. Then in June, they just submitted their draft  
24 treatment guideline.

25 We'll start discussing the review of NEI-0002.

1 We're working with the Office of Nuclear Regulatory Research  
2 in the review of this document. We have an overall outline  
3 that's presented the next couple of slides. Mike will be  
4 speaking to most of these points.

5 I just want to point out that our intent is to  
6 provide comments to NEI. We have talked to them a couple of  
7 times at public meetings about the categorization, the  
8 treatment and the peer review.

9 We're going to be providing formal comments to NEI  
10 over the next couple of months and then we'll be working  
11 with them to develop a final document that hopefully will be  
12 endorsed in the regulatory guidance that will go forward  
13 with the proposed rule.

14 Mike will now talk about the particulars of the  
15 review of the NEI-0002.

16 MR. CHEOK: This NEI-0002 is basically the  
17 industry peer review certification process. This is the  
18 process that was, I guess, adopted from the BWR Owner's  
19 Group process that was presented to the committee probably  
20 six months ago.

21 To review this document, we came up with a task  
22 plan and like Joe was saying earlier, this is going to be an  
23 Office of Research and NRR effort.

24 The task plan has four tasks in it. Task one  
25 basically calls for us to review the process itself, the

1 overall process, to see if it meets the general staff  
2 expectations of what we think a peer review should look  
3 like.

4 We also would like to look at the QA requirements  
5 that are being put on the PRA. In Reg Guide 1.174, we did  
6 say that parts of Appendix B should apply to the PRA, since  
7 it's used to change the licensing basis. We would like to  
8 see those parts of Appendix B being implemented.

9 In task two, this is the task that our Office of  
10 Research, I guess led by Mary Drouin, is going to be looking  
11 at. This task basically looks at the technical elements of  
12 the peer review process.

13 Again, we are writing a SECY paper, due to the  
14 Commission probably the middle of next month, that outlines  
15 our high level expectations of what we would like to see in  
16 the PRA.

17 So the Office of Research is going to use these  
18 high level expectations as a guidance to look at the peer  
19 review certification process to see if they meet this  
20 guidance criterion.

21 The next thing they're going to do is they're  
22 going to look at the sub-tier criteria that's provided by  
23 NEI-0002. We should note here that in submitting the  
24 document, NEI has asked that we do not look at sub-tier  
25 criteria -- I mean, do not review the sub-tier criteria.

1 They would just provide it for information.

2 The staff had come to the conclusion that we do  
3 need to look at the sub-tier criteria because this is the  
4 basis for which the peer reviewers are going to make the  
5 decisions whether something is graded with one, two, three  
6 or four.

7 So we have written a letter back to NEI to state  
8 that, yes, we will look at your certification process, but  
9 we will have to look at them in concert with the sub-tier  
10 criteria.

11 So part of task two here is for the Office of  
12 Research to look at this sub-tier criteria and, in a sense,  
13 compare it to existing and available documents, the ASME  
14 standards being one of them, to see how consistent they are.  
15 That's the first task in this sub-task.

16 And then if there are inconsistencies, determine  
17 if these inconsistencies will affect applications in option  
18 two.

19 Task three is then actually to look at what we  
20 actually want to do in option two. Remember, NEI has asked  
21 us to review the certification process in conjunction, in  
22 light of applications to option two.

23 So what task three does is that we need to look at  
24 what the requirements of option two are. In other words,  
25 what's the role of PRA in option two and how are we going to

1 use the results of a PRA in option two; how are things like  
2 defense-in-depth, safety margins, and the other expert panel  
3 type issues going to affect the results of the PRA.

4 DR. SHACK: Mike, I as recall, I didn't think you  
5 assigned an overall grade to a PRA. Wasn't it sort of  
6 graded on an element by element basis? Do we take an  
7 average or something?

8 MR. CHEOK: No. You are actually correct. We do  
9 give a grade to the elements themselves and NEI-0002 is very  
10 clear in saying that we do not assign an overall grade to a  
11 PRA.

12 DR. SHACK: Then what does task two mean then?  
13 Somehow it sounds as though there's something like the grade  
14 three PRA, grade three PRA is the overall beast.

15 MR. CHEOK: I think I'll go to that a little bit.  
16 Basically, what happens is NEI has asked us to look at this  
17 certification process with respect to option two and since  
18 they have four grades, the grade that corresponds to what  
19 the PRA should be to be good enough for option two is the  
20 grade three PRA.

21 So basically you're looking at the sub-tier  
22 criteria for grade three to see if these sub-tier criteria  
23 are what we think is needed to be applied for each element  
24 for option two.

25 DR. SHACK: Suppose he comes out with grade three

1 in X attributes and grade two in Z attributes.

2 MR. CHEOK: And I think we will discuss this in  
3 the next slide, but basically what happens is -- one of our  
4 comments to them is, look, you have to come up with a  
5 certain level of conformance in each element and then if you  
6 do not conform, we would like to know why you don't conform  
7 and document that, so that your expert panel will know why  
8 you don't conform and how you can get around this, what we  
9 call the tradeoffs to apply to option two.

10 But this thing has to be documented well enough  
11 for your expert panel to know and for the staff reviewer to  
12 know that you have used these tradeoffs correctly.

13 In a sense, I'm not -- I hear this committee  
14 discussing the grading levels yesterday for the ASME  
15 standards, and the more I listen to the discussion, the more  
16 I'm thinking the ASME is talking themselves out of having  
17 different grades, because, in a sense, they are defining a  
18 standard for grade four, for example.

19 And you come in and say, hey, look, for this  
20 application, I may not meet the standards, but I do not meet  
21 them because, here's my reasons, and there could be more  
22 bullets for grade one and maybe less bullets for grade two.

23 But I think when you apply something, you need to  
24 know those bullets anyway and you need to know how to get  
25 around those bullets or those bullets have to be fixed in an

1 update of the PRA.

2 So in essence, you're really comparing yourself to  
3 a standard, which is the grade four standard, and for each  
4 application, you need to know how you -- the tradeoffs are  
5 probably different for each application.

6 So in that sense, I'm not sure.

7 DR. SHACK: It's a useful tool for  
8 self-assessment.

9 MR. CHEOK: That's right, that's right.

10 DR. SHACK: I can see where my PRA has had  
11 shortcomings. It's not category one, two or three or grade  
12 --

13 DR. APOSTOLAKIS: Use your mic.

14 DR. SHACK: He's going to have to come in, as you  
15 say, and defend it.

16 MR. CHEOK: Right.

17 DR. SHACK: He'd be better off to go to grade four  
18 or category three and be done with it.

19 MR. CHEOK: Right. In essence, a grade two is I'm  
20 conforming to the standards, but to a less extent than grade  
21 three is. And how I don't conform to it, I have to document  
22 anyway, because I need to know why it doesn't conform, not  
23 just that it's a grade two.

24 A grade two by itself doesn't mean anything to me  
25 and a grade three doesn't mean anything to me.

1 I like to know why it's a grade three. So in that  
2 sense, putting the different grades out there doesn't really  
3 make that much sense.

4 DR. SHACK: Except for a self-assessment tool or  
5 to tell you how to fix it up.

6 MR. CHEOK: So basically, here in task three, like  
7 we were talking earlier, we would like to understand why  
8 something is not up to par and if there are any compensatory  
9 measures or tradeoffs that can be done; for example,  
10 sensitivity studies or more defense-in-depth to get around  
11 this one element that's not up to par, so to speak.

12 And the last task, we are trying to define what  
13 elements of the peer review process are important enough  
14 that it needs to be submitted to the staff and what elements  
15 are important enough to be kept on-site for staff  
16 inspection, so to assure us that this process has been  
17 carried out correctly.

18 Here, we met with NEI on Tuesday, two days ago,  
19 and our comments on NEI-0002, these are the high level  
20 initial comments, basically are summarized in these four  
21 bullets.

22 We said that we need sub-tier criteria to review  
23 the certification document.

24 MR. WILLIAMS: If I may. One thing I want to  
25 point out, too. It's not just that the sub-tier criteria

1 are integral, but also that we received only the BWR  
2 sub-tier criteria. We also need the sub-tier criteria for  
3 the pressurized water reactors, as well.

4 MR. CHEOK: We said that it's important for this  
5 process to document all the findings very well. It's in  
6 these findings that make the peer review process itself  
7 useful.

8 For example, I'll give an example. For grade  
9 three, there's a lot of "should's" in there. The "shalls"  
10 go in grade four, and the "mays" go in grade two.

11 If you look at the definition of a "should," it is  
12 you shall either have met the requirements or you have good  
13 documented reasons why you didn't meet the requirements.

14 I think that the licensee, PRA analysts, the  
15 expert panel, as well as the staff, need to know what  
16 "should" means in each of these cases. Is it because they  
17 met the element or is it because they had something that --  
18 some documentation that says they don't have to meet this  
19 element.

20 This documentation or justification might actually  
21 affect the application and if that's the case, I think we  
22 should have it ready for the expert panel to review and act  
23 on.

24 Keep in mind that the certification process could  
25 have been done two years ago with no application in mind.

1 So I think good documentation of this process is essential.

2 The third bullet here is how applicable are  
3 previous peer reviews. In other words, the majority of BWRs  
4 have already been peer-reviewed. A lot of the PWRs are  
5 being reviewed currently.

6 How do we apply the results of past peer reviews?  
7 I mean, the sub-tier criteria were not put down on paper  
8 until probably recently. What do we do with cases like  
9 that? What happens if the staff finds some discrepancies  
10 and would like to add the staff guidance into the guidance  
11 document? What do you do with plants that have already been  
12 certified?

13 So that's a topic that we need to discuss with  
14 industry.

15 Independent decision-making panel, again, I think  
16 Dr. Apostolakis pointed this out earlier, we are saying that  
17 perhaps the PRA doesn't have to be as good as our standards.  
18 Our expert panel can take care of this.

19 I think we need to have good guidance to the  
20 expert panel as to how they can take care of this.

21 Categorization. NEI submitted this document to us  
22 in March and in the document they talked about PRA scope and  
23 quality. It was at that meeting that actually it was  
24 suggested that they submit to us NEI-0002 to address the  
25 quality issue.

1           As far as the scope issue is concerned, they are  
2 proposing that an external events PRA and a low power  
3 shutdown PRA is not necessary for this process, and in  
4 Appendix T, the staff actually basically said the same  
5 thing.

6           NEI has proposed processes where you can use 91-06  
7 criteria that's for risk management and shutdown  
8 configurations and how you can use analyses and the seismic  
9 margin analyses in light of PRA and how we can categorize  
10 components using those kinds of analyses.

11           The staff is looking at those proposals and,  
12 again, I think it comes down to the role of the expert  
13 panel.

14           It's my personal feeling that if you are going to  
15 not do a PRA, you should be a little bit more conservative  
16 in your assessment of categories.

17           You should encourage the use of PRAs and they  
18 should be able to tell you the more correct results.

19           So, again, this comes to how we define the role of  
20 the expert panel.

21           DR. APOSTOLAKIS: Mike, as I recall, the South  
22 Texas project categorized something like 21,000 SSCs,  
23 roughly. And a typical number of SSCs that appear in a good  
24 PRA is on the order of maybe 1,200. That's the number.

25           MR. CHEOK: The number of events, the basic events

1 in a database normally is 1,200, 2,000, something like that.  
2 That could be less SSCs even, because --

3 DR. APOSTOLAKIS: Less SSCs.

4 MR. CHEOK: Yes.

5 DR. APOSTOLAKIS: The point is that it's 20,000  
6 versus 1,200, 1,500, 1,000, that kind of number.

7 MR. CHEOK: Right.

8 DR. APOSTOLAKIS: Which means that you had almost  
9 20,000 SSCs that were categorized without the PRA.

10 MR. CHEOK: Correct.

11 DR. APOSTOLAKIS: Are you familiar with the  
12 process that they followed to do this? We had a short  
13 presentation here once.

14 MR. CHEOK: I'm not totally familiar with what  
15 South Texas did, but what Appendix T calls for basically is  
16 to first map the SSCs on to the PRA, if you can; in other  
17 words, to implicitly model SSCs.

18 So instead of the 2,000, you might actually have  
19 6,000, the piping, the instrumentation that's dependent on  
20 the operators, the tanks.

21 DR. APOSTOLAKIS: Yes. So this is a variation, if  
22 you will, of the risk-informed ISI approach, the  
23 Westinghouse surrogate component.

24 MR. CHEOK: In a sense it is, yes.

25 MR. WILLIAMS: If I may, with regard to the South

1 Texas, I know that part of that process is that they have  
2 several critical questions that they ask about these non-PRA  
3 components, if you will, such as whether or not they're  
4 involved in the emergency operating procedures or not.

5 They assign a numerical rank from essentially zero  
6 to five rank.

7 DR. APOSTOLAKIS: Yes.

8 MR. WILLIAMS: According to some criteria, and  
9 then they have some weighting. Then they have rules that  
10 they've applied that according to the sum of all those ranks  
11 for the individual questions and the weights, that they then  
12 will bin those SSCs according to where they fall out of that  
13 numerical system.

14 DR. APOSTOLAKIS: So I think -- I mean, I fully  
15 agree with you that this sounds, and it is, a structured  
16 process, but I'm not sure that, as a community, we have  
17 really understood what the process is and what it means to  
18 do certain things.

19 For example, do these different constructed scales  
20 they use, do they represent independent attributes, mutually  
21 exclusive attributes, do they have to be independent, is  
22 there a risk of double counting perhaps.

23 You know, all these things -- we're getting now  
24 into the structure of deliberative processes, which is not a  
25 new field for some community, but that community is not part

1 of our community.

2 So I think since they are making these important  
3 decisions, I think we should look at this process a little  
4 bit more carefully. These may turn out to be great, that's  
5 fine, I'm not saying there are problems with it. In fact, I  
6 was very pleasantly surprised when I heard South Texas  
7 presented and showing that they actually tried very hard to  
8 put some structure into the process.

9 MR. CHEOK: We do have some experience with South  
10 Texas and we do have experience with ISI and IST, with the  
11 pilots in there. So we do have some kind of experience with  
12 how expert panels do work, but I think we still need to nail  
13 down exactly how the process should go.

14 DR. APOSTOLAKIS: Do you have any document that  
15 describes what was actually done? Because I haven't really  
16 seen it. Besides the presentation, I'm not familiar that we  
17 have anything else.

18 MR. WILLIAMS: For South Texas?

19 DR. APOSTOLAKIS: Yes, or anybody who has used --

20 MR. WILLIAMS: Certainly we have the submittals  
21 that South Texas has made to date.

22 DR. APOSTOLAKIS: It's just the results of the  
23 process itself.

24 MR. WILLIAMS: It's the process itself. They  
25 described the process in some --

1 DR. APOSTOLAKIS: Can you give an example or two?

2 MR. WILLIAMS: I believe so, yes, because we have  
3 copies of some of the risk significance basis determination  
4 documents.

5 DR. APOSTOLAKIS: Is that a huge document?

6 MR. WILLIAMS: The risk significance determination  
7 document, that's pretty large. The documents involving the  
8 description of the processes, those are manageable.

9 DR. APOSTOLAKIS: May you can coordinate it with  
10 Mr. Markley here.

11 MR. WILLIAMS: We can take care of that.

12 DR. APOSTOLAKIS: And see if part-time people can  
13 review it in a reasonable amount of time.

14 MR. CHEOK: I'll keep going through this bullets  
15 quickly. The second bullet basically says the role of  
16 importance analysis can be used in sensitivity studies to  
17 bound an increase in risk, or do we just depend on the  
18 importance matrix, such as Fussel-Veseley and RAW.

19 The next bullet there is, again, the expert panel,  
20 what role it plays, and we have discussed that quite a bit  
21 already. The fourth bullet there is how we treat low safety  
22 significant safety-related components, and I think Joe will  
23 talk about that in later slides.

24 The last bullet there is what role should  
25 monitoring and feedback play in this whole process, how does

1 this affect the PRA updates and how does this affect the  
2 whole process in general.

3 DR. APOSTOLAKIS: Now, you know that we had this  
4 presentation from Palisades on top event prevention  
5 methodology. Is that left out because the authors of the  
6 NEI-0002 were not aware of it, as most people are not, or  
7 because they decided they would go with Fussel-Veseley and  
8 RAW?

9 MR. CHECK: I think the Fussel-Veseley and RAW is  
10 something that's known to everybody. Everyone has the  
11 capability of doing it. So that's the way that NEI chose to  
12 go.

13 The top event prevention is another acceptable  
14 method to do this. I think they have at least one licensee,  
15 maybe two or three others might follow, but on a generic  
16 sense, they do not have enough -- I guess we can call it  
17 support for that methodology.

18 DR. APOSTOLAKIS: But, again, though, they don't  
19 have enough support because people have studied it and they  
20 decided not to support it or because it's just brand new and  
21 they are not really familiar with it?

22 MR. CHECK: I believe they are probably somewhat  
23 familiar with it. They just chose to go with the method  
24 that they already know how to do and they think will work.

25 DR. APOSTOLAKIS: Do they allow other methods to

1 be used?

2 MR. CHEOK: I think the documentation is such that  
3 they would be flexible to allow any other methodology, and  
4 the staff, in fact, say you can actually submit a top event  
5 prevention, if you like. There's nothing to stop them from  
6 doing that. We will just have to review it on its own  
7 basis.

8 DR. APOSTOLAKIS: Well, at some point, though, we  
9 have to understand what the differences are. Are we getting  
10 more or less or are you doing one methodology versus the  
11 other?

12 MR. CHEOK: We have an e-mail, I guess, we have  
13 communicated with Palisades on what they should be doing  
14 about the top event prevention methodology. They want to  
15 apply it to IST.

16 We haven't gotten back to them yet, but basically  
17 what we're going to tell them is that, sure, go ahead and  
18 submit it, we would like to find out more about it, and find  
19 out how applicable it is to option two and the rest of the  
20 stuff we're doing.

21 DR. APOSTOLAKIS: Okay. So you are in the process  
22 then of examining further that methodology.

23 MR. CHEOK: That's correct.

24 DR. APOSTOLAKIS: Okay.

25 MR. WILLIAMS: We will now talk about some of the

1 feedback we've given to the industry regarding treatment  
2 guidelines. Most of this discussion was provided to NEI and  
3 other industry stakeholders on Tuesday.

4 The first bullet deals with the definition of  
5 commercial practices. One of the predominant issues here is  
6 that commercial practices covers a very wide range of  
7 activities.

8 Consider, for example, the distinction between a  
9 Rolls Royce and Yugo. Both of those are commercial  
10 vehicles. They're presumably for the same end, but clearly  
11 much different in their application.

12 The staff is interested in basically defining the  
13 set of commercial practices that provides an adequate  
14 assurance of functionality, both in the context of the  
15 preservation of the design basis for the components that are  
16 categorized in the RISC-3 area, and also when those  
17 commercial practices are applied for the, for lack of a  
18 better term, severe accident attributes in the RISC-1 and 2  
19 areas.

20 The NEI document, NEI-0002, has provided a useful  
21 outline of how they propose to proceed in this area, but the  
22 staff is going to need additional details before we can  
23 complete our review.

24 The next bullet deals with the preservation of the  
25 design basis. Fundamentally, that's, under option two, the

1 existing deterministic design basis is supposed to be  
2 preserved. It cannot be changed by the rule itself. If the  
3 licensee chooses to do that, they'd have to choose another  
4 regulatory mechanism.

5 So the need to identify and provide adequate  
6 protection of those design basis attributes is an inherent  
7 part of the process.

8 The next bullet deals with change control. The  
9 issue here is that 10 CFR 50.59 is focused exclusively on  
10 the preservation of the deterministic licensing basis. So  
11 it's not an adequate tool to address facility changes that  
12 might affect severe accident performance.

13 For example, a pressurizer PORV could play an  
14 important role in a facility risk profile by providing the  
15 capability for feed-and-bleed, the once-through core cooling  
16 scenarios.

17 If a licensee chose to somehow diminish that  
18 capability, the existing 50.59 might fully allow the  
19 licensee to proceed and make that change, because it is not  
20 a design basis event.

21 However, it could have a very significant effect  
22 upon the facility's risk profile.

23 NEI has indicated that they agree with the staff  
24 on the need to address these severe accident attributes and  
25 has mentioned that in their guideline documents on

1 treatment. However, again, the staff is going to need some  
2 additional details. We have a lot of work to do before we  
3 can actually define the process in the way that it will be  
4 applied by the industry.

5 The predominant concern, at least in my mind, is  
6 that there's some level at which, similar to 50.59, at which  
7 prior staff review would be required before a facility  
8 change could be made. We want to strike a balance between  
9 the facility's ability, the licensee's ability to make  
10 reasonable changes to their facility and to manage their own  
11 risk profile, but also recognize that there is some  
12 threshold that they could reach, hopefully rarely, that we  
13 would want to be engaged prior to those changes being made.

14 The next bullet, dealing with the adequate  
15 assurance of RISC-2 capability. The fundamental issue here,  
16 in my mind, deals with performance monitoring. Basically,  
17 performance monitoring under normal operating conditions may  
18 not be relevant to the severe accident conditions that might  
19 be seen.

20 So how will you actually be able to meaningfully  
21 monitor these components as they normally operate and say  
22 that they derive information that's actually meaningful for  
23 their usage in a severe accident environment.

24 Also, I will point out that NEI has proposed that  
25 we divide the RISC-2 category into two subcategories.

1 Basically, one is those non-safety-related SSCs that are  
2 subject to some other regulatory treatment, such as fire  
3 protection components or station blackout components, and  
4 also one category where there's no existing special  
5 treatment, no existing regulatory requirements for special  
6 treatment.

7 So this has led to a distinction between the SSCs  
8 in the RISC-2 box.

9 Finally, with regard to the adequate assurance of  
10 RISC-3 functionality, again, we have the other side of the  
11 coin with regard to performance monitoring. Performance  
12 monitoring, again, during normal operating conditions may  
13 not provide meaningful information regarding design basis  
14 capability.

15 So a program that exclusively relies upon, say,  
16 for example, the maintenance rule, may not, in and of  
17 itself, be sufficient, may require some other attributes.  
18 You may have to rely upon other attributes of a commercial  
19 program or other regulatory controls to provide the adequate  
20 level of assurance for the protection of those design basis  
21 functions.

22 Are there any questions?

23 This slide outlines how we're proceeding with our  
24 review. Presently, the risk-informed Part 50 core team has  
25 been tasked with developing guidelines for the review of the

1 South Texas exemption. We will be complete with that task  
2 within the next few weeks.

3 Following on from that, we're going to develop  
4 acceptance criteria for the review of option two treatment.  
5 I anticipate that this will be an evolution from the South  
6 Texas guidance and will be the basis for our review of the  
7 generic industry guidance.

8 This means that the staff needs to have a good  
9 understanding of how well the South Texas and NEI proposals  
10 conform to one another. We've had a presentation both by  
11 South Texas and by NEI addressing this topic. There seems  
12 to be, at least on first blush, a good level of agreement  
13 between the proposals.

14 South Texas clearly did not apply the NEI  
15 guideline. It didn't exist at that time. But they have  
16 participated with NEI in development of their guidance and  
17 largely they conform to one another in terms of their  
18 processes.

19 This last slide provides the risk-informed Part 50  
20 option two schedule, as it stands at this point. I will  
21 point out this is a tentative schedule that we recently set  
22 up for management review, and some of the assumptions that  
23 are inherent here are still being refined.

24 If you'll note, for example, we say that in  
25 January 2001, the pilot program would be initiated.

1       However, in our meeting with NEI on Tuesday, we had some  
2       indication that pilot activities might begin much sooner  
3       than that, perhaps this September.

4               So some of these schedule assumptions and the  
5       overall timeline here is subject to change as we proceed.

6               At this point in time, however, we're projecting  
7       that we would complete the final rulemaking to the  
8       Commission by the end of 2002.

9               DR. APOSTOLAKIS: Do you know who the pilot plants  
10      will be?

11              MR. WILLIAMS: We don't have specific information  
12      at this point. We know that the first out-of-the-box will  
13      probably be some boiling water reactors. I could speculate,  
14      but that would be all it would be at this point.

15              DR. APOSTOLAKIS: And where does the South Texas  
16      exemption request fit into this?

17              MR. WILLIAMS: The South Texas review, right now,  
18      we're anticipating that that will be completely by April of  
19      next year. I'll point out we've characterized the South  
20      Texas review as a prototype versus a pilot, basically as a  
21      demonstration of the concept.

22              Since they don't conform or did not develop their  
23      process in full conformance with the NEI guidance and  
24      hopefully what will ultimately go into the regulatory  
25      guidance, we couldn't really call them a pilot. They do

1 play a significant, but distinct role in the effort.

2 I believe that concludes our presentation.

3 DR. APOSTOLAKIS: This concludes the whole thing?  
4 You want us to brief the Commission in September on what  
5 you've got here?

6 MR. WILLIAMS: I guess so.

7 DR. APOSTOLAKIS: Fine. Any comments or questions  
8 from the members? You will expect a letter from us at some  
9 point?

10 MR. BERGMAN: We considered this informational  
11 briefing. Of course, if you want us to provide something,  
12 we're certainly happy to get it.

13 We are coming back to you, though, at the -- I  
14 think it's the September meeting, but it's August 30th,  
15 maybe.

16 DR. APOSTOLAKIS: Okay.

17 MR. BERGMAN: Right. And at that point, we'll  
18 have a full Commission paper for you that addresses the ANPR  
19 comments and other related issues and we'll certainly want a  
20 letter from you at that point.

21 DR. APOSTOLAKIS: In September.

22 MR. BERGMAN: Right. I think our Commission  
23 briefing is going to be the week of the 18th of September.

24 DR. APOSTOLAKIS: I don't think there's time to  
25 have another subcommittee meeting. August is a month. But

1 we don't need a subcommittee meeting before the presentation  
2 to the full committee.

3 MR. BERGMAN: I don't think so. I mean, that's up  
4 to you, but I don't think so.

5 DR. APOSTOLAKIS: Okay. Any other comments from  
6 members of the public, NRC staff? Thank you very much.  
7 Very informative.

8 MR. WILLIAMS: Thank you, sir.

9 DR. APOSTOLAKIS: Appreciate it. Now, the next  
10 item on the agenda is Mr. Christie's presentation, which is  
11 scheduled to start at 10:30, and I'm advised that I have to  
12 stick to that schedule.

13 So we will recess for 50 minutes.

14 [Recess.]

15 DR. APOSTOLAKIS: We are back in session. Mr. Bob  
16 Christie, the floor is yours.

17 MR. CHRISTIE: My name is Bob Christie. I am the  
18 owner of a firm in Knoxville, Tennessee, called Performance  
19 Technology. I have been in the commercial electric power  
20 business, nuclear, for about 26 and a half years or so. The  
21 first 15 and a half years was as an employee of the  
22 Tennessee Valley Authority.

23 The last 11 years, I've been a consultant, not  
24 only for the nuclear business, but also for other places,  
25 such as the railroads and that, basically doing risk and

1 reliability evaluation.

2 I am here today to talk about a petition for  
3 rulemaking which was filed last year and to describe it and  
4 hopefully answer your questions about it.

5 I have been asked and requested by a staff member  
6 of the Nuclear Energy Institute to clarify completely that  
7 the views that I express today are not endorsed by the  
8 Nuclear Energy Institute.

9 So with that, I'd like to start.

10 DR. KRESS: Is there any particular reason that  
11 they haven't endorsed this?

12 MR. CHRISTIE: I have no idea. You'd have to ask  
13 them. This petition is a petition that does not come from  
14 the Nuclear Energy Institute and my views and the views that  
15 I express today, which I explained to you the last time when  
16 I talked to you, and I think it was March 1st, whatever it  
17 was, are the views of myself and a bunch of other people who  
18 have been following this and working this area for many  
19 years.

20 They asked me to make that statement, I made the  
21 statement.

22 The agenda today, I'd like to start by talking  
23 about a letter I sent to Dr. Tom King on May the 30th. I  
24 think I'll skip the introduction and background. We'll go  
25 back to it if we have time at the end. So really, I'd kind

1 of like to do A, C, D, E, F, and then go back and do B, if  
2 we have time, and then summarize at the end.

3 DR. KRESS: What is the status of the petition?  
4 Has it been --

5 MR. CHRISTIE: We'll talk about that.

6 DR. KRESS: You're going to talk about that.

7 MR. CHRISTIE: We'll talk about that in full  
8 detail.

9 DR. APOSTOLAKIS: I wouldn't skip the background  
10 completely, though. I think you should --

11 DR. KRESS: You're going to talk about SONGS and  
12 the background.

13 MR. CHRISTIE: Okay. We'll go over the background  
14 then, quick. The thing that's really amazing to me is I  
15 believe that we're very, very close to having a rule that's  
16 acceptable to everyone. We've had many meetings.

17 I guess the first public workshop was back last  
18 September. Then we had another public workshop in February,  
19 and then we had a -- I think it was called a public meeting,  
20 not a public workshop, we had a public meeting in May.  
21 We've also had other interactions and so on.

22 But at the May meeting, there were six criteria  
23 that the Nuclear Regulatory Commission people were using to  
24 make decisions with respect to 10 CFR 50.44. And so in the  
25 meeting on May the 17th, I think we got pretty good

1 agreement and pretty good definition of where we didn't have  
2 agreement.

3 So I'd like to tell you that today. I think we're  
4 pretty close. And let's go over what we discussed on May  
5 the 17th.

6 The first one has to do with the hydrogen  
7 monitoring, measuring the hydrogen monitoring concentration.  
8 That's their slide 23. And I think we have come to  
9 agreement that the hydrogen monitoring system can be  
10 commercial grade. It no longer has to be safety grade,  
11 safety-related, with all the bells and whistles. That was  
12 my interpretation of what happened.

13 Where we disagreed is, or I think we disagreed,  
14 that the staff of the Nuclear Regulatory Commission still  
15 believes that there should be requirements, quote, for the  
16 long term for hydrogen monitoring and while these  
17 requirements would allow you to be commercial grade, there  
18 are still going to be requirements and you will still have  
19 to have inspection and so on.

20 My position and the position of the others that  
21 I've worked with on this is basically this hydrogen  
22 monitoring is not safety-significant, it is not a primary  
23 indicator that is used for anything but to turn on the  
24 hydrogen control systems, which are the recombiners and the  
25 purge systems, and if we make the recombiners and the purge

1 systems non-safety-related and don't have requirements, then  
2 fine, the hydrogen monitoring is also not safety-significant  
3 and it would be put in a non-safety-significant category,  
4 turned over to the utilities, and the utilities would be  
5 responsible for it.

6 Not that they're going to immediately go out and  
7 dump or anything like that. They are just the ones that are  
8 now making the decisions.

9 DR. KRESS: When you say not safety-significant,  
10 that means it has insignificant impact on CDF and LERF. Is  
11 that what you mean by that?

12 MR. CHRISTIE: Insignificant impact on anything.

13 DR. APOSTOLAKIS: Have you subjected these to the  
14 Ross' adoption two that he is proposing?

15 MR. CHRISTIE: In option two, all this stuff isn't  
16 even in the PRA, doesn't get -- this is non-safety -- if you  
17 did an option two on this, this is all  
18 non-safety-significant. It's below the line.

19 DR. BONACA: Bob, this is the question I have. I  
20 remember when we did review, first of all, an application by  
21 the Westinghouse Owner's Group for elimination of the PASS  
22 system or of certain portions of the PASS system.

23 I remember that they put the burden on the  
24 hydrogen monitoring system to perform some function in  
25 support of the emergency actions level, because --

1 MR. CHRISTIE: Severe accident management  
2 guidelines.

3 DR. BONACA: So I don't remember the exact  
4 details, but I remember that they committed to maintain the  
5 hydrogen monitoring for a specific function in the severe  
6 accident management guidelines.

7 Now, when San Onofre came with the proposal to  
8 eliminate the hydrogen monitoring system, they took it back  
9 at some point, because they said that this had to go with  
10 the same option on severe accident management provided by  
11 Westinghouse and for that, they needed a monitoring system.

12 Could you address that point?

13 MR. CHRISTIE: Okay. Let me explain what happened  
14 with the severe accident -- well, let me explain what  
15 happened with San Onofre. San Onofre went in with a 50.12  
16 exemption request, which you people finally approved, but in  
17 the course of negotiations with that, San Onofre basically  
18 withdrew the application for the hydrogen monitoring to be  
19 declared non-safety.

20 They put it on hold. They didn't say it wasn't  
21 non-safety. They didn't say it was non-safety. They just  
22 put it on hold and they received the approval from the staff  
23 of the Nuclear Regulatory Commission for the recombiners and  
24 the purge to be non-safety and to pass onto the purview of  
25 the utility only.

1           Their position still was it was not  
2 safety-significant, it was not safety-related, and they just  
3 put it on hold. The Westinghouse Owner's Group, and I  
4 haven't been following it for PASS very much, but to the  
5 best of my knowledge, what the Westinghouse Owner's Group  
6 have said, and I believe there was a change in the middle of  
7 their submittal.

8           They started out with the hydrogen monitoring as  
9 being safety-related and they changed it to be  
10 non-safety-related. It's going to serve a function in the  
11 severe accident management guidelines which are not  
12 safety-related pieces of equipment and you don't have to  
13 have safety-related pieces of equipment to do it.

14           DR. BONACA: I understand. I'm only saying that I  
15 know the reason why they left it in, however, they did not  
16 ask for exemption on that system, was because -- I asked the  
17 question specifically and they answered that they, yes,  
18 would want to go with the WOG for the SAMG and because of  
19 that, they withdrew the monitoring system from the  
20 exemption.

21           So I think there was a logic behind the reason why  
22 it stayed there yet and I want you to keep it in mind as you  
23 go forth with this.

24           MR. CHRISTIE: And I haven't followed the  
25 Westinghouse Owner's Group post-accident sampling system

1 that closely, but I have been told that the post-accident  
2 sampling system WOG submittal changed the requirement for  
3 the hydrogen monitorings in the middle of the application to  
4 move the hydrogen monitoring from safety-related to  
5 non-safety-related and that's where it is today.

6 It was approved on the basis of non-safety.

7 MR. SNODDERLY: Excuse me. Dr. Bonaca, my name is  
8 Mike Snodderly. I did the San Onofre hydrogen exemption and  
9 I also did the review for the Westinghouse Owner's Group  
10 PASS sampling.

11 From my perspective, I believe that if you look at  
12 the exemption request for the PASS, it did credit the  
13 continuous hydrogen monitors, the safety-related continuous  
14 hydrogen monitors, as the way to measure hydrogen and to  
15 support core damage assessment, the Westinghouse Owner's  
16 core damage assessment guidelines.

17 Also, if you look at Regulation 50.47(b)(9) for an  
18 effective emergency plan, most licensees meet that with Reg  
19 Guide 1.101, Revision 3, which endorsed an NEI guideline.  
20 But that states that a general emergency is a loss of any  
21 two barriers and potential loss of a third barrier.

22 Potential loss of a third barrier includes whether  
23 an explosive mixture exists inside containment and most  
24 licensees use the hydrogen monitors for that determination.

25 So just to support and refresh what had happened.

1 DR. BONACA: Okay. I didn't have enough detail,  
2 and you have provided that. Okay. But I remember there was  
3 a connection. It wasn't in this part of the rule. It was,  
4 however, in the severe accident maintenance.

5 Now, whether your requirements may be to implement  
6 severe accident management steps and if they are part of the  
7 law, I don't know.

8 MR. SNODDERLY: The severe accident management  
9 guidelines are a voluntary initiative and as Mr. Christie  
10 points out, yes, we agree that the hydrogen monitors are not  
11 needed to actuate any of the mitigative features in 50.44,  
12 the hydrogen recombiners, the igniters, those types of  
13 things.

14 So that it could be eliminated from 50.44, the  
15 requirement of hydrogen monitoring. But there still is a  
16 requirement in NUREG-0737, the post-TMI requirements, that  
17 you have hydrogen monitoring, and, also, in how licensees  
18 have met this 50.47 requirement through the appropriate reg  
19 guides.

20 So as we go through this process, we've got to  
21 keep that in mind and we'll have to go back and reconsider  
22 those types of situations, but I believe the staff still  
23 believes that hydrogen monitoring, although you may not have  
24 to do it with safety-related continuous monitors that are  
25 currently installed, they still would be needed for the core

1 damage assessment and EP.

2 DR. BONACA: Thank you.

3 MR. CHRISTIE: And I think that's a pretty clear  
4 description of where the differences are between the  
5 position we have and what the staff has.

6 DR. APOSTOLAKIS: Again, I asked you about option  
7 two and you said it's below. How could it be below? If  
8 there is a box there that says non-safety-related,  
9 non-safety-significant, so this must belong there.

10 MR. CHRISTIE: In the option two, if you didn't  
11 change the rule, this would go into RISC-3.

12 DR. APOSTOLAKIS: Which is?

13 MR. CHRISTIE: Non-safety-significant, but  
14 safety-related.

15 DR. APOSTOLAKIS: Okay.

16 DR. KRESS: Because it's already designated.

17 MR. CHRISTIE: It's already. But if the rule, the  
18 petition for rulemaking is approved, that's the whole  
19 purpose, first -- and, see, we're doing box two and -- we're  
20 doing option two and three all at once with hydrogen. Okay.

21 We're moving it from safety-related, box one, to  
22 box four, by this rulemaking.

23 DR. APOSTOLAKIS: Right.

24 MR. CHRISTIE: So, again, that's the situation as  
25 far as measuring the hydrogen concentration.

1 MR. SNODDERLY: Excuse me. Dr. Apostolakis, I  
2 just wanted to address one thing on your point. If you just  
3 use option two and the criteria of CDF and LERF, yes, I  
4 agree with Bob Christie, it's going to be in the group  
5 three.

6 One thing I think we all need to keep in mind,  
7 though, is those other regulations, such as 50.47 and EP,  
8 aren't really addressed as one of the criteria for  
9 determining whether something is in box one or box three.

10 So I think that that's -- and sometimes in the  
11 expert panel, that's considered and sometimes it's not.

12 Currently, the way the hydrogen monitors and all  
13 the monitors that are required safety meet Appendix E, the  
14 emergency response data system. All those things currently  
15 would be in the low safety, no risk significance.

16 I think that's one issue that we're -- I don't  
17 think we're disagreeing on the categorization, but how do we  
18 treat that, because there is this acknowledgement that it is  
19 needed for those things.

20 DR. KRESS: Would that be considered a  
21 defense-in-depth requirement?

22 MR. SNODDERLY: I believe so, Dr. Kress, but I  
23 think what we're -- the issue, I think, that's being brought  
24 up here is that, yes, if you just apply the criteria of CDF  
25 and LEF, yes, this stuff clearly is not needed to meet that,

1 falls out; but do we maybe consider another criteria or are  
2 we adequately addressing it through the special -- you know,  
3 how is it going to be treated.

4 DR. APOSTOLAKIS: Let's go on.

5 MR. CHRISTIE: Okay. For the next, which is the  
6 mixed containment atmospheres, again, as far as we're  
7 concerned, basically, mixing the containment atmosphere  
8 comes because you have systems for containment heat removal,  
9 either fans and coolers or sprays, some plants have both,  
10 and these systems we're not proposing any change at all in.

11 We're still going to be mixing atmosphere. The  
12 proposed rule doesn't change that. Nothing changes that,  
13 and we're in complete agreement on that.

14 The next one is the control of the post-LOCA  
15 combustible gases. The Nuclear Regulatory Commission, on  
16 their slide 25, says remove post-LOCA hydrogen control from  
17 50.44. Complete agreement, we remove it from 50.44.

18 On the reactor coolant system high point vents,  
19 again, complete agreement.

20 DR. APOSTOLAKIS: Either you don't use them at all  
21 or --

22 MR. CHRISTIE: All right. I guess this is slide  
23 26, which is the reactor coolant system high point vents.  
24 Again, we got complete agreement. We're going to keep all  
25 the stuff in for the reactor coolant system high point

1 vents.

2 On the slide 27, which is the inert, the MARK 1's and MARK 2  
3 containments, again, complete agreement. We're not going to  
4 change -- no change. We're going to keep them inert.

5 The last one, and we should spend a little time on  
6 this one --

7 DR. KRESS: Where will I find that slide?

8 MR. CHRISTIE: Slide 28.

9 MR. MARKLEY: Page four.

10 DR. KRESS: Page four.

11 MR. CHRISTIE: Page four. It comes as an  
12 attachment --

13 DR. KRESS: No, I mean the real slide that he's  
14 talking about.

15 MR. CHRISTIE: That comes as the attachment to the  
16 May 30th letter from me to Dr. King.

17 DR. KRESS: Okay. I've got that here somewhere.

18 DR. APOSTOLAKIS: No, no, no. He means this. I  
19 think what Dr. Kress means is the actual slide 28.

20 MR. CHRISTIE: Right. It comes in the attachment.  
21 You got a letter from myself to Dr. King dated May the 30th  
22 and you have all the slides that we're talking about here.

23 DR. APOSTOLAKIS: Right.

24 MR. CHRISTIE: Okay. This is a very -- again,  
25 it's a tough slide to read. We had a very difficult time

1 with it on May the 17th. It's unclear. And really, as far  
2 as we could tell, it busts into two pieces.

3 One had a requirement for all plants, and that's to  
4 demonstrate the containment will withstand both short and  
5 long term a specified source, so and so, and then they had  
6 one for MARK 3's and the ice condensers, which is do  
7 something with the MARK 3's and the ice condensers for the  
8 igniters during station blackout.

9 What we have said, and we'll talk about this in a  
10 minute, is for the large dry containments, we have a  
11 requirement now, we've added a requirement to address the  
12 containment capability during severe accidents.

13 And I don't know whether the staff of the Nuclear  
14 Regulatory Commission agrees with that one. It's very  
15 unclear what this one was.

16 The a second part, and this is the one that I  
17 think we need a lot of discussion on, because it got brought  
18 up again in the Commissioners' briefing last week.

19 The staff of the Nuclear Regulatory Commission  
20 believed that the igniters should be operable during station  
21 blackout. Myself and the others do not understand this  
22 requirement at all, so let me explain what we see for  
23 station blackout and the igniters for the MARK 3's and the  
24 ice condensers, which are the ones that have the igniters.

25 If you have a station blackout, you have a loss of

1 all AC power, it becomes basically a timing problem. And  
2 let's take the boilers first. Let's take the MARK 3  
3 boilers.

4 If you lose all the AC power and your offset power  
5 is lost and your emergency diesel generators are lost, what  
6 you boil down to is you will have the turbine-driven reactor  
7 core isolation cooling. That will supply water to the  
8 reactor vessel.

9 You will also have the control systems that are DC  
10 powered coming off the batteries and you will also have the  
11 control systems that are AC powered that come off the  
12 inverters, which are powered by the batteries. This is what  
13 you're down to.

14 At this point in time, and this will go on,  
15 depending on whether it's a four-hour plant in battery life  
16 or an eight-hour plant in battery life, it just depends on  
17 how much battery you have, you will basically not see any  
18 core damage, we think.

19 I mean, basically, your RCSI, reactor core  
20 isolation cooling system is supplying water, the core is  
21 covered. You're not removing any heat from the containment,  
22 which is kind of worrisome, but you can control it, and, if  
23 that works, everything is fine.

24 DR. KRESS: You're saying the contribution of that  
25 station blackout sequence to core damage frequency is very

1 low.

2 MR. CHRISTIE: That's an automatic, yes. To get  
3 to the point where you have a loss of off-site power and the  
4 failure of all your emergency systems on-site.

5 DR. KRESS: You've got to have a lot of things  
6 happen. So that particular sequence --

7 MR. CHRISTIE: Right, that sequence --

8 DR. KRESS: -- for those plants don't add much to  
9 core damage frequency.

10 MR. CHRISTIE: To get to that point, we're talking  
11 a very low number on initiating events, plus those  
12 subsequent -- you know, the initiating event is loss of  
13 off-site power and the subsequent event is a loss of all  
14 your emergencies. That's a very low probability event.

15 On top of that now, you have the situation where  
16 you're keeping the core cooled with the RCSI and you have  
17 control because you've got your DC and your AC power  
18 systems.

19 And this goes on for approximately four hours. At  
20 the end of four hours, and let us ask yourself what role do  
21 the igniters play during this time. Why would you want to  
22 have them operable?

23 DR. KRESS: If they were operable, they might  
24 preclude --

25 MR. CHRISTIE: First off, how would you put them

1 operable? They require electrical power.

2 DR. KRESS: That's another question. But if you  
3 did go into core damage, which you say --

4 MR. CHRISTIE: No, we're not into core damage yet.

5 DR. KRESS: Then they have no purpose.

6 MR. CHRISTIE: Right, exactly.

7 DR. KRESS: But if they did go into core damage,  
8 then they may preclude an early failure of the containment.

9 MR. CHRISTIE: Wait a minute. Wait a minute. Now  
10 we're going down -- and now we're four hours into it. Let's  
11 say we have a four-hour plant, and the batteries fail. When  
12 the batteries fail, you're no longer going to be able to  
13 control RCSI, even though at Browns Ferry we thought we  
14 could jam the steam emission valve wide open and just take  
15 our chances.

16 But say we lose now the ability to have RCSI.  
17 Okay. The core -- the inventory in the core is going to  
18 start to deplete, depending on what codes you believe for --  
19 you know, whether you use MAPP or MELCOR. Within a couple  
20 of hours, the core is going to be melted and probably going  
21 through the reactor vessel and laying on the floor.

22 But if you don't have -- and during this period of  
23 time, if you were able to restore anything, electric power,  
24 what you -- well, in the first part, the first four hours,  
25 if you got electric power back, what would you restore?

1 Well, the first thing you would restore is you'd  
2 take -- you'd stop using the batteries and you'd try and get  
3 your AC and DC systems on control systems working off your  
4 emergency power systems or off-site.

5 If you've got off-site back, everything comes on  
6 and you don't even worry about it. But if you've got just  
7 one diesel, the first thing you're going to restore is the  
8 AC/DC. The second thing you're going to do is you're going  
9 to start going down to probably the suppression pool and  
10 start cooling the suppression pool, because HPSI and RCSI,  
11 if you don't -- well, you don't have HPSI.

12 You've got RCSI. RCSI can't cool -- can't use the  
13 water from the suppression pool forever because it's too  
14 hot.

15 So if you get an electrical diesel generator back  
16 in the first four hours, you're first going to make sure  
17 your batteries are taken care of and then you're going to go  
18 and start suppression pool cooling, because your HPSI is  
19 keeping you alive and you're not worried about it, and now  
20 you want to start removing heat from the containment.

21 So that period. The next period of time is where  
22 the core is melting and when the core is melting, again, the  
23 first thing you're going to do, if it's after four hours and  
24 your batteries are gone, but then you get an emergency  
25 diesel generator back, you're going to go first for the

1 control systems. You're going to want to know where you  
2 are, what's the status of my core, is it completely melted,  
3 is it on the floor or et cetera, et cetera. So that's the  
4 first thing.

5 The second thing you're going to have, and it's  
6 going to be a hodgepodge with boiling water reactors. What  
7 you're probably going to want to do is even if you melt it,  
8 you're probably going to want to put water on the core.  
9 Probably. That's probably something that you've really got  
10 to consider.

11 The other thing is you're going to have to start  
12 removing heat from the containment and you're going to  
13 either do it RHR through the suppression pool or sprays or  
14 whatever method you can do, you're going to do it.

15 Again, we don't see that igniters -- having  
16 operable igniters during this period of time is the thing  
17 that would cause is -- we wouldn't take our emergency diesel  
18 generator and automatically start taking some of that power  
19 off to power up the igniters. It doesn't seem logical to  
20 us.

21 DR. KRESS: If the rule says you need to have  
22 power to the igniters, all this other stuff is what ifs.  
23 But the question you're asking is should you have power to  
24 the igniters, should that be part of the rule.

25 And if I were to ask why would I want power to

1 those igniters, it's if my CDF is low enough in the sequence  
2 already, do I need a conditional containment failure  
3 probability that's very, very low, because I've already got  
4 the CDF low enough.

5 And does having power to the hydrogen monitors do  
6 anything to my conditional containment failure probability?  
7 I don't know that it does or not. I would suspect it does.

8 MR. CHRISTIE: I think, Tom, I'm not explaining  
9 myself well. You have X amount of dollars. With station  
10 blackout, you've got X amount of dollars. The staff is  
11 telling us they want to spend some additional money on  
12 station blackout to have the igniters operable during  
13 station blackout.

14 It makes no sense to us. If I am spending money  
15 on having an additional source of power at the plant during  
16 station blackout, other than my off-site power and my  
17 emergency diesel generators, I'm going to have it powering  
18 my AC and DC control and my containment heat removal  
19 systems.

20 The last thing on my mind, because I want to  
21 prevent core damage, and so my money is not going to go to  
22 igniters. Igniters don't do anything in the first four  
23 hours. Igniters probably don't do anything in the next four  
24 hours. Igniters may not even do anything in the long run.

25 We don't see why anyone would spend money on

1 igniters, on AC power sources for igniters, when the money  
2 would be better spent somewhere else, either preventing core  
3 damage or taking care of the heat removal.

4           Ultimately, supposing you could never get heat  
5 removal back, you're failing. You're going to fail the  
6 containment. I mean, it's just if you don't have heat  
7 removal, you're going to fail the containment. I don't care  
8 if you've got igniters powered forever.

9           So this is the -- in our mind, the most -- and  
10 that's why we wrote the rule the way we did or we proposed  
11 the rule the way we do.

12           DR. KRESS: I wasn't looking at it as an  
13 either/or. I was looking at it as you need containment heat  
14 removal and maybe you need igniters, also.

15           MR. CHRISTIE: Right. But from my standpoint,  
16 from a technical standpoint, if we are going to go and  
17 provide additional electrical power sources other than what  
18 we've already got, we're not going to put it on igniters.

19           If it were cost-beneficial, we'd probably put it  
20 on AC and DC control systems, we'd probably put it on heat  
21 removal, on boilers, because we want to keep water in the  
22 core, and so on and so forth.

23           Go over to a pressurized water reactor. Again,  
24 the same thing. You lose the off-site power, you lose your  
25 emergency AC. What are you down to? Well, you're down to

1 the turbine-driven emergency feedwater systems and, once  
2 again, the DC and the AC systems.

3 On a pressurized water reactor, this is going to  
4 go on for X amount of time. All right. Now, depending on  
5 what model you use for the reactor coolant pump seal LOCA,  
6 you're going to have a LOCA at the same time because your  
7 steam generators are cooling, but you're also losing water  
8 inventory off of the primary system and you're not  
9 replenishing it, because you have no AC power and there's no  
10 turbine-driven pump that supplies water to the reactor  
11 pressure vessel.

12 So for the first four hours, again, you're in a  
13 situation where you're cooling with the steam generators and  
14 your AC and DC power control systems are working fine. You  
15 know what's going on, so on and so forth.

16 Once again, if we restored anything during that  
17 period of time, we wouldn't be worrying about the igniters.  
18 We're going to go -- if we get something back, the first  
19 thing we're probably going to go do is start safety  
20 injection, the higher pressure safety injection pumps and  
21 restore the inventory we lost off of the reactor coolant  
22 pump seal.

23 So that's -- again, it's this priority of things  
24 that doesn't make any sense to us. If I were going to have  
25 an additional power source on the plant, I'm not going to

1 put it on igniters. It makes no sense to us.

2 The same goes when you start to melt the core.  
3 Now, when you start to melt the core and if you get the core  
4 on the floor, et cetera, et cetera, you're, again, going to  
5 be faced with a choice, hey, do I turn on containment heat  
6 removal sources or do I try and get safety injection working  
7 so that I pump water on wherever it is, dropped in the sump  
8 at the bottom of the reactor vessel, wherever it is.

9 But you're not going to worry about the igniters.  
10 Once again, it's containment heat removal.  
11 So from a technical standpoint, we don't understand the  
12 staff's belief that having an additional power source to  
13 make igniters operable at MARK 3's and ice condensers --  
14 why? And what we've said to them is, if you've got a  
15 problem, identify it. We have still not seen any technical  
16 justification or even know what exactly the problem is.

17 And then if you've got the problem, go put it in  
18 the context of the 51.09, the backfit, because then we'll  
19 all understand it, we'll understand what the problem is,  
20 we'll understand what the alternatives you're proposing are,  
21 and we'll understand what the cost-benefits are.

22 So that's where we are on that.

23 Okay. Now, if you want to talk background.  
24 Again, this work comes out of the Arkansas Task Zero and the  
25 San Onofre Task Zero, and the objective of those pilot

1 programs, we wanted to have a more objective and efficient  
2 way of doing business.

3 This is what we talked about before. We wanted to  
4 take the whole plant, we wanted to consider a whole plant  
5 package, which included cost generation and risk.

6 DR. APOSTOLAKIS: What happened to the whole plant  
7 study, by the way?

8 MR. CHRISTIE: It's gone.

9 DR. APOSTOLAKIS: It's gone.

10 MR. CHRISTIE: You can't get any -- it appears  
11 clear that the staff of the Nuclear Regulatory Commission  
12 are not interested and we can't interest them in the whole  
13 plant study, as far as I can tell.

14 So what we're down to now is working off of  
15 specific pieces. Though I think that's a mistake and we'll  
16 talk about that a little bit later.

17 And, again, the basis of what we said is that the  
18 primary responsibility for the public health and safety lies  
19 with the people who run the plant. Their regulatory process  
20 is only good for public health and safety. We've also got  
21 that the public health risk is different for each nuclear,  
22 and it changes with time.

23 We have addressed, we thought, in the whole plant  
24 study, all the major problems that were placed in the Kemeny  
25 report, which is the President's report on Three Mile

1 Island, and the best definition I saw of them was Dr. Thomas  
2 Pickford's separate opinion and we thought the whole plant  
3 addressed every one of those items.

4 We also believe that we don't have that much time  
5 to do all this stuff. We've got to get more efficient and  
6 effective, because basically, in an economically deregulated  
7 power industry, if you're not effective and efficient,  
8 you're not going to be a producer of power very long.

9 So the more effective and efficient we go, we  
10 believe the best definition of what's going to happen to the  
11 nuclear power plants in the future is contained in this  
12 paper by Mr. Shiffer, who is a retired executive out at  
13 Pacific Gas & Electric, someone who has lived through it on  
14 Diablo Canyon and, in this paper, told us what the future  
15 would look like.

16 Now, just a quick -- and we've been all through  
17 this before with you. If you look at the San Onofre  
18 evaluation report, again, this we've known for 20 years.  
19 The overall public health risk is dominated by severe  
20 accidents where the core is damaged and containment is  
21 bypassed or breached.

22 DR. KRESS: Before we take that one off, let me  
23 ask you a philosophical question about that. Should NRC  
24 just be concerned with the dominant accident sequences or  
25 should they be concerned with accidents that may be more

1 frequent, but not as dominant in terms of risk, but have  
2 some consequences?

3 That's the philosophical question.

4 MR. CHRISTIE: Tom, you know, when I'm talking  
5 about the whole plant, you -- and I talked to you on March  
6 1st. To my mind, what the nuclear industry should be  
7 shooting for is what I call the whole plant study.

8 We should know from top to bottom what that plant  
9 represents with respect to public health risks. We should  
10 know it. I mean, we should know what the health effects  
11 are. We should know what I call source term.

12 I look at it from the standpoint of a PRA. From  
13 the standpoint of a PRA, out of a level three, I get source  
14 terms to the people. We should know what those source terms  
15 are. We should -- they're in categories. We should know  
16 what the probabilities are, we should know how much  
17 tellurium and cesium.

18 We should know that. We should have that  
19 information for every plant. To go back to the output of  
20 the level two, we should know what the plant damage states  
21 are and level one and level two in the containment event  
22 tree. We should know all of this material.

23 We should know it all from top to bottom. We  
24 should know what the systems are responding, you know, that  
25 it's a high probability, we should know it all.

1           When we get that information, we ought to make the  
2 -- the plant ought to be able to determine for themselves  
3 what level in there should we go to to make sure that we  
4 have provided the adequate protection of public health and  
5 safety.

6           They're almost invariably going to go to lowest  
7 level possible. They're going to go down to system, because  
8 that's what they can control.

9           But we have to know the whole picture, because I'm  
10 not smart enough to know the whole picture without doing the  
11 whole picture. So that's -- my philosophical thing is we  
12 ought to consider everything, every accident -- you know,  
13 risk assessment doesn't say, hey, I only consider the ones  
14 that have a frequency greater than so-and-so. They take  
15 every frequency.

16           They don't consider just single failures. They  
17 consider every failure possible. They don't consider, hey,  
18 we can't have this plant damage. They consider all plant  
19 damage. That's the beauty of the risk assessment.

20           So that's what I'm --

21           DR. KRESS: I agree with you. The question is  
22 what should the NRC concern itself with in terms of their  
23 activities and rules and so forth.

24           MR. CHRISTIE: They start from the top. If they  
25 are absolutely convinced we meet the top, why do they go any

1 further? If you meet the goals, why are you going any  
2 further? The rest of it belongs to the utility.

3 See, I look at the thing, there's a certain amount  
4 of expertise in the Nuclear Regulatory Commission. They  
5 should focus on the things that they can do well and that  
6 they can add to value.

7 The value that they can add is that they're  
8 nuclear. We don't have a coal regulatory commission. We  
9 have a Nuclear Regulatory Commission.

10 If you wanted to protect against coal boiler  
11 explosions, would you create a coal regulatory -- no. You  
12 let the utility handle it.

13 DR. KRESS: I guess where I may differ a little  
14 from that is it seems to me like the goals of NRC are not  
15 just the two quantitative health objectives. They have  
16 goals that are different than those and they have to do with  
17 controlling things like worker exposure and controlling  
18 smaller releases of higher frequency.

19 There are rules in there that deal with those kind  
20 of things, and I call those goals, also. And I don't know  
21 where NRC should --

22 MR. CHRISTIE: Do you believe -- you know, the  
23 nuclear business, in my time, has undergone tremendous  
24 revolution. It's phenomenal to me now today that you can  
25 have nuclear power plants with a total quantitative dose to

1 all the workers at the plant is under 100 rem.

2 I mean, we used to do 500 rem. Okay. Now, that  
3 happened in my lifetime and it didn't happen because the  
4 Nuclear Regulatory Commission dictated it.

5 DR. KRESS: It was because the guys at the plant  
6 --

7 MR. CHRISTIE: The guys at the plant are not dumb  
8 people and they have -- and I'm not afraid to admit  
9 self-interest, man. We're going into a private enterprise  
10 system in which our survival is necessary.

11 But the beauty of it all is, and as you heard me  
12 say this before, you can't have a safe plant that isn't a  
13 good economic plant. You can't have a good economic plant  
14 that isn't a safe plant. It doesn't work that way.

15 You will do things right across the board. The  
16 guys in maintenance ops, engineering, et cetera, they don't  
17 -- no, it's a balance of plant, I'm going to do a shitty  
18 job, or it's a balance of plant, I'm going to do a great  
19 job, or it's safety-related, I'm going to do a great job, or  
20 it's safety-related, I'm going to do -- they don't do that.

21 They do a good job, and so from my standpoint,  
22 there's an absolute role for the Nuclear Regulatory  
23 Commission. It's there. People have a fear of nuclear and  
24 they have created, through law, the Nuclear Regulatory  
25 Commission. I think you're a good thing.

1           Okay. I mean, they haven't created a coal because  
2 people don't think that coal kills people to the same degree  
3 they do about nuclear.

4           So the Nuclear Regulatory Commission has a role  
5 and they can fill it, great, but they ought to focus on the  
6 things that they can do the best and the part that's the  
7 best for them is the nuclear part.

8           What's the health effects part? You know, we've  
9 ignored that for almost ten years now, as far as I can tell.

10          DR. APOSTOLAKIS: So you would like every unit to  
11 have a level three PRA.

12          MR. CHRISTIE: Absolutely. Absolutely.

13          DR. APOSTOLAKIS: Well, let's see what --

14          MR. CHRISTIE: I don't know. I think we are  
15 derelict in our duty if we don't. When I was at the  
16 Tennessee Valley Authority, in charge of PRAs, every PRA we  
17 did was a level three, every one.

18          DR. APOSTOLAKIS: As you know, the trend now is to  
19 work with LERF and CDF.

20          MR. CHRISTIE: That's because you made it so. I  
21 didn't make it so and some of the people at the plants  
22 didn't make it so. Some of them still have level three and  
23 we still use them.

24          Going back to -- again, the San Onofre safety  
25 evaluation report, it's not the design basis accidents,

1 again. It's the severe accidents, et cetera.

2 The stuff that we put in the plants for design  
3 basis accidents don't work in severe accidents. They're way  
4 under-sized, et cetera, et cetera.

5 Paying attention to design basis accidents can be  
6 detrimental. In the case of San Onofre, it was the  
7 distraction of the operators because they're paying  
8 attention to a non-safety-significant piece of equipment, at  
9 the detriment of the safety-significant equipment, and we  
10 want that.

11 So I guess the things we learned out of the San  
12 Onofre --

13 DR. APOSTOLAKIS: I guess I have to understand  
14 that a little better.

15 MR. CHRISTIE: Sure.

16 DR. APOSTOLAKIS: What is this distraction we're  
17 talking about? It seems that's a high level statement.  
18 They have to do an extra thing so that --

19 MR. CHRISTIE: If you have a design basis set of  
20 things and you do it, one of the things is that you have as  
21 part of the design basis, all the 50.44, et cetera, et  
22 cetera, and you will have to have hydrogen monitoring in  
23 place at X amount of time after an accident.

24 If you follow the NUREG-0737, it was 30 minutes,  
25 but now, because of Arkansas Task Zero, a lot of the plants

1 have moved to 90 minutes, et cetera. But some of the plants  
2 still have the 30-minute requirement.

3 What it means is that one of the reactor operators  
4 in the horseshoe, and, generally, if you're at minimal crew,  
5 there's only two, at some point in the accident, as dictated  
6 by the rules, has to pick himself up off out of the main  
7 boards and go set up the secondary boards, because almost  
8 all these things are not on the main boards.

9 It's not something -- you have to go to back  
10 boards and hook things -- you've got to coordinate. That's  
11 the other thing. You've got to start coordinating. Health  
12 physics has got to get in, chemistry has got to get in, ops  
13 has got to get in, maintenance has got -- it's a whole  
14 process thing.

15 And you just pick somebody up out of the control  
16 room, paying attention to things like, you know, what are  
17 the thermocouples in the core telling us, what are the  
18 radiation monitors telling us. It goes away.

19 DR. KRESS: Just to start up the hydrogen system.

20 MR. CHRISTIE: Just to start up the hydrogen  
21 system, which we all agree doesn't work for anything that  
22 really counts. That's the distraction.

23 DR. KRESS: And he could be using that time to do  
24 other things.

25 MR. CHRISTIE: Right. Hey, monitoring what your

1 thermocouple is telling you, what your heat removal, making  
2 sure your steam -- if you're a pressurized water reactor,  
3 making sure your steam generators are working correctly,  
4 watching your pressure/temperature curves, et cetera, et  
5 cetera.

6 All these things that we put in since Three Mile  
7 Island, now we're pulling a guy up and away he goes. And  
8 it's not that one single operator can't do it, they can do  
9 it. But can they do it as well as two? Probably not.

10 And when they get near drills and that, you know,  
11 they get -- well, anyway, it's just not right and we've --  
12 you know, and I think the staff of the Nuclear Regulatory  
13 Commission agreed. They approved the Arkansas, they  
14 approved the San Onofre, and we're moving towards rulemaking  
15 and we're getting agreement on a lot of things.

16 So anyway, my read is the important things that  
17 we've got to pay attention to with severe accidents, we've  
18 got to focus on containment integrity. The existing  
19 recombiners and purge don't work and the existing  
20 procedures.

21 And this is what we got out of San Onofre.  
22 Following the February meeting with the Nuclear Regulatory  
23 Commission, it became clear to us that it wasn't -- the  
24 rulemaking was not going to be something that happened  
25 tomorrow.

1           So what we did is we started an effort in the  
2 industry to go out and now we're going to produce exemption  
3 requests similar to the San Onofre exemption request and  
4 file it under the 50.12 process.

5           So this is the results from the first six plants  
6 that we looked at under this process. So what we're  
7 interested in here is what are the action levels, what's  
8 your design pressure and your failure pressure, what kind of  
9 system do you use in the plant, and when do you use them and  
10 how permanent are they and all the rest of that kind of  
11 stuff.

12           What came out of this study is that, man, there's  
13 a wide variation in the implementation. I mean, we were  
14 working off of San Onofre, which is basically recombiners  
15 with a backup purge that was never used. And then we found  
16 that at the plants that the recombiners were either off-site  
17 or on a warehouse on-site or somewhere.

18           So if you wanted to do something with hydrogen in  
19 the short term, you were going to have to use the purge.  
20 Also, believe it or not, they have systems called  
21 repressurization systems, because if you do design basis  
22 work, what happens is you don't reach the action levels in  
23 hydrogen until days into the accidents and by that time, you  
24 have cooled the containment to such a point that you don't  
25 have any driving point, any driving force to move the stuff

1 out, the hydrogen out of the containment. So you have a  
2 repressurization system.

3 This is caused by design basis accident analysis.  
4 So theoretically, you've got a system in a plant, if you're  
5 using purge, the way you have to pump up the containment to  
6 move out the hydrogen.

7 So we saw this and the recombiners, some of them  
8 were off-site, some of them were on-site, et cetera, et  
9 cetera.

10 What we saw is the use of the pressurization purge  
11 and the moveable recombiners, that's dangerous. It's  
12 dangerous to both the workers on-site and the people  
13 off-site.

14 If we have a severe accident and somebody opens up  
15 a purge valve, the calculations on the inner system LOCA and  
16 the steam generator tube ruptures are going to be dwarfed in  
17 comparison.

18 That's just a fact of life.

19 DR. KRESS: How big are those valves?

20 MR. CHRISTIE: Okay. The six we got, we got a  
21 six-inch, a four-inch and 48-inch butterfly.

22 DR. KRESS: Pretty good size lines, aren't they?

23 MR. CHRISTIE: Well, 48-inch butterfly is fairly  
24 big. They're using the normal purge, but they got a stop in  
25 it at 15 degrees instead of 90, which they -- then the other

1 thing is, what are these things going to do?

2 Suppose you really did, in a severe accident, open  
3 up a purge valve. You're going to saturate the HEPA filters  
4 without even blinking. They're going to be ineffective to  
5 beat the band, and who knows what's going to happen to the  
6 valves. The junk that's flowing through those valve paths  
7 are is just phenomenal.

8 I wouldn't -- again, I think everybody agrees it's  
9 not a good thing to do. No one would recommend opening a  
10 purge valve in a severe accident. Simple thing. No one  
11 would recommend hooking up a recombiner. We got recombiners  
12 that are stored off-site or stored on-site, where you have a  
13 pad right next to the reactor building containment, and  
14 theoretically, you're going to go hook up a recombiner in a  
15 severe accident.

16 Now, the doses at Three Mile Island were measured  
17 outside the reactor building, if I remember correctly, were  
18 measured in the tens to hundred R per hour range. You  
19 believe the workers are going to go out there and hook  
20 anything up? It's not going to happen, and we know that.

21 You see, it's not something we don't know. The  
22 other thing we checked out is that on all the large -- these  
23 are all large drives. What's the containment capability?  
24 Can you stand the burn without the recombiners, without the  
25 purge, without the monitors, without anything?

1 Fine. As far as we can tell, everybody has got  
2 more than enough capability to withstand a burn. Three Mile  
3 Island did. It was designed for 50 psi gauge, it probably  
4 had an ultimate of about 150. It stood 28 without even  
5 blinking.

6 And the hydrogen production rate at Three Mile  
7 Island was probably about as great as you can get, when you  
8 think of the zirc water we did. We drained it, we threw the  
9 water by it as we were draining it, then we filled it again,  
10 we drained and we threw the water by it again, then we  
11 drained it and threw the water by it.

12 I mean, if you were talking about how much  
13 hydrogen can you get out of the zirc water, you'd run a  
14 Three Mile Island accident. So we had, what, 45 percent  
15 zirc water, somewhere in that neighborhood, and about an  
16 eight percent containment volume and it burned and got a 28  
17 gauge.

18 The large drives, they can stand it. It's not --  
19 okay. Here's a personal belief of mine. I just don't  
20 like going to the plants and having the plant people  
21 understand that they're writing procedures for design basis,  
22 where the reality is they're not going to follow them, and  
23 if they did follow them, it was going to really be hurting  
24 people.

25 Now, these are not dumb people. Okay. But their

1 problem, again, is the application of probabilistic risk  
2 assessment at plants across the United States is not  
3 uniform. Not everybody does use PRA across the board.

4 So you've got to be careful. Some plants are  
5 still living in design basis space to a much greater degree  
6 than others.

7 So my problem is I don't like knowing that we got  
8 in the plants the potential for problem, knowing what the  
9 solution is, and we can't take immediate action.

10 Now, the plants are going to turn in their  
11 exemption requests, because they don't believe the  
12 rulemaking is going to be anything that's going to be fast,  
13 and the exemption request will take care of it, because  
14 we'll get rid of the recombiners and the purgers and the  
15 hydrogen monitors, et cetera, and you'll never have to worry  
16 about it. It will become blanked off for purges, et cetera.

17 But that takes a while. I mean, you know, we're  
18 thinking maybe about two in the month of July and a couple  
19 more and so on. And it just seems weird.

20 Now, we've had some discussions. Mr. Mike  
21 Snodderly just told me today there may be another way.  
22 Maybe we can go in and change the emergency operating  
23 procedures generically type of thing.

24 I suggested in my letter of May 30th an  
25 information notice to let people know that they shouldn't be

1 doing things like opening purge valves and moving  
2 recombiners in a severe accident.

3 So I think we're going to do something. It's  
4 just, myself personally, it takes a while. It just flat  
5 takes a while.

6 Why do we have a system where we have a known problem with a  
7 known solution and it takes the bureaucracy an awful  
8 inordinate amount of time to get the solution solved?

9 All right. Let's go. We're running out of time,  
10 but we'll see if we can get through.

11 Let's go the proposed rulemaking. The first thing  
12 we wanted to do was change Appendix A, Part 50, Appendix A,  
13 criterion 41.

14 If you look at criterion 41, what it says is  
15 you'll have a hydrogen control system and what it's going to  
16 do, it's going to reduce the concentration and quality of  
17 fission products released in the environment by postulating  
18 accidents and the control of the concentration of hydrogen  
19 or oxygen to the other substances in a containment  
20 atmosphere following postulated accidents.

21 Okay. So this is what it says. It says we're  
22 going to reduce the concentrations that can get out and  
23 we're going to control the hydrogen in. All right. And  
24 it's going to be postulated accidents.

25 Okay. Well, we know that the postulated accidents

1 don't work. So when we were looking at a GDC and you were  
2 asking how are you going to risk-inform the GDC. Okay. The  
3 first thing we're going to do is we thought we'd take out  
4 the stuff about the postulated accidents.

5 Providing things to reduce the concentration of  
6 fission products and to control hydrogen and oxygen for  
7 postulated accidents, that doesn't work in risk-informed  
8 space.

9 So what we said is, okay, let's write it this way.  
10 We're going to have systems to control fission products,  
11 hydrogen, et cetera, et cetera, to assure that the reactor  
12 containment is maintained for accidents in which there is a  
13 high probability for fission products to be present.

14 We moved it out of design basis space into severe  
15 accident space. Now, in some of the comments to the  
16 rulemaking, they said, well, you're going to have to define  
17 high probability. I agree, we're going to have to define  
18 high probability, but the reality is we already got the tool  
19 to do that. We got the risk assessments and every plant in  
20 the United States can define the sequences with high  
21 probability.

22 Now, where they cut it off or where everybody cuts  
23 it off, we'll argue about that till the day I die. But the  
24 reality is the plants have the tool, and so we've got this  
25 -- we re-created a GDC or a criterion to move it from design

1 to severe accident space. We think we've done a good job.

2 So we knew we had to change the GDC, because if we  
3 had changed 50.44, but we didn't change the GDC, then we're  
4 still in the postulated accident space, et cetera, et  
5 cetera, et cetera. It wouldn't work. So we've got to  
6 change the GDC, if you want to go to severe accident space.

7 Inerted containment, no problem. MARK 3 and ice  
8 condensers have to have the igniters, no problem. Leave it  
9 the same. We added one and this one is causing a lot of  
10 consternation.

11 We thought it was pretty simple. What we said was  
12 if you're a large dry and you're depending on the  
13 containment capability, which is what you're doing now, all  
14 the plants in the United States with large drys depend upon  
15 containment capability to stand the burn.

16 If that's what's going on, why the regulation that  
17 says withstand a burn? Okay. Regulation could correspond  
18 to risk. If the risk is the containment is going to  
19 withstand it or not, then write your regulation that says  
20 it.

21 So that we wrote it, say, and we put in words and,  
22 man, these words caused trouble, based upon realistic  
23 calculations, can withstand, without any hydrogen control  
24 system, hydrogen burn for accidents, again, with a high  
25 probability of existing -- of causing severe -- you know.

1           But to me, this is the words that you got to have  
2 in severe accident space.

3           Now, the beauty of this is every large dry in the  
4 United States has already done this. We've all done  
5 mid-core. We all went back after Three Mile Island and all  
6 of us looked at it, the NRC looked at it, the industry  
7 looked at, and all of use evaluated the ability of the large  
8 dries to withstand the burns.

9           We all evaluated it in the 51.09 backfit space.  
10 We all said they can withstand the burns, we don't need the  
11 igniters in the large dry.

12           So what this proposed rule says, let's make our  
13 knowledge that came out of Three Mile Island and all this  
14 stuff from mid-core and so on and so forth, let's make it  
15 correspond to what we're doing today. We are basing it on  
16 the ability of large dries to withstand the burns. Write the  
17 regulation to say large dries withstand the burn.

18           DR. KRESS: When you talk about hydrogen control  
19 system, does that include something to be sure the hydrogen  
20 is mixed and doesn't reach --

21           MR. CHRISTIE: Yes. That's the other part. We'll  
22 go back in the 50.44. We didn't change any of that mixing.

23           DR. KRESS: That's still part of it.

24           MR. CHRISTIE: Right. This is a whole package.

25           DR. KRESS: Then why did you choose 75 percent?

1 MR. CHRISTIE: Because that's what is in there,  
2 that's the igniter.

3 DR. KRESS: That's already in there.

4 MR. CHRISTIE: If you had a large dry that  
5 couldn't withstand a burn, then you go through the backfit  
6 process to see whether you put the igniters in. If the  
7 backfit process says put the igniters in, you put the  
8 igniters in. That's all this proposal will say.

9 DR. KRESS: Okay.

10 MR. CHRISTIE: It's, we think, pretty simple and  
11 it says, hey, this is what we're doing out there in the  
12 world, write the regulation to say what you're doing in the  
13 world.

14 We wanted to make the regulations and the risk  
15 comparable. I mean, that's the whole purpose of  
16 risk-informed performance-based regulation. And we think  
17 we've done it. That's what we think.

18 And this is just the same thing for the high point  
19 vents.

20 DR. KRESS: Let me ask about large dries. Clearly,  
21 in my mind, they can withstand the hydrogen burn, but a  
22 hydrogen burn with igniters spreads the pressure out over a  
23 long period.

24 MR. CHRISTIE: I'm not sure that that's true.

25 DR. KRESS: It burns the hydrogen as it goes in,

1 supposedly.

2 MR. CHRISTIE: It depends on when they're turned  
3 on and how fast the stuff goes.

4 DR. KRESS: Yes, but that's the general idea.  
5 Whereas if you didn't have igniters in those, then you could  
6 build up the hydrogen to a pretty high level. They're  
7 designed so you don't get up to detonation levels,  
8 generally, but you can get up to a pretty high level and  
9 then ignite them by some ignition source and you get a much  
10 different kind of pressure spike.

11 MR. CHRISTIE: Three Mile Island is proof of that.

12 DR. KRESS: Yes. Would there be any difference in  
13 the nature -- I'm also assuming if you've got that much  
14 hydrogen in there, you're in a severe accident and you also  
15 have fission products present at the same time.

16 MR. CHRISTIE: Sure.

17 DR. KRESS: Would there be much difference in the  
18 release of fission products and their subsequent  
19 consequences between those two scenarios?

20 MR. CHRISTIE: No, because in order to get the  
21 fission product releases, if you got that point, just like  
22 we did at Three Mile Island, you're going to have to have  
23 heat removal. Containment heat removal has got to fail.  
24 Whether you burn it fast, slow, it doesn't matter. What's  
25 going to happen is the containment is going to stand the

1 burn, whether it's slow or fast doesn't matter.

2 DR. KRESS: I'm assuming that you still have  
3 leakage, normal leakage path, and --

4 MR. CHRISTIE: But the amount of material that's  
5 getting out in the normal leakage path is so infinitesimal  
6 and such a small -- I mean, what -- we're not going to --

7 DR. KRESS: You say it's not worth worrying about  
8 that difference, is what you're saying.

9 MR. CHRISTIE: Not worth worrying about. Not  
10 worth worrying about. Not that I can see, Tom. I mean, you  
11 know, we -- I think. And Lord only knows that we've spent  
12 gobs of money.

13 DR. KRESS: Suppose the difference between those  
14 types of burns meant you -- in the one burn with the  
15 igniters, you were below 10 CFR 100, and the other burn, you  
16 were just a little above it. Is that something that --

17 MR. CHRISTIE: I'll tell you this, flat. If  
18 you're in severe accident space --

19 DR. KRESS: You don't worry about 10 CFR 100.

20 MR. CHRISTIE: 10 CFR 100 is long gone, in my  
21 mind. If the tech support center is worried about 100, when  
22 we're in a severe accident, especially Three Mile Island, we  
23 --

24 DR. KRESS: They're focusing on the wrong thing.

25 MR. CHRISTIE: Yes. We ought to start replacing

1 that tech support center fast.

2 I'm almost close to being on time. To summarize,  
3 I have and others have -- a sufficient knowledge exists to  
4 change the regulation of combustible gas control. We don't  
5 need anymore studies, we don't need anymore work. We don't  
6 - you know, we can spend hundreds of millions of dollars  
7 more if we want to, but we don't need to.

8 We're done. I mean, enough is enough. I  
9 absolutely believe that if you're going to rewrite the  
10 regulations, you've got to focus them on the severe  
11 accident. I mean, that's just the way you've got to write  
12 the regulations.

13 I know that's a major cultural change with the  
14 staff of the Nuclear Regulatory Commission and they are also  
15 included as a major regulatory change for the staffs at the  
16 nuclear power plants, but we've got to get through that. I  
17 mean, we've got to.

18 In order to have more effective and efficient  
19 regulations, we've got to get through that.

20 DR. APOSTOLAKIS: Actually -- go ahead.

21 DR. KRESS: Go ahead. I've asked enough. You go  
22 ahead.

23 DR. APOSTOLAKIS: Isn't the notion, the very name  
24 severe accident tied to design basis accident, the concept  
25 of design basis?

1 MR. CHRISTIE: I don't think so.

2 DR. APOSTOLAKIS: Beyond design basis is severe.

3 DR. KRESS: In a sense, that's an arbitrary thing,  
4 but to say the regulations ought to focus on severe  
5 accidents, which is what I heard right there, seems a little  
6 bit problematic to me, because the reason the severe  
7 accidents are the risk dominant ones is because the  
8 regulations have gotten rid of all of the high frequency --

9 MR. CHRISTIE: I disagree with that completely. I  
10 disagree with that completely.

11 DR. APOSTOLAKIS: But I think you can rephrase it.  
12 Let's say we start with a clean slate. Instead of using  
13 terminology that is really tied to the existing system, what  
14 you're really saying there is focus on risk.

15 DR. KRESS: Yes.

16 MR. CHRISTIE: Okay. That would be appropriate.  
17 I accept that.

18 DR. APOSTOLAKIS: Which now will lead you -- what  
19 does it mean to focus on risk? Well, you are going to the  
20 sequences of events that dominate that risk.

21 MR. CHRISTIE: That's right.

22 DR. APOSTOLAKIS: And you are free now from design  
23 basis or whatever. You look at the sequence and say what's  
24 the best job I can do to make sure the risk is low.

25 DR. KRESS: I think that would be a good approach.

1 DR. BONACA: I think there is space for both  
2 needs. When you design ECCS systems, you are using some  
3 requirements of the existing law that make sense. You are  
4 designing how much water do you need to deal with some  
5 limiting accidents of some type.

6 Now, when you evaluate the response of other  
7 systems, you may need to focus the way you're saying. What  
8 I'm trying to say, you cannot exclude it. It's the same way  
9 in which, after TMI, we discovered that using the analysis  
10 made to design the plants, to train the operator was wrong,  
11 because life, things don't move the way that the analysis  
12 for designing the plant moved.

13 So in designing the plant, you are looking at  
14 limiting events to build equipment that will deal also with  
15 the limiting event. In training the operator, you develop  
16 analysis that gives you what will really happen in most  
17 cases, so that the operators are able to deal with those  
18 issues.

19 So I'm only saying that to say we only should  
20 focus on severe accident is somewhat limiting insofar as  
21 regulation is concerned, because you still have some design  
22 objectives that you want to maintain there. Who knows?  
23 Maybe we'll beat another plant ten years from now.

24 DR. APOSTOLAKIS: Yes, but that's not in the  
25 present. Anyway, we understand the spirit of this.

1 MR. CHRISTIE: Yes. We've been through this many  
2 times. Okay.

3 The next thing is when we put together the  
4 proposed rulemaking, again, it's a first of a kind and we  
5 were doing the best job we could.

6 But what we thought -- and, see, this is our  
7 framework. Our framework starts on public health risk is  
8 dominated by severe accidents, with containment bypass and  
9 breach, probabilistic risk assessment is the best tool to  
10 measure it.

11 You're going to focus on the sequences that are  
12 most significant, and so on and so forth.

13 So our framework just said, okay, let's start with  
14 that kind of a philosophical approach to the whole problem  
15 and then let's just go ahead -- and what we said is let's  
16 retain whatever is in there that's effective and efficient.

17 So if you got high point vents, if you got  
18 inerting, if you got igniters for the MARK 3, and so and so,  
19 fine, retain it. Just keep it. No sweat. Add where  
20 necessary.

21 We added the section that had to do with the large  
22 drys, checking their containment capability.

23 Now, we would believe that that would be an  
24 appropriate addition to the rulemaking process to cover the  
25 large dry plants.

1           In essence, we've already done it. Let's just put  
2 it in the regulations. To me, it passed the backfit rule.

3           DR. KRESS: Because you've already done it.

4           MR. CHRISTIE: Right.

5           DR. KRESS: It's not going to cost you very much,  
6 is it?

7           MR. CHRISTIE: Right. You've already done it, it  
8 doesn't cost you anything, and it meets the backfit rule.  
9 And then delete whatever is not effective and efficient.

10           We wiped out, and I think we got agreement now, we  
11 wiped out all the post-LOCA design basis hydrogen  
12 requirements. I mean, to me, it's a simple problem in just  
13 -- I don't need option three, I don't need option two. I  
14 can sit down and write a rule to address the specific thing  
15 just doing exactly what I said.

16           Go through, identify the things that are important  
17 in probabilistic risk assessment space, retain what's  
18 effective and efficient, add where it's necessary, and  
19 delete whatever is left.

20           I absolutely believe this is -- this petition for  
21 rulemaking is a risk-positive thing. By that, I mean the  
22 potential for health effects on people surrounding the plant  
23 will be less if this petition for rulemaking is approved  
24 than if it's not.

25           We have identified certain problems with the

1 existing regulations, which have to do with distracting the  
2 operators, having the potential for purge valves open,  
3 having the potential for guys wandering around the yards  
4 after severe -- you know, et cetera, et cetera.

5 We can eliminate those. We can have not only a  
6 safer plant, but a more cost-effective. I think it's -- why  
7 aren't we doing this tomorrow? I mean, that's the thing  
8 that's driving me the nuttiest.

9 It's everybody comes out ahead. I sat there in  
10 that meeting with the Commissioners on the 20th and had  
11 people come up and say the industry is only interested in  
12 the economics and we'll -- you know, that's all we're --  
13 we're not. We're interested in doing things that make the  
14 plants better, both from a safety standpoint and an  
15 economic.

16 Anything that makes it better, and both is our  
17 first priority.

18 DR. KRESS: What is the status of your petition?

19 MR. CHRISTIE: You'll find out this afternoon. I  
20 hope you ask, and ask well.

21 DR. BONACA: I have a question. On your slide C,  
22 where you're talking about basing the removal of -- for dry  
23 containment based on the reactor containment capability.

24 MR. CHRISTIE: Right.

25 DR. BONACA: For the first time really, you are

1     tying a requirement to a severe accident assumption of  
2     performance in the containment.

3             What I mean is that if you look at the  
4     containments, the way they are today, they are designed to  
5     meet whatever the design requirement, assuming the design  
6     basis, say 50 psi capacity.

7             And then in your presentation, you're saying 140,  
8     130 psi capability. We made these estimates for the PRAs.  
9     They were based on the original design of the containments.

10            Now, we know containments with aging go through  
11    relaxations. There are relaxation of tendons and there are  
12    requirements that by the time they get down to certain  
13    values, these tendons be retensioned and things of that  
14    kind.

15            But that's an interesting concept, because you are  
16    tying a specific requirement to a performance, which right  
17    now is not being regulated. It's just an estimate.

18            And the question I have is, for example, would it  
19    be a problem for a containment?

20            MR. CHRISTIE: To the best of my knowledge, it's  
21    not. We've already been through this. It's not a problem  
22    for the containment.

23            DR. BONACA: No, no, no. We haven't gone through  
24    this, I'm sorry. We have used the original design of the  
25    containments to perform an estimate of their ultimate

1 capability. But the fact is when you monitor containment  
2 tendons performance, you allow them to relax, until they get  
3 to a certain limit, where the capability for design basis  
4 used is challenged and then you are going to replace and  
5 retention and so and so forth. You have programs to do  
6 that.

7 So I'm saying that the age of a containment, its  
8 ultimate capability may not always be at the level we use  
9 for the IPES or the PRAs.

10 MR. CHRISTIE: Okay. And, again, I'm going back  
11 to the -- we've had a test case for large drys and hydrogen  
12 combustion. It's called Three Mile Island Unit 2. In  
13 there, this was a containment designed for 50, probably had  
14 an ultimate of 150.

15 We produced hydrogen in Three Mile Island in  
16 bushels, probably more than we're ever going to ever produce  
17 again. The spike was less than the design. Okay.

18 We can argue, hey, it might be 30 psi if we had  
19 done something different, et cetera, et cetera, but the  
20 difference between 30 and 150 is -- fine, maybe 20 years  
21 from now, the containment ultimate is 135. I don't care.

22 I mean, as long as we've got this kind of tool  
23 that allows us to put these things in perspective and to  
24 make decisions to spend money, we've got to use it.

25 If we don't use it, then we won't be as effective

1 and efficient. And I'm the last person in the world to say  
2 it's the perfect tool, I'm the last person to say that it's  
3 going to be fixed in concrete and we're never going to  
4 change our knowledge base and what we know and understand.

5 I'm the opposite. I think it's going to change  
6 constantly and we've got to be -- and I'm with you. We've  
7 got to be aware of those.

8 But what I want to focus on is the things that are  
9 safety significant. I want to stop spending the money on  
10 the things that aren't safety significant.

11 DR. BONACA: I agree with you 100 percent.

12 MR. CHRISTIE: Okay.

13 DR. BONACA: But there has to be some defensible  
14 technical basis for everything that we are going to discuss  
15 and accept.

16 I'm saying that I see the reference here to the  
17 ultimate capability of containments. There has been a  
18 criterion in here proposed that bases itself on that  
19 capability and I'm saying the capability, however, is not  
20 one that is guaranteed.

21 In fact, it varies because all the monitoring  
22 systems for the capability are not focusing on the ultimate  
23 capability, they are focusing on the design pressure of the  
24 containment, which is well below that.

25 MR. CHRISTIE: I do not read --

1 DR. BONACA: That is what's being preserved. What  
2 is being preserved is a design capability of the  
3 containment. That's all I said.

4 MR. CHRISTIE: I don't see anywhere in that  
5 proposed rulemaking that says that we're using the ultimate  
6 capability. We're just saying that the large drys are going  
7 to check their containment capability. We don't use  
8 ultimate capacity. We just say for high probability events,  
9 check your containment capability.

10 Whether you use design, whether you use ultimate,  
11 whatever you do, that's for the people at the plants to  
12 decide how to do it, and they've done it.

13 Now, the last thing is, and this goes to the  
14 schedule and where we stand. You've got to remember that  
15 this rulemaking didn't come from me as a rulemaking effort.  
16 It came from me as a letter to the Commissioners saying  
17 based upon what I read in the San Onofre safety evaluation  
18 report, we've got a problem and here is my solution to the  
19 problem.

20 And the Commissioners sent it down to the Office  
21 of Nuclear Reactor Regulation for fix. The fix that Nuclear  
22 Reactor Regulation and I have worked out is the rulemaking.

23 This is a rulemaking. This is not part of option  
24 three, it doesn't depend on option there. When we agreed to  
25 rulemaking, it had nothing to do with option three.

1           The letter I sent back in to NRR -- and I was  
2 dealing with NRR and I'm still dealing with NRR on the  
3 rulemaking -- it says fine, if you want to take this over to  
4 the option three people in Research and treat it as one of  
5 the things that they should be using as the first set of  
6 things to do, I have no problems with that. But this is a  
7 rulemaking.

8           Okay. The status of it is today, the people who  
9 are doing option three tell me -- well, first off, in the  
10 February meeting, they told us they'd have recommendations  
11 to the Commission in June. Now, as I understand it, the  
12 recommendations go to the Commission in August, but they'll  
13 talk to you about that I hope this afternoon.

14           But it's not a rulemaking. The recommendations  
15 that they're going to make to the Commissioners in August  
16 are not -- they were explicit that it's not going to be a  
17 rulemaking.

18           What they're going to send is something to the  
19 Commissioners that's going to recommend something and then  
20 they're going to wait for the Commissioners to make a  
21 decision as to what to do and then they're going to start a  
22 rulemaking process.

23           And I'm looking at the thing and I'm saying to  
24 myself, wait a minute, we sent it in, we didn't send it in  
25 as a rulemaking, but then we agreed that the rulemaking was

1 the best way to handle the thing, and you're going to send a  
2 recommendation up that doesn't say rulemake.

3 It doesn't make any sense to me. Now, I don't  
4 understand the bureaucracy at the Nuclear Regulatory  
5 Commission any more than I'm sure they do, but it just  
6 doesn't seem to me to be efficient to go back and start a  
7 whole new affair. We've got a rulemaking, we've got a  
8 petition. We've been through the public comment period.

9 If you wanted a -- if the staff of the Nuclear  
10 Regulatory Commission wanted to push that through, all they  
11 got to do is say, boom, final rulemaking, and away it goes.

12 Now, if the staff of the Nuclear Regulatory  
13 Commission doesn't want to have the petition approved, fine,  
14 then they say they don't want to have it approved and here's  
15 the following reasons and they send me a letter back saying  
16 we've considered it, but we don't want to do it, and too  
17 bad.

18 DR. KRESS: Well, it seems to me like if NRC has  
19 embarked upon option three, which is risk-informing a great  
20 deal of Part 50, and that they have a priority system on  
21 which regulation they're going to do first and that if this  
22 one fits into that priority system, so that it gets early  
23 attention, and that all they're doing is trying to figure  
24 out what they mean by risk-informing the rule, it seems like  
25 it's appropriate to include it under that process.

1 MR. CHRISTIE: I have no problem at all.

2 DR. KRESS: That's the way I read what's going on.

3 MR. CHRISTIE: The way I read it is they're going  
4 back to square one.

5 DR. APOSTOLAKIS: We'll ask them this afternoon.

6 MR. CHRISTIE: Right. Ask them this afternoon.  
7 The things that I have a problem with right now are the bit  
8 about station blackout for the MARK 3's and the ice  
9 condensers. It doesn't make any technical sense to me. And  
10 then where in the world are we with respect to getting a  
11 rulemaking gone?

12 I think we've got a good rulemaking. I think  
13 we're very close to having complete agreement on a  
14 rulemaking, as far as I can tell.

15 DR. APOSTOLAKIS: Okay. Thank you very much, Bob.  
16 We will recess until 12:45.

17 [Whereupon, at 11:47 a.m., the meeting was  
18 recessed, to reconvene at 12:45 p.m., this same day.]

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## A F T E R N O O N S E S S I O N

[12:47 p.m.]

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2  
3 DR. APOSTOLAKIS: We are back in session. This  
4 afternoon we will discuss the risk-informed revision of 10  
5 CFR Part 50 option three and 10 CFR 50.44.

6 I understand most of the presentation is on 50.44.  
7 I thought it was to be on option three. I don't know.

8 I have a number of comments on SECY-00-0086, which  
9 I don't know now how we can transmit to you and when the  
10 committee will have a chance to review that, because this is  
11 a very important document.

12 At some point, we will have to write a letter, I  
13 suppose. That would be sometime in December, Tom?

14 MR. KING: I think we're talking about two  
15 letters, probably. We owe the Commission a paper in August,  
16 which is primarily to present our recommendations on 50.44,  
17 but, also, as part of that paper, we're going to provide an  
18 updated framework document, recognizing that this is all  
19 work in progress and things are evolving as we go.

20 We're also going to present the Commission any  
21 policy issues they have to deal with and we're going to talk  
22 about those today.

23 I think these are policy issues that aren't  
24 limited to 50.44. These are broader policy issues. It was  
25 50.44 that brought them out.

1 DR. APOSTOLAKIS: So in July we will have to write  
2 a letter.

3 MR. KING: So I would like a letter either in July  
4 or, at the latest, I know you don't have an August meeting,  
5 but you have a meeting starting August 30th, I think, your  
6 September meeting, that would probably be the latest for  
7 that August paper.

8 Then in December, we owe another report to the  
9 Commission and we would probably be asking for a letter on  
10 that one, as well.

11 DR. APOSTOLAKIS: And that would be on option  
12 three, independent of 50.44.

13 MR. KING: Well, 50.44 is part of option three,  
14 remember. It's the first test case that we're running  
15 through the framework.

16 DR. APOSTOLAKIS: But we haven't discussed the  
17 framework, that's my concern.

18 MR. KING: We had discussed it back in March or  
19 so. We went through the framework. You had given us a  
20 number of comments. We didn't ask for a letter.

21 DR. APOSTOLAKIS: Without the benefit of a  
22 document, though. We had the viewgraphs, I remember, but  
23 not the document. I mean, this is the first time I see this  
24 document and it's being transmitted to the Commissioners  
25 April 12.

1 MS. DROUIN: It was transmitted then, but it was  
2 out for public comment. The first of February, we sent it  
3 to the public document room. It was on the web site. So  
4 it's been out there since February 1.

5 DR. APOSTOLAKIS: Well, sure, but --

6 MR. KING: Recognize, the April 12 package is not  
7 the final framework. It was a status report and we gave the  
8 Commission what we called a draft framework. It represented  
9 work that was done up to that time and the framework is  
10 evolving as we proceed and we get into these test cases.

11 So your comments on the framework are certainly --  
12 it's not too late. We certainly are interested in those. I  
13 mean, if you want to give those to us today, fine. If you  
14 want to talk about them, if you want to schedule another  
15 meeting to talk about them, whatever.

16 DR. APOSTOLAKIS: I don't know how the members  
17 feel.

18 DR. KRESS: I think it's an extremely important  
19 document and we ought to schedule a meeting and get the full  
20 benefit of comments from as much of the committee as we can,  
21 the subcommittee anyway.

22 MR. KING: We got comments -- not recently -- a  
23 couple months from NEI on the framework. We're having a  
24 meeting with them tomorrow to talk about their comments on  
25 the framework.

1 So they continue to come in as time goes on.

2 DR. KRESS: This is a seminal document. We really  
3 ought to --

4 DR. APOSTOLAKIS: It's a big thing. We can  
5 decide. I don't know. Mario, do you have any thoughts?  
6 Bill? Bob? Jack? Any comments?

7 MR. KING: It would be useful to do that, though,  
8 before this August paper goes up. The sooner the better.

9 DR. KRESS: We'd have to do it with subcommittee  
10 then?

11 MR. KING: But when?

12 DR. KRESS: Just have a subcommittee of the whole.  
13 Get all the members here.

14 DR. APOSTOLAKIS: The problem with full committee  
15 meetings is that you can't really get into detail.

16 DR. KRESS: You can't get into enough detail for  
17 this document at the full committee. I'd rather have a  
18 subcommittee of the whole and have a full day of it, at  
19 least, maybe even more, if they would agree to it.

20 MR. KING: We're having our own internal retreat  
21 on the framework document and 50.44 on July 14, as you know.  
22 Even internally we're getting some comments on it.

23 DR. BONACA: Will you be here the morning of the  
24 11th?

25 DR. APOSTOLAKIS: I will be here in the morning,

1 yes, Tuesday morning, the 11th. In fact, the P&P meeting  
2 can be pushed a little bit into the afternoon, or another  
3 way would be to maybe do the P&P in the morning, finish with  
4 it.

5 DR. BONACA: We can adjust that.

6 MR. KING: That would be much better for us,  
7 because we have a meeting with NEI in the morning of July  
8 11th.

9 DR. KRESS: We could cover it pretty well in half  
10 a day, I think.

11 MR. KING: Half a day would probably be --

12 DR. APOSTOLAKIS: I'm sorry. What?

13 MR. KING: A half a day meeting would probably be  
14 enough.

15 DR. APOSTOLAKIS: Half a day, you know, four to  
16 five hours. I don't think we need more to that.

17 MR. KING: The afternoon of July 11th is okay.

18 DR. APOSTOLAKIS: We have to coordinate it with  
19 the Chairman of the committee so that the P&P subcommittee  
20 meeting --

21 MR. KING: We come to you again on the 12th as a  
22 full committee, but we only have two hours.

23 DR. APOSTOLAKIS: It's out of the question. We  
24 have to get into it in more detail. I mean, this is one of  
25 the major changes in the regulation.

1           So let's say until we settle it with Dr. Powers,  
2 that the 11th, which is a week from this coming Tuesday,  
3 right?

4           MR. KING: Right.

5           DR. APOSTOLAKIS: We'll try to find a block of  
6 four hours or so.

7           DR. SHACK: That's Tuesday afternoon.

8           DR. APOSTOLAKIS: Tuesday afternoon, so that  
9 members can fly down in the morning. The ones who are  
10 members of P&P will have to come Monday night anyway. Does  
11 Noel know that?

12          MR. MARKLEY: Noel is going to check with Dana  
13 now.

14          DR. APOSTOLAKIS: Yes, but he should propose that  
15 the P&P be in the morning.

16          MS. DROUIN: At this meeting, George, are you  
17 looking for more a round tabletop discussion where you would  
18 just be walking through and giving us --

19          DR. APOSTOLAKIS: I'm sorry, Mary. What did he  
20 just tell us? 1:00 for us.

21          MR. MARKLEY: 1:00 for us.

22          DR. APOSTOLAKIS: I'm sorry. Go ahead.

23          MS. DROUIN: Are you more interested in just  
24 sitting down and going through the report and having more of  
25 a roundtable discussion or us preparing a formal

1 presentation?

2 DR. APOSTOLAKIS: Well, you must have presented  
3 this to other people. I don't want you to spend extra time  
4 preparing. I mean, it's always helpful if you guide the  
5 discussion by a set of viewgraphs, but if you have to start  
6 from scratch, no.

7 MR. KING: We could take previous viewgraphs and  
8 hit the high points.

9 DR. APOSTOLAKIS: The things that you have used  
10 already, because we can always go page by page.

11 DR. BONACA: Actually, you have a number of charts  
12 in the report.

13 MR. KING: Yes.

14 DR. BONACA: That you can push that out and we can  
15 --

16 DR. APOSTOLAKIS: But a lot of this stuff I see  
17 for the first time, like the prioritization decision tree.  
18 In fact, we will ask the whole committee to come. This will  
19 be a subcommittee with the full committee present.

20 MS. DROUIN: I think we ought to give them the  
21 more updated version.

22 MR. KING: There obviously isn't much time.

23 MS. DROUIN: George, as Tom had pointed out, this  
24 has been a living document.

25 DR. APOSTOLAKIS: Exactly.

1 MS. DROUIN: And we have been receiving comments  
2 and as we have received them, we have been updating it. I  
3 think it would probably help for you to not -- we can get it  
4 to you this afternoon, right away, the more updated version.

5 DR. APOSTOLAKIS: If I can get it this afternoon,  
6 that's fine with me, because I'm going out of the country  
7 this weekend.

8 MS. DROUIN: We can give it to you. In fact, I  
9 have one right here, I can get it copied right away.

10 DR. APOSTOLAKIS: Are there dramatic changes?  
11 Because I've marked this up.

12 MS. DROUIN: In terms of the basic framework,  
13 those figures, no, but chapter five, which talks about the  
14 implementation, the prioritization and everything, that has  
15 changed quite a bit.

16 DR. APOSTOLAKIS: So the members who have not read  
17 it have an advantage here.

18 DR. BONACA: Well, we'll need to see it sometime  
19 next week.

20 DR. APOSTOLAKIS: Yes. So I think it's a good  
21 idea. Tuesday.

22 MS. DROUIN: I can give it to you right now. I  
23 have it right here in front of me.

24 DR. APOSTOLAKIS: Tuesday, I hope Dana will agree.

25 MR. KING: So we'll plan July 11th, in the

1 afternoon then.

2 DR. APOSTOLAKIS: Let's plan on that, until we  
3 hear from Dr. Powers.

4 MR. KING: And you'll probably get -- maybe touch  
5 on some of the framework issues today as we go through  
6 50.44.

7 DR. APOSTOLAKIS: Of course.

8 MR. KING: All right. For the record, we have put  
9 on the front slide the primary participants who have been  
10 working on the 50.44 issue. They're not all at the table.

11 With me at the table, for the record, my name is  
12 Tom King, from the Office of Research; John Lehner, from  
13 Brookhaven National Laboratory; Mary Drouin, from the  
14 Research staff; Trevor Pratt, from Brookhaven; and, Allen  
15 Camp, from Sandia.

16 As I said, we're not asking for a letter at this  
17 point. This is a status report. We're going to focus on  
18 50.44 and we're going to touch on some of the potential  
19 issues that will probably be in the paper that goes up to  
20 the Commission in August.

21 Some are policy, some are technical, but even the  
22 technical ones even have some policy nature.

23 So any thoughts you folks have on issues would be  
24 very useful to get today, so we can start to formulate them  
25 for the paper.

1 Stakeholder input. One question we had gotten was  
2 that you were interested in talking about the January 19  
3 letter we got from Joe Colvin of NEI. It basically came in  
4 and reported the results of a survey that NEI had taken of  
5 the industry.

6 It was an attempt to give us some information on  
7 their priorities and potential cost savings associated with  
8 risk-informed changes they'd like to see, and that would  
9 help us prioritize our activities.

10 We did get the letter. We basically found it  
11 matched up pretty well with the priorities we had already  
12 come to from our own thinking and previous discussions among  
13 ourselves and with industry folks.

14 We had also gotten a letter dated April 18 from  
15 Steve Floyd to myself, with a lot of comments on the  
16 framework document. If you don't have that, I've got a copy  
17 here you can have. You do have it?

18 DR. APOSTOLAKIS: Yes.

19 MR. KING: Okay. And as I said, tomorrow we're  
20 meeting with NEI on the comments in that letter.

21 We had responded to the Colvin letter. It was  
22 just a short response thanking them for their input and  
23 recognizing that the main points in their letter we were  
24 accommodating as part of our framework and option three  
25 work.

1           That's all I really intended to say about the  
2 January 19 letter. I don't know if you have any other  
3 specific points you want to get into.

4           DR. KRESS: I had, I guess, a question. The 19th  
5 letter had some associated cost-benefit savings that NEI had  
6 gotten from their survey.

7           MR. KING: Yes.

8           DR. KRESS: Do you have any plans for using those  
9 numbers in any way in this process?

10          MR. KING: I think those numbers will certainly  
11 help us in trying to prioritize our work. If we see  
12 regulations that look like they would have a large  
13 cost-benefit impact associated with them, they may go more  
14 toward the top of the list of things we work on first.

15          DR. KRESS: But they won't be used -- I think  
16 prioritization --

17          MR. KING: That's not the only factor.

18          DR. KRESS: Prioritization is a good thing to use  
19 them for, but I was concerned that you may have some sort of  
20 an inverse backfit part of your system that has as  
21 cost-benefit type of --

22          MR. KING: We're going to get to that issue when  
23 we get to the slides.

24          DR. KRESS: You wouldn't use those numbers for  
25 that, though.

1 MR. KING: If we do some sort of reverse backfit  
2 test, those numbers could be useful. But whether we do one  
3 or not is an issue at this point. I was going to talk about  
4 that when we get to another slide.

5 DR. KRESS: I'll wait.

6 MR. KING: In terms of prioritization, I mean,  
7 clearly safety is the first factor.

8 DR. KRESS: Of course.

9 MR. KING: If we go through a risk-informed look  
10 at something and there's a safety issue that really goes to  
11 the to of the list. But then there's other factors to sort  
12 out the other things, and cost is one of them.

13 The other thing I want to mention, maybe you're  
14 not aware of, is some members of the Research staff had a  
15 meeting with Commonwealth Edison a week or so ago, June  
16 14th, actually, where Commonwealth Edison gave out quite a  
17 detailed list of changes that they feel could be made,  
18 risk-informed changes to the regulations, and cost savings  
19 associated with them.

20 They went into more detail than the Joe Colvin  
21 January 19 letter. If you are interested in that list, I've  
22 got a copy of it here. You might find it interesting to see  
23 what they have to say.

24 DR. UHRIG: I don't think we have it.

25 MR. MARKLEY: What we have is a June 7 NEI letter.

1 DR. BONACA: That's right.

2 MR. MARKLEY: That's the latest thing you have.

3 MR. KING: This is the results of the June 14  
4 meeting, but it's publicly available. This is an extra  
5 copy, if you want to take it.

6 With that, I'm going to turn it over to Mary to  
7 talk about our approach and the alternatives we've come up  
8 with on 50.44.

9 MS. DROUIN: We weren't planning on getting into  
10 any of the details of the framework, but we wanted to talk a  
11 little bit about the framework, because it does establish  
12 our approach and how we came up with our options.

13 We have developed a framework and in developing  
14 that framework, what we tried to do was blend the principles  
15 from Regulatory Guide 1.174 with the cornerstones that are  
16 outlined in the oversight program for safe nuclear power  
17 plant operation.

18 So what we tried to do there was balance an  
19 accident prevention and accident mitigation to achieve a  
20 defense-in-depth approach in building the framework.

21 The way we went about trying to achieve this  
22 defense-in-depth balance is that we defined four strategies  
23 in the framework and these four strategies were looking at  
24 limiting your initiating events, or limiting your core  
25 damage accidents, or limiting your radionuclide releases, or

1 limiting your public health effects.

2 And taking these strategies and this accident  
3 prevention and mitigation, we then came up with quantitative  
4 guidelines for these. We only developed these quantitative  
5 guidelines to help us frame the options, such that when we  
6 come up with a risk-informed option, we wanted to make sure  
7 the option was neither too conservative, such that we were  
8 imposing undue conservatism or undue burden; at the same  
9 time, we wanted to make sure an option is not too relaxed.

10 So whereas we don't expect to ever see this  
11 quantitative guidelines in a regulation, they're just  
12 helping us put it in the ballpark, such that we have  
13 achieved these strategies in maintaining our  
14 defense-in-depth.

15 DR. KRESS: Might those numbers appear in a reg  
16 guide or somewhere else?

17 MS. DROUIN: They could appear in a reg guide for  
18 -- and I'm going to get to that in one of our options on  
19 50.44.

20 DR. KRESS: At the moment, those numbers are  
21 intended to be means.

22 MS. DROUIN: Yes.

23 DR. APOSTOLAKIS: I have two comments already on  
24 this. I don't think that calling it balanced high level  
25 defense-in-depth really represents what you're doing and you

1 say that also in the document, the approach recommended by  
2 the ACRS and adopted herein is a structure of this high  
3 level defense-in-depth approach.

4 Well, the ACRS recommended the preliminary  
5 framework that also addressed what to do at lower levels,  
6 and you are very silent on this in this chapter two, to the  
7 point where one wonders have you rejected this or what do  
8 you plan to do at lower levels.

9 But then you go to chapter four and on page 4-3,  
10 it says decisions regarding lower level defense-in-depth in  
11 the form of redundancy or diversity are generally well  
12 suited to this type of analysis, which is a PRA.

13 I mean, you just said it was a PRA, that's what it  
14 refers to. So I was wondering why you focus so much on high  
15 level defense-in-depth and you don't actually say this is  
16 defense-in-depth at the high level, rationalist at the lower  
17 level, except when the uncertainties are such that  
18 defense-in-depth must be invoked at lower levels, as well,  
19 as you strongly imply later that you're going to do.

20 I mean, if I read chapter two, the only thing you  
21 are telling me is that at the high level, you are  
22 structuralist, and nothing on anything else. But later on  
23 in the implementation, you say, no, no, no, we're going to  
24 use PRA at lower levels.

25 I'm just wondering why that was --

1 MS. DROUIN: Are you disagreeing with what's later  
2 on in the --

3 DR. APOSTOLAKIS: I am not disagreeing. I'm just  
4 wondering why you focus so much on the high level  
5 defense-in-depth and even in your title here says balanced  
6 high level. What happens at lower levels?

7 MS. DROUIN: I think that is one of the comments  
8 from other people and from ourselves that we have noticed in  
9 the document is this inconsistency of things written in one  
10 part of the report and the other.

11 That's not meant to be.

12 DR. APOSTOLAKIS: No, I understand. I'm just  
13 making the comment. When I read it, I was wondering,  
14 because you talk about structuralist and rationalist, and  
15 they say we're going to apply structuralist at the high  
16 level.

17 So I said, well, gee, on the next page they're  
18 going to tell me why rationalist at lower levels is a crazy  
19 idea, because they don't want to use it. But you are  
20 completely silent.

21 But then when it comes to chapter four, you are  
22 speaking about it matter of factly, yes, and we're going to  
23 do PRA evaluation.

24 So I think it needs tightening up.

25 MS. DROUIN: Absolutely.

1 DR. APOSTOLAKIS: I don't disagree with what you  
2 say.

3 DR. KRESS: You're not opposed to this high level.

4 DR. APOSTOLAKIS: I just don't think this is what  
5 they're doing. This is part of what they're doing.

6 DR. KRESS: It's part of what they're doing, yes.

7 MS. DROUIN: Yes.

8 DR. KRESS: But I would not have called this the  
9 structuralist approach.

10 DR. APOSTOLAKIS: No. It's the preliminary  
11 proposal.

12 DR. KRESS: I would call it the rationalist. But  
13 I would have called that a rationalist approach there.

14 DR. APOSTOLAKIS: Well, because at the high level  
15 we impose the structuralist, without any reason. What they  
16 call four strategies, that's what we do, too. That's why  
17 it's preliminary.

18 DR. KRESS: I still disagree. This is  
19 rationalist.

20 DR. APOSTOLAKIS: Because of the uncertainties at  
21 that level, but I think that's too subtle for most people.  
22 Anyway, your name is on the paper. You can't disagree.

23 DR. KRESS: It's too late to disagree.

24 DR. APOSTOLAKIS: It's too late to disagree. And  
25 the other thing is, which is related to what you said, I'm

1 just limiting my comments on what you said, which brought --  
2 you really go out of your way in this document to tell  
3 people that one quantitative risk numbers will not appear in  
4 the regulations and you say that so many times, that there  
5 must be a reason behind it.

6 So what is that reason?

7 MR. KING: That makes it risk-based.

8 MS. DROUIN: It makes it risk-based.

9 DR. APOSTOLAKIS: If you use one number, it makes  
10 it risk-based?

11 MR. KING: Put the number in the regulation.

12 DR. APOSTOLAKIS: The way you put it here, Tom, is  
13 that nothing that smells of frequencies will appear  
14 anywhere. It's one thing to base everything on the QHOs and  
15 quite another to have such sweeping statements that the  
16 regulations will be deterministic.

17 And the way I understood it, then, PRA will be  
18 used to rationalize why you go this way and that way. But  
19 it seems to me that in some instances, you may have to use  
20 unavailabilities or something.

21 You are saying no, no -- that's a no-no. Would  
22 that make it risk-based if you use the little number here  
23 and there?

24 MR. KING: If we start putting risk numbers,  
25 whether they're core damage frequencies or reliability

1 numbers or something in the regulations, our view is, yes,  
2 that makes it risk-based, because then that becomes the sole  
3 factor on which you make your decision.

4 DR. APOSTOLAKIS: No, because the oversight  
5 process uses performance indicators and explains to us that  
6 --

7 MR. KING: But they're not in the regulations.  
8 We're talking about the regulations. Reg guides are a  
9 different story. SRPs are a different story.

10 DR. APOSTOLAKIS: Reg guides are not regulations.

11 MR. KING: Reg guides are not regulation. Reg  
12 guides are one way to meet the regulations, one acceptable  
13 way.

14 DR. APOSTOLAKIS: It's just that you say it so  
15 many times in such a definitive way, that I thought there  
16 was something behind it.

17 MR. KING: Maybe we over-emphasized a bit.

18 DR. APOSTOLAKIS: Yes, I think you did.

19 MR. KING: But the idea is --

20 DR. APOSTOLAKIS: Heaven forbid if we become  
21 risk-based, a quarter of a page.

22 DR. SHACK: They keep getting advice from advisory  
23 committees to put numbers in, George.

24 DR. APOSTOLAKIS: Say it again.

25 DR. SHACK: They keep getting advice from some of

1 their advisory committees to put numbers in, letters.

2 DR. KRESS: They continue to reject it.

3 DR. APOSTOLAKIS: Another thing is I don't know if  
4 -- it looks like the risk-based is really something that the  
5 agency must avoid at all costs. I thought risk-informed was  
6 a good terminology that really reflected reality, but now it  
7 has come to the point where people say we're not going to do  
8 this because if we do, it's risk-based.

9 In other words, it has become something to avoid  
10 at all costs.

11 DR. KRESS: I guess I would disagree that having  
12 actual risk numbers as targets makes it risk-based. If you  
13 do all the other things, like defense-in-depth and deal with  
14 uncertainties and appropriate margins, also, then I think  
15 you can have numbers in there and call it risk-informed.

16 DR. APOSTOLAKIS: I think so, too. But anyway, if  
17 you tone down the document here. It appears like you're so  
18 sensitive to that.

19 MR. KING: I mean, we don't want it so slanted  
20 that -- we're sensitive.

21 DR. APOSTOLAKIS: I mean, we are sensitive people.  
22 Allen, you wanted to say something a half an hour ago.

23 MR. CAMP: I forgot what it was.

24 DR. KRESS: We talked you out of it.

25 DR. SHACK: One comment we made before was that

1 these were PWR numbers and they're not really BWR numbers.  
2 You end up with LERF about the same range, but at least  
3 looking at the IPEs, these look like sort of unrealistic  
4 expectations for conditional containment probabilities for  
5 BWRs.

6 MR. KING: They are really numbers that come out  
7 of the Commission's 1990 SRM that told us how to implement  
8 the safety goal, that laid out the ten-to-the-minus-four CDF  
9 and the LERF we derived working backwards from the QHO.  
10 You're right, we haven't tried to distinguish between B's  
11 and P's and that's certainly an issue in implementing it  
12 that we're going to have to deal with.

13 But they're intended to be a generic set for both.

14 DR. APOSTOLAKIS: One last comment, because I  
15 think it's relevant to what's coming.

16 The document 00-0086, well, gee, you know, today  
17 we have 00-02, now we have 00-0086.

18 DR. KRESS: 007.

19 DR. APOSTOLAKIS: Yes. A lot of zeroes. This  
20 document proposes a framework and then it goes on to propose  
21 some target numbers for containment, the right frequencies,  
22 and so on.

23 Now, this is intended to be used by the regulator,  
24 correct?

25 MS. DROUIN: Yes.

1 DR. APOSTOLAKIS: And I was wondering -- and,  
2 again, I don't have a position on this, but I think it's  
3 something that needs to be aired.

4 The QHOs were always intended to be goals, not  
5 measures of adequate protection or inadequate protection.  
6 In other words, you can exceed them and you can still  
7 provide adequate protection.

8 Is it really appropriate for such fundamental  
9 documents to use the QHOs, something that is a goal and we  
10 know already 19 PWR units are above it? Not the QHOs, but I  
11 mean the lower CDF.

12 Is it appropriate to do that, Tom? I don't know.  
13 Or should we looking for something else?

14 DR. KRESS: George, I would prefer we not even  
15 discuss that subject anymore, because I like the idea of  
16 using those goals as guidance to guide the regulations, even  
17 though they may or may not represent adequate protection, as  
18 we know it, in terms of real numbers.

19 Those are pretty good goals and I see very little  
20 wrong with them. They're accepted. And I think as a  
21 guidance, you're not going to -- you're not going to say you  
22 must meet these numbers. That's why they're saying they're  
23 not going to put the numbers, partly why they're there, but  
24 they're going to use it to guide how they get the  
25 regulations and the regulations are going to be crafted in

1 such a way that they won't exactly meet them.

2 Some plants will do better and some plants may not  
3 do as good. So I think it's a nice target to set when  
4 they're going to want to gauge how to write the regulations.  
5 It avoids this issue of quantifying adequate protection and  
6 trying to put numbers in the thing.

7 So I'm comfortable with it now and I kind of want  
8 to avoid even mentioning it anymore. Go on and let's do it,  
9 because it does raise issues of are we ratcheting and are we  
10 doing --

11 DR. APOSTOLAKIS: Well, that's exactly my concern.  
12 But if we start using them in the regulations, before you  
13 know it, they will become measures of adequate protection.

14 DR. KRESS: That's what I would really -- I have a  
15 hidden agenda. That's what I'd really like to have happen.

16 DR. APOSTOLAKIS: Well, my agenda is out in the  
17 open and I really don't think that would be appropriate.

18 For example, I don't understand -- you just said  
19 that we can use those to write regulations and then we'll  
20 say, you know, gee, some of you guys will not meet it. I  
21 don't understand that.

22 I mean, if we write the regulations, then --

23 DR. KRESS: They'll meet the regulations, but they  
24 may not exactly meet those target values for the frequencies  
25 and the CDFs and things like that. They'll be close enough

1 -- if you do the regulations, it's good enough, but there  
2 won't be a direct one-to-one link between the --

3 DR. APOSTOLAKIS: There won't be a direct  
4 one-to-one link, but if we follow the framework and we have  
5 numbers for core damage frequency, conditional probability  
6 of containment failure and so on, and we write the  
7 regulations that way, then eventually they will meet those,  
8 because the regulations will be a coherent code.

9 DR. KRESS: I say good.

10 DR. APOSTOLAKIS: I realize that, but the question  
11 is whether you want this to be a measure of adequate  
12 protection.

13 MR. KING: No. No. The issue you're talking  
14 about is going to have to be discussed in the August paper  
15 and the Commission is going to have to buy into using the  
16 safety goals as the measure of how far we want to go in  
17 risk-informing things.

18 DR. APOSTOLAKIS: I think that we are using the  
19 safety goals because that is what's available, correct?  
20 It's a number that's available.

21 MR. KING: It's what is available. It avoids  
22 having to deal with the question of defining adequate  
23 protection, which, in my view, isn't necessary for  
24 risk-informing.

25 DR. KRESS: And it gives you an idea of what a

1 proper balance might be based on tradition.

2 MR. KING: And it reflects the Commission's --  
3 remember, the safety goal policy statement is a statement of  
4 the Commission's expectations of the safety they'd like to  
5 see achieved.

6 DR. KRESS: It has a lot to --

7 MR. KING: If that's what they want to see  
8 achieved, it would seem reasonable to me that we proceed  
9 down a path that lays out a framework to achieve that. And  
10 maybe it won't pan out in all cases for cost-benefit reasons  
11 or something, but why not aspire to that?

12 DR. APOSTOLAKIS: I can see this ratcheting up the  
13 regulations down the line.

14 MR. KING: That's another issue.

15 DR. APOSTOLAKIS: So I really think -- and I'm  
16 glad you said that you will raise the flag to the Commission  
17 to think about it.

18 DR. KRESS: But risk-informed regulations are  
19 going to be voluntary, right?

20 DR. APOSTOLAKIS: Yes, that's right. Okay.

21 DR. SHACK: And the proposed rule will have to  
22 meet a backfit rule.

23 DR. KRESS: I think it's entirely appropriate that  
24 they use these.

25 DR. APOSTOLAKIS: This is something that I think

1 we should discuss at the subcommittee meeting.

2 DR. KRESS: Yes, we ought to.

3 DR. APOSTOLAKIS: Which I was informed will be at  
4 1:00 on Tuesday, July 11th.

5 DR. KRESS: Okay. And you put that on the  
6 calendar.

7 DR. APOSTOLAKIS: That will certainly be on the  
8 calendar and see how we can approach it.

9 DR. KRESS: Sure.

10 DR. APOSTOLAKIS: Because it may be that you put a  
11 few qualifiers there and then the concern goes away. But I  
12 don't think we should just matter of factly pick up those  
13 numbers and just run with them and starting writing the  
14 regulations. I just don't think so.

15 MR. KING: It's clearly a policy issue, in my  
16 view.

17 DR. APOSTOLAKIS: Yes. It's a policy issue and  
18 before the decision is made, I think the decision-makers  
19 should be informed what the concerns are.

20 MR. KING: Okay.

21 DR. APOSTOLAKIS: Of the various agendas we have.  
22 Maybe a three-vision approach may be useful.

23 MR. KING: Shades of gray, maybe.

24 DR. APOSTOLAKIS: Shades of gray are working very  
25 well. See, if you look at the ASME thing, I think now the

1 categories make much more sense to me.

2 MS. DROUIN: Are you ready?

3 DR. SHACK: Category one plants and category two  
4 plants.

5 DR. APOSTOLAKIS: Yes.

6 MS. DROUIN: In looking at our approach, there's  
7 three major steps. The first one, of course, is selecting  
8 what regulation to risk-inform out of 10 CFR 50.

9 What we have done to date is that we have  
10 performed a core screening and we're going through our  
11 prioritization. The core screening, first, just looked at  
12 whether or not the regulation dealt with accident prevention  
13 and accident mitigation and if it did, then it was a  
14 candidate for risk-informing regulation, and then we started  
15 going through the prioritization.

16 And in going through the prioritization, the first  
17 thing we would look at once it was a candidate, is it even  
18 warranted to risk-inform the regulation. What we mean by  
19 that is in looking at the regulation, if you risk-informed  
20 it, were you going to be able to gain any safety benefit,  
21 was there any conservatism in that regulation, was there any  
22 excess burden.

23 And if you weren't going to gain any safety  
24 benefit and there wasn't any conservatism and there wasn't  
25 any excess burden, then it would be eliminated further.

1           Then in further prioritization, the next thing  
2 that we would look at is what was the safety significance of  
3 that regulation, and then looking at what the resources it  
4 would take to risk-inform and then also looking at the  
5 potential for reducing any unnecessary burden.

6           And taking these factors into account, 50.44 fell  
7 out as a very high priority and that was the one that we  
8 identified as the first in what we're using as our test case  
9 against the framework.

10           DR. APOSTOLAKIS: You didn't know that, Bob?

11           MR. CHRISTIE: Excuse me?

12           DR. APOSTOLAKIS: This morning you said you didn't  
13 know what the staff was doing. They are telling us this is  
14 the test case. Is that consistent with what you said this  
15 morning?

16           MR. CHRISTIE: They're testing against the  
17 framework.

18           MR. MARKLEY: Microphone, please.

19           MR. CHRISTIE: This is Bob Christie, Performance  
20 Technology. The staff, in option three, is testing the  
21 framework with respect to 50.44. In my comments to you on  
22 March 1st, we vehemently disagreed with the framework that  
23 has been outlined in the February meeting to us.

24           The framework has changed. We don't see that the  
25 changes have been any for the better and they can go on

1 having this very complicated framework document that they  
2 can test any regulation about to infinity and that will be  
3 their objective.

4 Our objective is to make the regulations more  
5 effective and efficient and we don't need this framework and  
6 testing out 50.44, in the petition we submitted or I  
7 submitted or any submits, against this framework seems to us  
8 to be kind of an academic exercise that doesn't move  
9 anything towards decisions to make the regulations more  
10 effective and efficient.

11 Just flat, hey, we're now shooting for how safe is  
12 safe enough, is adequate protection, just blows my mind. It  
13 just absolutely is crazy.

14 If that's what we're fighting for, you know, you talk about  
15 this being voluntary, you want to say how safe is safe  
16 enough is now adequate protection, you just carry on with  
17 voluntary efforts, if that's the framework and that's the  
18 decision criteria.

19 MR. KING: That's not what we said. We're not  
20 equating how safe is safe enough to adequate protection.

21 MR. CHRISTIE: Again, this is Bob Christie. I  
22 heard that we are going to aspire at writing the regulations  
23 to achieve the levels as set forth in the safety goals,  
24 which are, as far as I can tell, in the June 11 or whatever,  
25 the June 1990 memorandum was, from the Commissioners to the

1 staff, was very clear that the safety goals were how safe is  
2 safe enough, the point at which even backfit was not to be  
3 considered.

4 Aspiring to them and using those as the guides and  
5 the criteria for the regulation, to me, look like you're  
6 moving the rules to how safe is safe enough.

7 DR. APOSTOLAKIS: And this is certainly something  
8 that we'll discuss on July 11th. Anyway, thanks for the  
9 comment.

10 MS. DROUIN: In developing our options, we took  
11 two different paths to come up with the options. The first  
12 was to look at the current requirements and to risk-inform  
13 the requirements. The other path to come up with options  
14 was to start with a blank piece of paper, look at the threat  
15 or the concern and if you started with a blank piece of  
16 paper, what requirements would you come up with, and then  
17 that would give us the pool of options and then based on  
18 those options, we would come up with alternatives for a  
19 risk-informed 50.44.

20 In going down the path of looking at the current  
21 requirements, what we would do and what we have been doing  
22 on 50.44 is to go back and look at those requirements and  
23 look at what was the technical bases of those requirements,  
24 look to see how those requirements were implemented by the  
25 licensees, identify any related regulations in the

1 implementing documents, because one of the biggest things  
2 that we have learned is you can't take these things in  
3 isolation.

4 A lot of the problems that you have with a  
5 particular regulation is not so much in the regulation  
6 itself, but it comes out perhaps in a related regulation or  
7 in the implementing documents.

8 And then start doing a risk evaluation of that and  
9 coming up with options. We'll get through this more as we  
10 get into 50.44.

11 Once we have identified the alternatives, then I  
12 do an evaluation to try and prioritize those. In this  
13 particular prioritization, what we would do is look at both  
14 the impact to the NRC and the impact to the licensees.

15 In looking at the NRC, we would look at such  
16 things as is it going to require a rule change, what would  
17 be the impact of doing this on other regulations and  
18 implementing documents, would we have to modify them, would  
19 we need to create perhaps some new regulatory guides, what  
20 would be the extent of regulatory analysis that we would  
21 need to do.

22 If the alternative would require some submittal  
23 from the licensee, what would be the extent of NRC review,  
24 what would be the impact on inspection. These are just some  
25 of the factors that we would take into account in trying to

1 prioritize the regulation.

2 Also, of course, goes in there what the safety  
3 benefit would be.

4 In looking at the licensee and the impact on the  
5 licensee, what would be the need for perhaps new or make  
6 modifications to the current design in place, looking at the  
7 need for analysis on the licensee's part, the impact on  
8 their maintenance and inspection activities, impact on  
9 technical specifications, impact on procedures and training.

10 And here, again, are just some examples of the  
11 things that we would be looking at.

12 Moving on. I'm just going to quickly go through  
13 it, because hopefully we'll get, after this slide, right  
14 into 50.44, how this ties explicitly back to the framework  
15 and how we've used the framework to come up with our  
16 risk-informed options.

17 First, starting with what is the concern that  
18 we're dealing with and how does this concern tie into the  
19 four strategies that are outlined in the framework.

20 Is it dealing with accident prevention and  
21 mitigation and within those two things, is it dealing with  
22 just limiting the initiating events or is it dealing with  
23 limiting the accident sequences or is it dealing with  
24 limiting your radionuclide releases or is it dealing with  
25 the health effects.

1           For example, on 50.44, the fact that we're dealing  
2 with the combustible gases, the strategy that is of concern,  
3 that it's tying directly to into the framework, is our third  
4 strategy of limiting your radionuclide releases, trying to  
5 contain your conditional containment failure probability.

6           And then identifying that concern, the relative  
7 importance of that concern against the quantitative  
8 guidelines. If, for example, and this is just hypothetical,  
9 if you look at this and you see from your risk insights that  
10 your conditional containment failure probability from this  
11 concern is -- say it's extremely high, close to unity,  
12 that's identifying that this is a concern, this is something  
13 that the regulations ought to be dealing with.

14           If you are on the other extreme and you're getting  
15 something that's, making up a fictitious number,  
16 1E-to-the-minus-four for your conditional containment  
17 failure probability, then you would question why are we  
18 regulating this.

19           DR. KRESS: Do you mean the contribution of that  
20 particular rule to the conditional containment failure  
21 probability?

22           MS. DROUIN: The contribution of that concern.

23           DR. KRESS: That concern, I mean. The concern you  
24 said here was containment failure.

25           MS. DROUIN: The concern is hydrogen combustion.

1 DR. KRESS: The concern is hydrogen combustion.

2 MS. DROUIN: So if I look at, if I'm going through  
3 and I'm looking at my risk insights --

4 DR. KRESS: Now, will you do this on a plant type  
5 by plant type basis? Like you will look at it for -- I  
6 mean, will the rule apply to all plants across the board or  
7 would you look at the ice condenser separately from --

8 MS. DROUIN: Both, both.

9 DR. KRESS: -- BWRs?

10 MS. DROUIN: Both.

11 MR. KING: You will see the alternatives. Some  
12 are broader that apply generally and some are the specific  
13 like the current rule, but modified to reflect risk  
14 insights.

15 DR. KRESS: So you might have this rule written  
16 differently for ice condensers as opposed to large dries.

17 MS. DROUIN: Absolutely.

18 DR. KRESS: Okay.

19 MS. DROUIN: So you would look at the specific  
20 containment types, but you would also look at it  
21 generically.

22 And then once you've identified whether or not  
23 this is a concern that should be in the regulations, then in  
24 developing the options, we would look and make sure that a  
25 single class doesn't contribute more than ten percent to

1 that guideline.

2 DR. KRESS: Now, that's a very interesting number.

3 DR. APOSTOLAKIS: That's a Sizewell guide.

4 DR. KRESS: It's the rule of ten, which is a nice  
5 rule to use when you have to pick something out of the air,  
6 which is basically what you have to do. It's a policy type  
7 thing.

8 But I guess I wanted to ask, could you have an  
9 additional line there and say "or" more than ten percent to  
10 the uncertainty?

11 MS. DROUIN: In doing that, you would have to  
12 account for the uncertainty in there.

13 DR. APOSTOLAKIS: To the standard deviation.

14 DR. KRESS: Or to the standard deviation or  
15 something like that.

16 MS. DROUIN: Yes.

17 DR. KRESS: Could you have an additional -- that  
18 would help me a little, because it ties into my concept of  
19 what defense-in-depth is related to uncertainties.

20 DR. APOSTOLAKIS: I have a number of comments on  
21 this. First of all, I don't know that you can separate the  
22 variance from the mean, because if you reduce -- you see,  
23 these are wide distributors.

24 If you reduce the high tail, the mean also moves.

25 DR. KRESS: Sometimes.

1 DR. APOSTOLAKIS: So clearly it's something we  
2 have to understand.

3 DR. KRESS: But you need to understand the point  
4 with the uncertainties, too.

5 DR. APOSTOLAKIS: The other point I want to make  
6 is this is really a defense-in-depth structuralist kind of  
7 approach, because you're just declaring it ten percent. I'm  
8 wondering why.

9 I agree with what you said earlier that you will  
10 have defense-in-depth at the top level, but what is it -- or  
11 maybe it's rationalist view here.

12 DR. KRESS: It's a rationalist view, in my  
13 opinion.

14 DR. APOSTOLAKIS: Realize that the uncertainties  
15 are very large at the accident sequence level and you want  
16 to take a defense-in-depth measure to handle those, and that  
17 is that no single class should contribute more than ten  
18 percent.

19 You could rationalize it that way.

20 DR. KRESS: I'm not sure I know exactly what they  
21 mean by accident class here.

22 DR. APOSTOLAKIS: I think they mean the initiator.

23 DR. KRESS: The frequency range of initiators.

24 DR. APOSTOLAKIS: Yes. In other words, I think  
25 they define it here.

1 DR. KRESS: It could be different kinds of  
2 sequences.

3 DR. APOSTOLAKIS: There is a definition here that  
4 these must have --

5 DR. KRESS: But what you do when you do that is --

6 DR. APOSTOLAKIS: -- similar physical  
7 characteristics.

8 DR. KRESS: -- you lump into an accident class  
9 different kinds of sequences, which bothers me, to some  
10 extent.

11 DR. APOSTOLAKIS: Like small LOCA will be one  
12 class.

13 DR. KRESS: No, I don't think so. Those  
14 initiators of frequencies within certain ranges are a class.

15 DR. APOSTOLAKIS: No. That's not --

16 DR. KRESS: That's not what you mean.

17 DR. APOSTOLAKIS: No.

18 MR. KING: No.

19 DR. KRESS: You actually mean the traditional  
20 sense of --

21 DR. APOSTOLAKIS: Small LOCA.

22 DR. KRESS: Okay. Then I'm not bothered by it.

23 DR. APOSTOLAKIS: Physical and chemical  
24 characteristics.

25 DR. KRESS: Okay. I'm not bothered by it then.

1 DR. APOSTOLAKIS: These are not the categories  
2 that they have in the framework.

3 DR. KRESS: They're not related to these  
4 categories. Okay.

5 DR. APOSTOLAKIS: Infrequent events.

6 MS. DROUIN: That's right.

7 DR. APOSTOLAKIS: But, again, maybe you want to  
8 think a little bit about it and the rationalization here of  
9 the framework.

10 MR. KING: Yes.

11 DR. APOSTOLAKIS: Also, it appears -- I think it  
12 should be given more prominence. I think all the  
13 defense-in-depth measures you are taking in this framework  
14 should be collected in one place.

15 DR. KRESS: I do, too.

16 DR. APOSTOLAKIS: And justified.

17 DR. KRESS: And this is, in my mind, a  
18 defense-in-depth --

19 DR. APOSTOLAKIS: I have an agenda, too, by the  
20 way.

21 DR. KRESS: -- issue there.

22 DR. APOSTOLAKIS: If you justify them in terms of  
23 uncertainty, the whole document is rationalist.

24 DR. KRESS: I agree.

25 DR. APOSTOLAKIS: And I think this clearly will be

1 justified on the basis of uncertainty.

2 DR. KRESS: Absolutely.

3 DR. APOSTOLAKIS: You're talking about things that  
4 are so uncertain.

5 MR. KING: The Commission asked us to come back  
6 and present to them what is our definition of  
7 defense-in-depth and collecting all of this in one place, we  
8 are going to have to do that. You'll see it show up on the  
9 issues slide as something we're going to have to lay out so  
10 that they don't have to search for it here and there in the  
11 document.

12 DR. APOSTOLAKIS: Also, you really don't -- this  
13 is too important, it seems to me, to talk about it matter of  
14 factly somewhere there.

15 But I think you can clearly justify just about all  
16 the defense-in-depth measures you have here using the  
17 arguments based on uncertainty, even the high level.

18 DR. KRESS: I would attempt to do that.

19 DR. APOSTOLAKIS: And that would be a significant  
20 step over the rational --

21 DR. KRESS: It would be a wonderful step, George.

22 DR. APOSTOLAKIS: I knew you would agree.

23 DR. KRESS: Yes. Okay.

24 MS. DROUIN: Okay. Now, we're going to get  
25 explicitly into 50.44. When you just look at 50.44 itself

1 and not any related document, any related regulation or  
2 related regulatory guide or something and just look at the  
3 specific requirements, what I have here is that there are  
4 both analytical requirements and what I call physical  
5 requirements in 50.44.

6           When you look at the analytical requirements, it's  
7 telling you to deal with a postulated LOCA. For some  
8 containment types, you go to a degraded core accident.

9           It specifies the combustible gas. It's just  
10 hydrogen, and the source is from the fuel cladding  
11 oxidation. The amount, there's two different amounts you  
12 have to deal with, depending on the containment type. I've  
13 just quickly abbreviated here. One is a five percent versus  
14 a 75 percent metal-water reaction.

15           When you get into the physical requirements, what  
16 I call physical requirements, there's six of them. You have  
17 to measure your hydrogen concentration, ensure your mixed  
18 atmosphere, control your combustible gas concentrations, and  
19 those are applying across all your LWRs.

20 The last three, inerting your MARK 1 and 2 containments,  
21 installing the high point vents, that's for all light water  
22 reactors, and installing your hydrogen control system, your  
23 igniters, for your MARK 3's and your ice condensers.

24           So at a high level, those are the requirements,  
25 the specific technical requirements.

1 DR. APOSTOLAKIS: When was this rule passed?

2 MS. DROUIN: There were three stages. You had the  
3 original, then you had a 1981 amendment, and then you had a  
4 1985 amendment.

5 DR. APOSTOLAKIS: The original is from?

6 MS. DROUIN: 1979. That's right, 1979.

7 DR. APOSTOLAKIS: So it was a TMI type.

8 MS. DROUIN: Right. The 1981 --

9 DR. APOSTOLAKIS: Oh, just before.

10 MS. DROUIN: Right. And then the 1981 was a TMI  
11 update, response to TMI.

12 DR. KRESS: Are the requirements, either in this  
13 particular regulation or in some other?

14 MS. DROUIN: No. These are --

15 DR. KRESS: These are in .44.

16 MS. DROUIN: -- specific in 50.44.

17 DR. KRESS: Are there requirements elsewhere --

18 MS. DROUIN: I'm going to get to that.

19 DR. KRESS: -- that ask for purge and vent  
20 capability?

21 MS. DROUIN: I'm sorry. Purge and vent is part of  
22 the control of combustible gas concentration. You need to  
23 do the recombiners or the purge and vent.

24 DR. KRESS: Or the purge and vent.

25 MS. DROUIN: Yes.

1 MR. KING: The rule doesn't say have recombiners.  
2 It just says be able to control post-LOCA control and some  
3 plants have chosen to do the purge event.

4 DR. KRESS: Okay.

5 MS. DROUIN: Okay.

6 DR. KRESS: But that's part of this rule here.

7 MR. KING: Yes.

8 MS. DROUIN: Yes. When you look at how the  
9 licensees have complied with 50.44, what I've noted on the  
10 left side are just the physical requirements, and when you  
11 look at the predominant means of compliance, you see some  
12 difference between what you saw in the previous slide and  
13 this slide.

14 For example, the physical requirement was just to  
15 measure hydrogen concentration. That's all 50.44 required  
16 you to do. The way licensees have complied with that is to  
17 install safety-grade continuous hydrogen monitors.

18 And as you go down, you'll see the same type of  
19 thing, against some of those requirements, that it doesn't  
20 match up directly to 50.44, and there's reasons for that and  
21 that's where we get into why you cannot look at a regulation  
22 in isolation.

23 You have to see all the tentacles and look below  
24 the surface. I haven't listed them all here. It's quite  
25 extensive. I've only pulled out three just for an example.

1           One regulation that's tightly tied to 50.44 is  
2 Appendix E to Part 50, the emergency planning and  
3 preparedness for production utilization facilities. This  
4 one is requiring your continuous hydrogen monitoring for  
5 your emergency response data system.

6           When you go to 50.46(b), it's specifying your  
7 maximum hydrogen generation and postulated LOCAs for the  
8 purpose of complying with your ECCS acceptance criteria.  
9 That's getting into the five percent.

10          When you look at Reg Guide 1.97, that's what is  
11 imposing the safety grade. So, again, I have just listed  
12 three of them here, but there's a lot of other regulations  
13 that are tied to this, 50.34 is another one. There's other  
14 regulatory guides.

15          So as we talk about risk-informing 50.44, we're  
16 also talking about perhaps having to change other  
17 regulations and other documents if you want to receive the  
18 complete benefit.

19          DR. APOSTOLAKIS: That's a purely administrative  
20 issue. It's not that these other regulations bring some  
21 other aspect of the accident or some other accident depends  
22 on this that we have to deal with. It's just  
23 administrative.

24          I mean, somebody decided that hydrogen control is  
25 important and then that thought is reflected in a number of

1 regulations.

2 Is that a correct statement?

3 MS. DROUIN: In a simplistic answer, yes, but not  
4 always necessarily so, because it might be in another  
5 regulation for something totally different.

6 DR. APOSTOLAKIS: In a different context.

7 MS. DROUIN: Yes.

8 DR. APOSTOLAKIS: But in this context, the three  
9 examples you gave us, it seems to me, they all stem from the  
10 fact that somebody decided this is important and now it's  
11 reflected in emergency planning.

12 MS. DROUIN: Right.

13 DR. APOSTOLAKIS: Core cooling design.

14 MR. SIEBER: Well, 50.46(b), that's an input  
15 assumption to the calculation that establishes the final  
16 acceptance criteria.

17 MS. DROUIN: Right.

18 MR. SIEBER: So that one is different than the  
19 other two. The other two, to me, seem to be administrative.  
20 Somebody here in White Flint wants to know what your  
21 hydrogen is during an accident. That's why it's on ERDS.

22 And it's in Reg Guide 1.97 because it's in ERDS,  
23 part of emergency planning, and because the rule existed in  
24 the first place, 50.44.

25 So to me, 50.46(b) is different because then you

1 have to recalculate to see if you continue to comply with  
2 the final acceptance criteria under Appendix K.

3 DR. APOSTOLAKIS: There is a technical reason for  
4 50.46(b) in terms of the cladding integrity, coolable  
5 geometry, actually.

6 DR. BONACA: I think what you're trying to say is  
7 that in some cases, it may not be only a threat of issue.  
8 There is some other type of technical reasons for having the  
9 requirement. Is it true?

10 MS. DROUIN: Yes.

11 DR. APOSTOLAKIS: Yes.

12 MS. DROUIN: Now, when you start looking at going  
13 back and trying to pull your insights, your risk insights  
14 out to see what risk-informed 50.44 or how would you create  
15 a risk-informed regulation that deals with combustible  
16 gases.

17 When you start looking at your PRAs and you start  
18 looking at your core damage and your core melt accidents,  
19 the first thing that comes out is that the combustible gases  
20 that can challenge your containment integrity are not  
21 limited to hydrogen.

22 You have both hydrogen and your carbon monoxide  
23 that you need to deal with and also the sources for these  
24 are not just limited to your fuel cladding oxidation. You  
25 also need to take into account your core-crete interaction.

1           One thing I might point out here is that in terms  
2 of your core-crete interaction, that is highly a function of  
3 what concrete you use. If you're using basalt concrete,  
4 then you aren't getting your carbon monoxide generation.

5           Also, you're generating these combustible gases,  
6 both in the early stages of the accident and in the late  
7 stages.

8           So in dealing with trying to control your gases,  
9 you have to look at the whole timeframe. You can't just  
10 limit yourself to the early parts of the accident.

11           When we start going through the history of our  
12 PRAs and the insights coming from the PRAs, starting with  
13 WASH-1400, is the biggest insight that came out of there, of  
14 course, is that LOCAs are not the only thing you have to  
15 deal with.

16           You have other accidents that are contributing and  
17 you're getting hydrogen generation, you're getting  
18 combustible gases from these others, and when you  
19 particularly look at WASH-1400, it did predict a fairly high  
20 conditional containment failure probability from hydrogen  
21 combustion.

22           Even though it wasn't the dominant contributor, it  
23 was a dominant one.

24           You then had the Three Mile Island accident, which  
25 generated the start of the severe accident research program.

1 Primarily what this program did was confirm the importance  
2 of your hydrogen, your hydrogen combustion, and the way  
3 that, when you look at the first -- the 1981 amendment and  
4 the 1985 amendment and the things that were put into place  
5 to control these, that these were the right measures in  
6 dealing with it.

7 When we move on to --

8 DR. APOSTOLAKIS: Now, has anyone questioned these  
9 findings from the industry? This is all NUREGs and  
10 NRC-sponsored projects, but I'm sure the industry has done  
11 work.

12 MS. DROUIN: We're going to get into some industry  
13 stuff here, too, on the next one.

14 DR. APOSTOLAKIS: You will. Okay.

15 MS. DROUIN: I couldn't fit it all on one slide.

16 DR. APOSTOLAKIS: So it just happened randomly  
17 there.

18 MS. DROUIN: Now I'm going chronologically. The  
19 next big risk study that came out was NUREG-1150. It pretty  
20 much still confirmed the same thing. You had other  
21 accidents that were contributing to your core damage.

22 Hydrogen combustion was a dominant contributor and  
23 that the new thing was that hydrogen combustion was not a  
24 challenge to your large volume containments.

25 MR. SIEBER: That's based on the assumption that

1 you use ultimate strength as opposed to design strength.

2 MS. DROUIN: Yes.

3 MR. SIEBER: And the ultimate strength, as I  
4 picture it, has tremendous uncertainty associated with it.

5 MS. DROUIN: That's correct.

6 MR. SIEBER: And that's why you don't design  
7 bridges to the ultimate strength.

8 MS. DROUIN: That is accurate. Let me move on to  
9 the next set of PRAs that came out, which are our IPes, and  
10 you look at the insights that were documented in NUREG-1560,  
11 again, you still see a wide range of accident initiators are  
12 contributing.

13 A thing that came out of here which we also saw in  
14 NUREG-1150 was that your hydrogen combustion or station  
15 blackout accident sequences was a significant contributor to  
16 containment failure for your MARK 3's and your ice  
17 condensers.

18 Those two little -- those last words got left off the slide,  
19 but that's very important, because these refer to your MARK  
20 3's and your ice condensers.

21 Some more recent research that was going on  
22 related to the resolution of your DCH and this is a program  
23 that was looking at your challenge to containment integrity  
24 for just large dries and ice condenser containments for  
25 station blackout, and the information that's coming out of

1 there is that hydrogen combustion can be a challenge to your  
2 containment integrity for ice condensers during SBO.

3 DR. KRESS: How is that related to DCH? It's  
4 because it's putting the hydrogen combustion pressure on top  
5 of the DCH pressure or is it because you get additional  
6 hydrogen out of the DCH event? I'm trying to figure out why  
7 that particular bullet is under the DCH issue resolution.

8 MR. CAMP: What happened is basically this study  
9 was done to look at DCH in ice condensers. That was the  
10 driving purpose of the study.

11 When they did the study, they concluded that the  
12 ice bed was going to be pretty effective in mitigating the  
13 DCH part of the event.

14 But the calculations that they did accompanying  
15 this with the hydrogen source terms that they got from  
16 RELAP/SCDAP calculations and CONTAIN calculations to look at  
17 the containment load almost always produced containment  
18 failure from hydrogen.

19 DR. KRESS: So it was an ancillary result.

20 MR. CAMP: It was an ancillary result to the DCH  
21 study.

22 MR. KING: And remember in DCH there's a bunch of  
23 hydrogen that accumulates in the containment before the  
24 actual DCH event and it's that preexisting hydrogen plus the  
25 DCH --

1 DR. KRESS: Plus the pressurization, plus the  
2 ignition.

3 MR. KING: Yes.

4 MS. DROUIN: And the last point that we want to  
5 make is that as you go through and look at all these  
6 insights that have come from WASH-1400, 1150, the IPEs,  
7 they've all dealt with just internal events and when you  
8 start taking the fire and seismic into control, the  
9 accidents associated with those tend to have characteristics  
10 very similar to station blackout.

11 So whereas you're getting station blackout to be a  
12 concern from your internal, it's even more important when  
13 you start taking into account fire and seismic.

14 DR. APOSTOLAKIS: Is this a good time to take a  
15 ten-minute break?

16 MS. DROUIN: Sure.

17 DR. APOSTOLAKIS: Back at two.

18 [Recess.]

19 MR. KING: What time do you want us to finish up?

20 DR. APOSTOLAKIS: Well, NEI needs about half an  
21 hour, they told me, and I'm leaving at three. So can you  
22 finish in 15 minutes or is that too much to ask?

23 MS. DROUIN: Yes, we can.

24 MR. KING: We can. I think most of the issues  
25 we've talked about, so the last two slides ought to go

1 pretty quickly. But we ought to just spend two minutes on  
2 the last two.

3 DR. APOSTOLAKIS: I'm sorry. We're back in  
4 session. Are you disagreeing with Mr. Christie's evaluation  
5 or you are not even thinking at all in those terms?

6 MS. DROUIN: We're doing our own evaluation.

7 DR. APOSTOLAKIS: I didn't say your own. Mr.  
8 Christie's. He presented to us his arguments why he thinks  
9 things should go a certain way in terms of the first four  
10 hours of the accident and after that and so on that it will  
11 distract the operators from other important things.

12 So all this is in agreement with what he said or  
13 is there a disagreement?

14 MS. DROUIN: I think we're in very close  
15 agreement. What we'll do, instead of going through each of  
16 the containment types, why don't we jump to slide 16.

17 DR. APOSTOLAKIS: Okay. Good. I like experienced  
18 presenters.

19 MS. DROUIN: The previous slides, it just goes  
20 into more detail, containment type, what we learned from the  
21 various PRAs and research.

22 If you jump to slide 16 and you summarize what  
23 we've learned and what conclusions did those insights lead  
24 us to, what we're saying here is that when you look at the  
25 results from these PRAs and from research, and you look at

1 that relative to combustible gases and the potential for  
2 combustion and its challenge to containment integrity, what  
3 we have learned from that is that a risk-informed 50.44  
4 needs to have these kind of ingredients.

5 In looking at the accident types, it needs to  
6 focus on what we would call the risk significant core melt  
7 accidents. It shouldn't just deal with LOCAs or just the  
8 degraded part of the accident. It should deal with the full  
9 accident and it should focus on those that are the risk  
10 significant ones.

11 DR. APOSTOLAKIS: Risk significant with respect to  
12 public health and safety? What's risk significant for core  
13 damage is not necessarily significant for public health.

14 MS. DROUIN: Public health.

15 DR. APOSTOLAKIS: And Mr. Christie emphasizes the  
16 fact that we should focus on public health and safety. So  
17 when you say risk significant, you refer to those, as well.

18 MS. DROUIN: I'm talking about those that can  
19 challenge containment and that would lead to a large  
20 release.

21 DR. APOSTOLAKIS: So you're in agreement.

22 MS. DROUIN: Yes.

23 DR. KRESS: Is there any concept in here of  
24 containments leak and you put a hydrogen burn into it, that  
25 may increase that leak? For two reasons; it may make the

1 hole bigger and it may increase the pressure to the driving  
2 force.

3           You don't calculate a containment failure, but  
4 there's some probability that you're increasing leak and  
5 you've got fission products that you're blowing out at a  
6 faster rate.

7           It's generally a regulatory objective to limit  
8 that kind of release, although it's not a LERF, because it's  
9 not the kind of large early release. It's a small early  
10 release.

11           But is there any thinking in that, in  
12 risk-informing this, that you need to deal with those kinds  
13 of things, also?

14           MS. DROUIN: I wouldn't say directly, but  
15 indirectly it gets covered. Bear with us and hopefully  
16 we'll answer it.

17           The next major ingredient is what combustible  
18 gases do you concern yourself with, and you shouldn't just  
19 be limited to hydrogen, but also take into account your  
20 carbon monoxide and also looking at the sources, not  
21 limiting yourself to the fuel cladding, but also looking at  
22 core-concrete interaction, and the source terms should be  
23 based on realistic calculations.

24           When you do the realistic calculation, you may end  
25 up at a 75 percent metal-water reaction. It might be less

1 than that or it might be more, but we would perform and come  
2 up with a specified term here.

3 DR. KRESS: Are there any core-concrete  
4 interaction sequences that contribute to LERF? I'll ask  
5 Trevor, maybe, or you. I don't know. Is that a non-LERF  
6 phenomenon?

7 MR. PRATT: Maybe one or two in the boilers.

8 DR. KRESS: One or two in the boilers.

9 MR. PRATT: Not in the large volume containments.

10 DR. KRESS: But this sub-bullet is intended to  
11 look at it in context of LERF or just to look at it in  
12 general?

13 MR. PRATT: In terms of early and late. It's a  
14 dominant contributor to late.

15 DR. KRESS: So you're not limiting this  
16 risk-informing just to early failures.

17 MS. DROUIN: No, and that's where we get into --

18 DR. KRESS: You're including late.

19 MR. PRATT: Yes.

20 MS. DROUIN: That's where we get into the next  
21 bullet, is that in controlling the combustible gases, you  
22 need to look at both the early phases and the late phases of  
23 the accident.

24 DR. KRESS: So it's not just -- so you can't just  
25 look at LERF.

1 MS. DROUIN: Correct.

2 DR. KRESS: Glad to hear you say that.

3 MS. DROUIN: Okay. If you remember, earlier, we  
4 had said that 50.44 dealt with both what we call analytical  
5 requirements and physical requirements. So when we look at  
6 the analytical requirements, we are saying that the  
7 analytical requirements, in going from what is currently in  
8 50.44, the changes that we think ought to be done, it  
9 should, again, account for your risk significant core melt  
10 core melt accidents.

11 You need to account for your combustible gases  
12 generations from both your fuel cladding oxidation and your  
13 core-concrete, and specify the amount and rate of your  
14 combustible gas generation based on realistic calculations.

15 So that matches up exactly to the previous slide.  
16 These were things that were specifically called out in 50.44  
17 and these are how we would propose the alternative for the  
18 analytical requirements.

19 When we get to the physical requirements, we've  
20 identified three alternatives. The first alternative is  
21 taking the specific requirements from 50.44 and modifying  
22 them. For example, eliminating the requirement for safety  
23 grade continuous monitors, add the capability to measure  
24 your hydrogen concentration under degraded core conditions,  
25 such that whatever instrumentation you had there, it would

1 survive under high pressure, high temperature, whatever  
2 those conditions were.

3 Insuring your mixed atmosphere for your risk  
4 significant accidents, whichever they are for your  
5 particular plant; eliminate your post-LOCA hydrogen control  
6 system, that would be your recombiners. It would also be  
7 your vent and purge system.

8 Adding a long-term hydrogen control for your risk  
9 significant core melt accidents and ensuring your hydrogen  
10 control for your risk significant core melt for your MARK  
11 3's and ice condensers. These are lining up one to one to  
12 your six physical requirements.

13 DR. KRESS: Let me ask you about that first  
14 sub-bullet, eliminate the requirements for safety grade  
15 continuous monitors. Is that based on some criteria that  
16 says that the risk achievement worth of being safety grade  
17 is not worth having them safety grade or is this an SSC  
18 that's low on your priority list for some criteria?

19 MR. KING: It's based on the fact that these would  
20 be used in an accident management situation and  
21 traditionally we have not required accident management type  
22 stuff to be the full pedigree safety grade. It will be  
23 consistent with that approach.

24 DR. KRESS: Even though it might be a significant  
25 contributor to changing the conditional containment failure

1 probability, you wouldn't. If it had real significance  
2 there, you would still eliminate it.

3 MR. KING: See, you're not eliminating the  
4 requirement. You're just saying it doesn't have to be  
5 safety grade in terms of --

6 DR. KRESS: It doesn't have to be safety grade.

7 MS. DROUIN: It doesn't have to be safety grade.

8 MR. KING: -- all the pedigree requirements that  
9 go with it.

10 MS. DROUIN: We still want you to measure, but we  
11 aren't going to be prescriptive that the way you go about  
12 measuring is that --

13 DR. KRESS: We were looking at what are the potential  
14 requirements for things to be safety grade or not safety  
15 grade not based on tradition, but if you had to do it again,  
16 and the concept was, well, if it had a pretty big  
17 contribution to RAW or Fussel-Veseley for either CDF or  
18 LERF, then maybe it ought to be called safety grade.

19 But this is not the kind of criteria you used here  
20 at all.

21 MR. KING: No.

22 MR. PRATT: I was just going to add that the  
23 emphasis was moving away from it needed the continuous  
24 monitoring early to an accident management strategy later.  
25 So that gets you away from having to have the information

1 available for immediate responses, which we don't envisage  
2 there would be any.

3 So it would be a long-term accident management.

4 DR. KRESS: Yes, but isn't it still needed or used  
5 in some of the emergency response criteria? You use it  
6 there. Wouldn't that call for sort of an early measure? I  
7 thought it was one of the indicators that you use to decide  
8 on emergency response measures.

9 MR. PRATT: In that context, it certainly may be  
10 necessary. In the context of what we're looking at here, in  
11 terms of hydrogen control, there's no immediate measures  
12 that we would need, we believe, that requires this  
13 information. That's the point.

14 But you certainly would probably want that  
15 information further, but for this particular --

16 MR. SNODDERLY: Excuse me, Dr. Kress. This is  
17 Mike Snodderly, Probabilistic Safety Assessment Branch. The  
18 other thing is early I think we would be relying more on the  
19 indicators of containment high range rad monitor and the  
20 core exit thermocouples and then supplemented by the  
21 hydrogen monitors as a confirmatory.

22 As far as the emergency planning goes, right now,  
23 the way I see it, the way -- the biggest thing it's used for  
24 is distinguishing between a general emergency and a site  
25 area and is there a threat to the containment due to high

1 hydrogen concentration.

2 DR. KRESS: You could almost infer that from the  
3 fission.

4 MR. SNODDERLY: Right. And I think we've  
5 adequately addressed that, as Bob Christie pointed out, in  
6 the ANO amendment, where we went from a -- we went to a  
7 performance-based requirement for hydrogen monitoring.

8 DR. KRESS: Thank you.

9 MS. DROVIN: The next alternative is one where we  
10 would eliminate all the physical requirements and replace it  
11 with a high level type of statement to control your  
12 combustible gases for all light water reactors for your risk  
13 significant accidents. Under this alternative, we would  
14 leave it to the licensee to demonstrate how they would meet  
15 this requirement. This is much more performance-based type  
16 of requirement.

17 The licensee could come in and, say the way they  
18 meet that requirement is using the current physical things  
19 that are there in the plant now, or they could come in and  
20 do some type of analysis to show --

21 DR. KRESS: But when you looked at what they  
22 brought to you, you would probably take these bullets up  
23 above and say how did you deal with this, this.

24 MS. DROVIN: That could be one way.

25 DR. KRESS: It still would be the same

1 consideration.

2 MS. DROVIN: Or they could come back in and show  
3 that they aren't challenging the containment through some  
4 type of analysis. So, this would have a lot of flexibility  
5 in how they would go about doing it. They could be very  
6 prescriptive, or they could come back more in an analytical.

7 MR. KING: This one has an attractive advantage  
8 for future plants. It would give them a lot more  
9 flexibility.

10 MS. DROVIN: Yes.

11 MR. KING: So, again, it depends on how much  
12 weight the Commission wants to put on current versus future  
13 plants. It could drive, you know, some selection of one of  
14 these alternative over another.

15 DR. KRESS: Would you put an Appendix K like thing  
16 in there that says we want 95 percent confidence that you  
17 don't fail the containment?

18 MR. KING: Well, we'd have to specify what the  
19 performance is that we're looking for.

20 DR. KRESS: Yes.

21 MS. DROVIN: The third alternative, actually what  
22 it is is what you see, alternative two is kind of a mixture  
23 of alternative one and alternative three. Alternative three  
24 is going to the strategies of the framework and  
25 demonstrating that you're meeting those strategies so that

1 you would go through and demonstrate that your containment  
2 integrity is not challenged from your combustible gases or  
3 seeing an order of preference by limiting your radionuclide  
4 releases or your core damage accidents or the initiating  
5 events, or you come in and insure your emergency  
6 preparedness.

7           You would go in now into your regulatory guide,  
8 and this is where you might, for example, see numbers.

9           DR. APOSTOLAKIS: I was about to say that.

10          MS. DROVIN: Yeah.

11          DR. APOSTOLAKIS: But then wow, you would be risk  
12 based.

13          MS. DROVIN: No, it's not in the regulation. It's  
14 in the regulatory guide.

15          Then the last of this is that all of these options  
16 may require, you know, confirming changes in other  
17 regulations in order to get the full benefit. So, that's an  
18 issue we would have to look at.

19          On that note, I'm going to get Tom wrap up.

20          MR. KING: Let me just take the last two minutes  
21 and talk about slide 20, some of the potential issues we're  
22 going to have to address in the August paper. Selected  
23 implementation had been raised a couple of years ago when we  
24 were talking about risk informing Part 50. I think it  
25 really boils down to all of these things are going to be

1 voluntary alternatives, but does that mean you can pick,  
2 say, 5044, for example. You can pick the current 5044, or  
3 you take a risk informed 5044, the total package, or should  
4 licensees be able to within the risk informed 5044 pick and  
5 choose the pieces they like that's going to effect --

6 DR. KRESS: How -- what are you going to use as  
7 guidance in deciding on this policy issue? Is this one that  
8 you just allow the commissioners to say yes or no, or do you  
9 have some thoughts as to why one might want to allow  
10 selective implementation or why not? What I had in mind  
11 there is is there some principle that if you allow selective  
12 implementation that you can pick this one, this one, and  
13 this one, and therefore, your risk status has changed to the  
14 point that it's unacceptable, or your uncertainty in that is  
15 unacceptable. Is there some thinking about what you would  
16 use to, as a criteria, for deciding on selective  
17 implementation or not?

18 MS. DROVIN: I'm giving my personal thoughts here.  
19 I think that if you allow selective implementation within a  
20 regulation, you're not risk informed because the risk inform  
21 is supposed to focus in on the risk significant. In some  
22 cases, there may be cases where to be risk informed, it's  
23 just reducing things. There may be cases, as you see in  
24 5044, to be risk informed, you're going to take some things  
25 away, but you're going to have to add some things. There

1 were things missing.

2 DR. KRESS: So, you're thinking it's either a  
3 whole package or not at all?

4 MS. DROVIN: And I think that if you allow  
5 selective implementation, then you would just go after those  
6 things that are going to reduce, but the things that were  
7 safety significant --

8 MR. SIEBER: Compensatory.

9 MS. DROVIN: -- may not be selected. I don't  
10 think that's a risk informed regulation.

11 MR. KING: We have already said risk informed is a  
12 two-edged sword. When you go in and, well, the risk  
13 information can lead you to --

14 DR. KRESS: I was assuming both edges of the sword  
15 would show up in each individual regulation, and I may be  
16 wrong there, so that I could choose this regulation, but I  
17 have to choose all of that particular regulation. I get  
18 both ends of the sword there.

19 MR. KING: Yeah, yeah.

20 DR. KRESS: And then I would allow selective  
21 implementation because --

22 MR. KING: On a regulation by regulation basis.

23 DR. KRESS: Right, regulation by regulation basis.

24 MR. KING: Yeah, I think that's Mary's personal  
25 opinion is what she likes, and I think we're going to have

1 to go to the Commission with a recommendation and talk about  
2 the criteria to why we picked that one, whatever it ends up  
3 being.

4 MR. SNODDERLY: Sorry, Tom. I think, Dr. Kress, a  
5 concrete example of that would be the Mark 3 containments.  
6 So, right now, we had igniters for Mark 3 containments, but  
7 from a risk study, we knew that 96 percent of the risk is  
8 from station black-out sequences. So, the igniters aren't  
9 available during -- they're not there. So, it doesn't make  
10 sense to say okay, we're going to risk inform this  
11 regulation, and the Mark 3 owners are going to say hey, you  
12 know what? I like that I don't need recombiners, and that  
13 makes sense, but does it also make sense, as you've gone  
14 through this process to say, shall we continue to allow this  
15 anomaly to exist?

16 Now, there's a lot of other things to consider,  
17 but I think like that's a hard example of what, you know,  
18 that we -- one example.

19 MR. KING: Okay, and it's related to the backfit  
20 question. If you're going to do a backfit analysis, are you  
21 doing it piece by piece, or are you doing -- taking the  
22 whole rule as a package and doing the backfit and looking at  
23 the aggregate of how things come out. Also, the backfit,  
24 one of the stakeholders raised the question of the reverse  
25 backfit test. If we are, you know, ending up net burden

1 reduction, should there be some, you know, tangible benefit  
2 in doing that? Should there be some criteria for which to  
3 do that? So, that's part of the issue when we talk about  
4 backfit.

5           The risk informed guidelines we talked about,  
6 that's the issue of using the safety goals and the  
7 subsidiary objectives as the guidelines for making the  
8 changes. I mean, that has to be a Commission decision  
9 versus future plants, how much weight do you give from one  
10 to the other. Technical issues, long-term containment  
11 performance -- one of the NEI comments was they didn't think  
12 that ought to be a consideration. We're going to talk to  
13 them about that tomorrow.

14           Defense in depth, it's the issue, George, you  
15 talked about, rolling those considerations up as something  
16 the Commission can deal with is an issue. Safety margins is  
17 the same thing, and treatment of uncertainties is tied in  
18 with that. So, a number of things that we're going to have  
19 to lay in front of the Commission that aren't just unique to  
20 5044. I mean, these things are generic to this whole risk  
21 informed process.

22           With that, I think we've talked about the schedule  
23 already, so that's it.

24           DR. APOSTOLAKIS: Any questions? Any comments  
25 from the members?

1 DR. KRESS: Well, I'd like to offer my  
2 encouragement to this framework. I think they're going in  
3 the right direction. You know, I may argue with some of the  
4 details right now, but yeah, I think it shows some good  
5 thinking and some good progress. I like the approach, at  
6 least.

7 DR. APOSTOLAKIS: Speaking of the approach, the  
8 three alternatives that you put up there, you will evaluate  
9 those in some way at some point, or are there preliminary  
10 alternatives? Is that the idea?

11 MR. KING: Right now they're preliminary  
12 alternatives. I think there's an open question. We go to  
13 the Commission in August. Do we recommend one of those, or  
14 do we recommend to the Commission that each of these has  
15 some merit, and maybe the next step ought to be an advance  
16 notice of proposed rulemaking to get feedback on those three  
17 alternatives.

18 DR. APOSTOLAKIS: Once you do any sort of analysis  
19 to --

20 MR. KING: Enough analysis to say that they're  
21 feasible. We don't want to give the Commission unfeasible  
22 alternatives.

23 DR. APOSTOLAKIS: No, they are feasible, but I  
24 mean, if I go with alternative two versus alternative three,  
25 what am I doing to the condition containment failure

1 probability, for example?

2 MR. KING: Pros and cons kinds of things, yeah.

3 DR. APOSTOLAKIS: You will do that kind of thing?

4 MR. KING: Yeah.

5 DR. APOSTOLAKIS: Quantitatively.

6 MR. KING: As best we can.

7 DR. APOSTOLAKIS: As best as possible. I knew  
8 that was coming. Okay, thank you very much. Any other  
9 comments? No?

10 DR. KRESS: I also wanted to mention, I would hope  
11 at some point along the line that uncertainties get more  
12 explicitly built into the criteria.

13 DR. APOSTOLAKIS: I think in the July subcommittee  
14 meeting, we'll probably have a lot to say about that.

15 DR. KRESS: Yeah.

16 MS. DROVIN: We skipped over that slide.

17 DR. KRESS: Yeah, okay. Maybe so. I'll look  
18 through your slides.

19 DR. APOSTOLAKIS: Well, I don't know whether we  
20 want to ask how this is affecting the rulemaking, but Mr.  
21 Christie requested.

22 DR. KRESS: Well, that wouldn't hurt to ask.

23 DR. APOSTOLAKIS: Whom do we ask? Do we ask you  
24 or the NRR?

25 DR. KRESS: I think ask these people over here.

1 MS. DROVIN: Ask Cindi.

2 MS. CARPENTER: This is Cindi Carpenter from NRR.  
3 Basically, we have the petition for rulemaking. It was  
4 noticed, and we're waiting -- it basically is being  
5 incorporated into what they're doing in Option 3. Option 3  
6 in 5044 is going to provide the technical basis for how we  
7 resolve that petition for rulemaking, so they're very well  
8 aware of what Mr. Christie has proposed, and we're waiting  
9 on the outcome of that right now.

10 DR. APOSTOLAKIS: So, the technical basis you are  
11 referring to is the August document?

12 MS. CARPENTER: The August and probably the  
13 December document also, I'm thinking.

14 MR. KING: The August document --

15 MS. CARPENTER: The August, okay.

16 MR. KING: -- would be the one that deals with  
17 this issue.

18 DR. APOSTOLAKIS: Okay, thank you.

19 DR. KRESS: I'm glad to see the National  
20 Laboratories so well represented.

21 DR. APOSTOLAKIS: So, the next presentation is  
22 from NEI, and it's on a different subject, 10 C.F.R. 50.69  
23 and Appendix T.

24 DR. SHACK: Option 2, Option 3, we cover  
25 everything.

1 DR. APOSTOLAKIS: Boy, this is a dynamite  
2 subcommittee meeting. Mr. Floyd, would you introduce your  
3 colleagues, because we have not seen them before.

4 MR. FLOYD: Yeah, right. To my left is Adrian  
5 Haymer, and to my right is Biff Bradley, all from NEI.

6 DR. APOSTOLAKIS: Wonderful.

7 MR. FLOYD: We're actually going to talk about two  
8 topics today. We have some brief comments on Option 2, and  
9 we also have some brief comments on Option 3 to cover.

10 DR. APOSTOLAKIS: Very good.

11 MR. FLOYD: Okay, with respect to Option 2, just  
12 wanted to advise the committee here that we have submitted  
13 the PRA certification industry peer certification process to  
14 the Commission formally for review. It's in a document  
15 called NEI-00-02. All plants will be peer reviewed by the  
16 end of 2001. Our status right now is that all the boiling  
17 water reactors have completed the peer certification  
18 process, and I don't know, maybe perhaps as many as 25  
19 percent of the PWR's at this stage, but they all are  
20 scheduled to be completed with their review by the end of  
21 2001.

22 DR. KRESS: Is your intention to say that peer  
23 review would correspond to Category 2 or 3 in the ASME  
24 guide? Say that you would like to say go through this peer  
25 review. Then we correspond to Category 2 or 3, or are those

1 completely separate?

2 MR. FLOYD: They're somewhat separate because we  
3 don't know what the final form of the ASME standard will be.  
4 What we're saying and what we suggested in our letter is  
5 that the peer certification process is adequate and  
6 appropriate for Option 2 of risk informing Part 50.

7 DR. KRESS: Okay.

8 MR. FLOYD: It may comport with what the final  
9 ASME standard comes out with in one of the categories, but  
10 we don't know that at this point.

11 MR. BRADLEY: It's an application specific review.

12 MR. FLOYD: Yeah, and we're saying that only for  
13 this Option 2 application.

14 DR. KRESS: Okay.

15 DR. SHACK: Just, I got confused about this this  
16 morning. Since you're not grading the whole PRA, you're  
17 doing it element by element, do I then get a list of  
18 elements that have to be grade three or above to support  
19 Option 2, or do I get an overall road map that really tells  
20 me now?

21 MR. BRADLEY: I think those are issues that we're  
22 going to get into when we get into the review process with  
23 NRC. I think our initial thinking is, you know, there is no  
24 overall grade. There's a grade on each sub-element, and  
25 generally speaking, I think we're talking about something,

1 you know, for most of the sub-elements, a grade level three  
2 in the certification process to support Option 2.

3 One of the things we've got to do is coordinate or  
4 correlate our Part 50 guideline document in that whole  
5 process with the certification process so that as we do  
6 that, it will become more clear which elements are most  
7 important. I think the general thinking of what I saw from  
8 NRC, and probably we don't disagree, is that we're looking  
9 at a level three for most, if not all, of the sub-elements  
10 to support that.

11 DR. KRESS: My first thought, Bill, is I was going  
12 to find out, look and see how much -- which elements are  
13 more important, put a weighting factor on and take the  
14 grades and get an overall grade. Anyway, they're probably  
15 doing something like that but not putting numbers on it.

16 MR. FLOYD: And I think the third bullet really  
17 goes to what we've been talking about, is at the meeting  
18 that we had this week, the NRC did lay out at least the  
19 outline of what the review process will be for the peer  
20 certification process.

21 The other item we had down here, as you know, the  
22 South Texas nuclear project has an exemption request in, and  
23 of course, one of the concerns the staff has is how does  
24 that relate to the overall Option 2 generic rulemaking  
25 issue. South Texas has prepared a matrix comparing their

1 risk categorization and treatment process to the NEI  
2 guideline process approach. We haven't had a chance to  
3 fully review that, but in general, it looks to be -- looks  
4 like they captured the essence of it.

5           The conclusion we think we would agree with is  
6 that, although when you get down at the level of detail,  
7 their approach is a little bit different. When you get at  
8 the how-to level, the concepts and the philosophy that are  
9 embedded in the guideline document are consistent with the  
10 approach that they had. That wasn't by happenstance. Of  
11 course, we were cognizant of what their approach was when we  
12 were developing the guideline document, as well as being  
13 cognizant of the ANPR and the SECY papers. Our guideline  
14 document has been evolutionary to accommodate those changes  
15 as they've gone along.

16           The other thing I wanted to say in general about  
17 Option 2 here is that, just give you an update on the pilot  
18 status. NEI has been coordinating with the owners' groups a  
19 pilot project effort to test out a number of systems at lead  
20 plants in each of the owners' groups. So far, the  
21 Westinghouse, BWR owners' group and CE owners' group have  
22 all now voted to fund a project.

23           The scope of the projects are very similar in  
24 scope and schedule. They will be starting roughly in the  
25 September time frame, late August, early September time

1 frame, and having the preliminary bulk of the work done by  
2 around the end of the year and then writing up an evaluation  
3 report.

4 All three owners' groups will be using the NEI  
5 guideline as their template for conducting their review to  
6 see what enhancements and revisions need to be made to the  
7 guideline document as we move forward.

8 Some other Option 2 issues, we've identified a  
9 couple of issues, I think, the we would like to get an early  
10 read from a legal perspective. The first one is the  
11 differentiation of design basis from special treatment. Let  
12 me see if I can explain what we mean by that. Take, for  
13 example, the environmental qualification rule. We view that  
14 as a special treatment requirement. We hear some in the  
15 staff say that no, part of the design basis is the specific  
16 special treatment requirements that are embedded in the 5049  
17 regulation. That makes a big difference on how we write our  
18 guideline and what special treatment provisions you put in  
19 place, and also it makes a big difference as to what the  
20 bottom line benefit of Option 2 is, depending upon the  
21 resolution of that issue.

22 So, we'd like to get a fairly timely read from the  
23 agency on what is their position with respect to the  
24 relationship between special treatment requirements and the  
25 design basis requirements. Are they one and the same, or

1 are your design basis requirements -- I mean, our view is  
2 that, for example, in the EQ area, if you have a pump that  
3 has to deliver 100 gallons per minute to each steam  
4 generator under a harsh environment, that's the design basis  
5 functional requirement.

6 The special treatment regulation is the how do I  
7 provide that assurance that it can do that. There may be  
8 other ways of providing them, and we're really talking about  
9 the RISC-3 category here, by and large, which is the low  
10 safety significant but safety related category. Do you need  
11 that same degree of pedigree that's embodied in 5049 to  
12 provide a reasonable assurance that that design basis  
13 function is agreeing under those high energy line break  
14 conditions can be met.

15 DR. KRESS: It seems like if you're going to be  
16 risk informed, that that's the appropriate way to view it.

17 MR. FLOYD: Well, that's our view. In fact, it's  
18 almost an oxymoron to say that if the intent of the Option 2  
19 approach is to grade the pedigree of treatment, but you  
20 can't do that because the pedigree of treatment is indeed  
21 part of the design basis, and you can't change the design  
22 basis, you, in essence, don't have an Option 2. We just  
23 want to get it nailed down and get agreement on that. We've  
24 heard conflicting opinions on that.

25 The second issue is related to Part 21, and its

1 applicability to really RISC-2 and RISC-3 boxes. The  
2 position that we've taken in the guideline is that Part 21  
3 is certainly applicable to the RISC-1 box. It's not  
4 applicable to the RISC-2 box because the RISC-2 box doesn't  
5 contain components that pass the definition of what is a  
6 basic component. Our position in the RISC-3 box is that  
7 Part 21 also would not apply because the test in Part 21 is  
8 you have to have a substantial safety hazard as a result of  
9 the deficiency. We're talking about items that if we  
10 have agreement on the risk categorization process, we've  
11 defined that if they were to have a problem, they don't  
12 create a substantial safety hazard. So, that's our  
13 position, and we, again, would like to have an early-on  
14 legal read of that from the agency, again, because it has  
15 great bearing on how we develop our guideline document and  
16 the overall benefits of Option 2.

17 Next issue we have is commercial treatment for the  
18 RISC-3 category. This is where, obviously, all of the  
19 discussion or the bulk of the discussion has gone on to  
20 date. We have provided in our early draft of our guideline  
21 to the staff what is known as an Appendix A, which they  
22 characterized earlier this week as a good outline of the key  
23 elements that should be in a commercial program. The  
24 feedback we got was that they would like to see some  
25 additional detail in the document, not so much on the how to

1 you provide, the assurance that the design basis function  
2 will be maintained, but what are the desired results and  
3 outcomes that you'd like to see from that.

4           So, we're looking now to go back and see if we can  
5 add some more detail to the Appendix A that focuses on  
6 desired results outcomes, without getting into the how to.  
7 This is the difficult road to walk down because we could  
8 very easily wind up replacing 18-point criteria in Appendix  
9 B with a very detailed and prescriptive commercial program  
10 if we go too far in one direction. Then you've eliminated,  
11 again, the benefit of trying to reduce emphasis on low  
12 safety significant SSC's.

13           DR. KRESS: The parts that you are going to -- the  
14 components that you're going to get from the commercial  
15 program, it seems to me like there ought to be some thinking  
16 about what is the actual reliability. There ought to be  
17 enough data out there to say that in general, the  
18 reliability of commercial parts for this particular pump or  
19 whatever it is has this mean and this variance, and  
20 therefore, it very well meets the requirements I have on my  
21 PRA that shows this is not a safety significant thing.

22           You wouldn't have to go into the -- you know, it's  
23 sort of a Bayesian approach. You wouldn't have to go into  
24 the commercial process and what they do and what their  
25 quality controls are. You just use the database. Is there

1 any thinking along that line?

2 MR. FLOYD: Yeah, there is. We actually see two  
3 elements in it. That is certainly one element, and we think  
4 that's appropriate for those design basis functions which  
5 can be routinely monitored through normal plan operation.  
6 That's an appropriate way to treat those. We acknowledge  
7 that there are other certain design basis functional  
8 requirements in harsh environments, for example, or seismic  
9 conditions that you're not going to be able to do that  
10 monitoring for. So, then you need to have some design  
11 control and procurement control aspects put in place to  
12 assure that the equipment is being ordered with those  
13 considerations in mind.

14 MR. BRADLEY: There may be uses in other  
15 industrial applications where the equipment, it spurns  
16 routinely to a harsher environment, and you might be able to  
17 get some benefit out of that.

18 DR. KRESS: Yeah, that's what I had in mind, other  
19 industrial applications.

20 MR. BRADLEY: Right. We will be looking at that.

21 MR. FLOYD: Right, looking at those.

22 DR. APOSTOLAKIS: You mentioned the benefits. Do  
23 you have any idea what -- I mean, if the industry implements  
24 this, what the benefits will be to them in terms of dollars?

25 MR. FLOYD: The only plant that's really looked at

1 in much detail is south Texas, and they're telling us that  
2 this could have benefits of, you know, in the \$2 million, \$3  
3 million per year potential in terms of, largely in the  
4 procurement related area, procurement and inventory control.

5 DR. APOSTOLAKIS: So you think that will be more  
6 or less the ball park?

7 MR. FLOYD: It's hard to say. That's really what  
8 the -- because they're a little bit unique because of their  
9 late vintage of their licensing basis for their plant. They  
10 have a lot more safety related SSC's identified in their  
11 licensing basis than a typical plant has. That's really  
12 what the pilots, I think, are going to tell us, which is why  
13 the owners' groups are very interested in having a scoped  
14 pilot effort that will give them some of those answers.

15 DR. APOSTOLAKIS: It might be less for others?

16 MR. FLOYD: It could be less for others, and it  
17 may turn out that that is representative. We just don't  
18 know yet.

19 DR. APOSTOLAKIS: And after these savings are  
20 realized, then people will spend a billion dollars to have a  
21 good level three PRA perhaps?

22 MR. FLOYD: Well, you know, we are going to talk  
23 about that a little bit in just a few more minutes, but no,  
24 I think --

25 DR. APOSTOLAKIS: Category three.

1 MR. FLOYD: This is a market-drive, I think,  
2 application in general, and I think if people start seeing  
3 the benefits of applying risk technology, and the benefits  
4 are real intangible, you're going to see people embrace them  
5 more strongly and be willing to make a greater investment in  
6 it.

7 DR. APOSTOLAKIS: And after they do that, we'll  
8 need a new ASME standard because everyone will be category  
9 three.

10 DR. KRESS: We'll have to have a category four?

11 MR. BRADLEY: Don't get too far down the road.  
12 We've got to make the baby steps first here.

13 MR. FLOYD: The other issue we have on Option 2 is  
14 treatment of prior commitments. As we know, and I think as  
15 we talked before at this committee, a typical plant has  
16 somewhere around eight to 10,000 commitments. These are  
17 things that are beyond strict regulatory requirements. Many  
18 of them are the way the licensee has chosen to meet a  
19 specific regulatory requirement, but nonetheless, that's  
20 about a ball park number in the order of eight to 10,000 per  
21 plant.

22 What we would hope could happen under this Option  
23 2 approach would be a replacement, a blanket replacement, of  
24 those current commitments, which by and large, went to  
25 special treatment considerations and, you know, pedigree of

1 equipment, with an acknowledgement that the new risk  
2 categorization process and the new defined treatment process  
3 for the various boxes is indeed a replacement for the  
4 previous commitments, without making a licensee go through  
5 the commitment management guideline, which has been endorsed  
6 by the agency, and write up a piece of paper for each of  
7 those 8,000 commitments to disposition it. We'd like to see  
8 a blanket replacement. Otherwise, it is a fairly extensive  
9 bureaucratic process to go through to officially eliminate  
10 those commitments from the docket.

11 DR. BONACA: Just before you leave this overhead,  
12 I would like to ask you about Part 21. The benefit there is  
13 that probably in the procurement components which are not  
14 subjected to the requirement.

15 MR. BRADLEY: Yes.

16 MR. FLOYD: Yes.

17 MR. BRADLEY: Well, Part 21, it's imposing a  
18 significant liability on the vendor or the dedicator, so  
19 even if we can have -- let's say relaxation of other  
20 requirements, if Part 21 is still there, much of the benefit  
21 is not going to be gained.

22 DR. BONACA: Certainly, however, there is still a  
23 benefit to the industry of communicating problems of the  
24 components, and maybe they could be communicated in other  
25 vehicles than Part 21.

1 MR. BRADLEY: Yes, we've thought about that as  
2 well, that maybe, you know, there's ways to meet the intent  
3 without imposing a type of liability that drives the parts  
4 prices up.

5 DR. BONACA: Or eliminate suppliers, actually,  
6 because I mean, some of them don't want to supply any more.

7 MR. BRADLEY: Right, and this is an issue. On  
8 RISC-2 where you may say, you know, in a BWR, for instance,  
9 at the condensate system or feedwater system is risk  
10 significant, you know, trying to impose Part 21 on those  
11 types of vendors would probably be very problematic for the  
12 industry.

13 MR. FLOYD: As a close-out for Option 2, I think  
14 I'd be remiss if I didn't say that I think we've been having  
15 some very good meetings with the staff on Option 2.  
16 Obviously, the industry has some more gelling to do. The  
17 staff has some more gelling to do with respect to positions,  
18 but philosophically, I don't think we heard anything in our  
19 last meeting this past week that is greatly out of sync with  
20 what the industry thinks is the necessary things to do with  
21 respect to treatment for the SSC's under Option 2. So, I  
22 think we're on the right pathway.

23 I'd like to switch now to Option 3. We do think  
24 that there has been a tremendous amount of thought and  
25 effort put in by the NRC staff in establishing the Option 3

1 framework. Some of the comments specifically that we have,  
2 and we provided these in our public comments, we tend to see  
3 that -- we think this is leaning a little bit more towards  
4 risk base than risk informed. At least our impression. It  
5 may be a wrong impression, but there seems to be more  
6 emphasis on the bottom line number results and less on the  
7 integration of the thought process that's embodied in Option  
8 2 approach with the integrated decision making process.

9 DR. APOSTOLAKIS: I didn't get that impression  
10 from the representation.

11 MR. FLOYD: Okay.

12 DR. APOSTOLAKIS: But again, risk based is  
13 something that should be avoided at all costs, right?

14 MR. FLOYD: It comes across more in looking at the  
15 framework than I think it does on the individual rulemaking  
16 efforts, you know. This is more a comment on the framework  
17 document, I think, than --

18 DR. APOSTOLAKIS: Well, they go out of their way,  
19 as I pointed out, than earlier, to state in several places  
20 that risk numbers will not appear in the regulations. I  
21 thought that was excessive. So, I guess it's in the eye of  
22 the beholder. An excessive number of times. I mean, they  
23 can say it once. Not that they went too far, although that  
24 might be the case, too. I don't know. We're going to have  
25 a subcommittee meeting July 11 at 1:00 to discuss the

1 framework here, Option 3. It was decided today.

2 MR. BRADLEY: That's one none of us can support.

3 We have a --

4 MR. FLOYD: Right, we have a risk informed  
5 regulation working group meeting on the 11th.

6 MR. HEYMER: And a date with senior management.

7 MR. FLOYD: And senior management, PRA steering  
8 committee meeting with the staff on Monday morning.

9 MR. BRADLEY: One thing, since you mentioned this,  
10 it might be helpful is we could -- there's so much going on  
11 in risk informed right now. One of the reasons we couldn't  
12 be here all day today is we have many meetings going on  
13 within the industry. If possible, if we could coordinate  
14 our schedules in advance, we might be able to support these  
15 meetings.

16 DR. APOSTOLAKIS: I believe that is an excellent  
17 suggestion. Let me tell you about today's meeting. I mean,  
18 it was scheduled, really, this afternoon when we realized  
19 that the emphasis on the staff's presentation today was on  
20 5044. You know, the committee really has not been given the  
21 opportunity to discuss the details. So, it was something  
22 that it was decided at the last moment, but I think this is  
23 a great idea because, you know, I at least learned a lot by  
24 hearing different viewpoints.

25 MR. FLOYD: Right.

1 DR. APOSTOLAKIS: It's unfortunate. Maybe you can  
2 go back and look at your commitment and maybe one of you can  
3 show up for awhile.

4 DR. KRESS: But that seemed to be about the only  
5 date we could come up with.

6 DR. APOSTOLAKIS: Yeah, this is the only day, you  
7 see, because it's just before the full committee meeting.

8 MR. BRADLEY: Well maybe just make an effort to  
9 share our schedules and try to do that.

10 DR. APOSTOLAKIS: No, we will. Are you in town  
11 that week?

12 MR. BRADLEY: They are in town that week. I'm on  
13 vacation.

14 MR. FLOYD: We're partly in town that week.

15 DR. APOSTOLAKIS: I mean, if you can show up  
16 around 4:00. Do your meetings go late?

17 MR. FLOYD: They go -- this one is from one to  
18 5:00 in the afternoon, since we're meeting with the PRA  
19 steering committee in the morning from nine to 11:00.

20 DR. APOSTOLAKIS: Anyway, that's --

21 MR. BRADLEY: Your full committee meeting is the  
22 12th?

23 DR. APOSTOLAKIS: Yes. You plan to be there?

24 MR. BRADLEY: Yeah, that's probably a date we can  
25 -- I can't speak for you guys.

1 MR. FLOYD: You might have to cover it, Adrian.

2 DR. APOSTOLAKIS: Okay, so maybe then we can give  
3 you some time.

4 DR. KRESS: That would be helpful. That would be  
5 in time before we wrote our letter.

6 DR. APOSTOLAKIS: Yeah.

7 MR. FLOYD: As you know, it's hard to schedule all  
8 of these meetings that are going on and all the parties that  
9 are interested in what's going on in risk informed  
10 regulation. That is a challenge to get the schedules to  
11 match.

12 DR. APOSTOLAKIS: That's right, but especially for  
13 issues like Option 3 -- I mean, on Option 2. It seems to me  
14 we really have to go through and scrutiny every detail  
15 because these are major pieces of regulation.

16 MR. FLOYD: Right, significant changes.

17 DR. APOSTOLAKIS: Now, the second bullet --

18 MR. FLOYD: Yeah, let's get to that one.

19 DR. APOSTOLAKIS: What is it that bothers you  
20 there, the fact that they are using the safety goal numbers  
21 --

22 MR. FLOYD: What's bothering us --

23 DR. APOSTOLAKIS: -- as given by the Commission,  
24 or the idea of using safety goals?

25 MR. FLOYD: No, no, not the idea of using safety

1 goals. It's the way in which the safety goal is being  
2 applied. Our understanding is that the current policy  
3 statement is that safety goals are to be applied on the  
4 general fleet of plants and are not to be used on an  
5 individual plant basis. Our read of the framework document  
6 seems to be driving it more towards the intent to use it on  
7 an individual plant basis, and that hasn't been a policy  
8 decision that has been made yet.

9 DR. APOSTOLAKIS: If you use 1174, you're using it  
10 on an individual plant basis.

11 DR. KRESS: That's much more so there than you are  
12 in this.

13 DR. APOSTOLAKIS: But those numbers there come  
14 from the QHO.

15 MR. FLOYD: Well, 1.174 is really for evaluating  
16 individual changes that you're making --

17 DR. APOSTOLAKIS: But individual plants --

18 MR. FLOYD: -- but it doesn't specifically say  
19 anywhere in Reg Guide 1.174 that you cannot exceed either  
20 the minus four or ten to the minus four core damage  
21 frequency.

22 DR. KRESS: My reading of the framework document  
23 would say that they're using these safety goals just like  
24 they were intended, and that is to gauge how well they're  
25 writing the regulations to get the fleet of plants on an

1 average down there. They won't say each individual plant,  
2 you have to meet this safety goal. They're going to say  
3 we're going to write the regulations so that on the average,  
4 there is a tendency to, if they follow these regulations,  
5 there is a tendency that they might meet the goals, but not  
6 each individual plant. That was my reading --

7 DR. APOSTOLAKIS: Yeah.

8 DR. KRESS: -- that they were just using them just  
9 like they were intended to be.

10 DR. APOSTOLAKIS: I had a different reading. I  
11 thought that before you know it, if you use them like that,  
12 they will become measures of adequate protection, and that  
13 was not the original intent.

14 MR. FLOYD: No, it was not the original intent.

15 MR. BRADLEY: Well, I guess the fact that we have  
16 different readings says something, that maybe --

17 DR. APOSTOLAKIS: That we should have a  
18 subcommittee meeting.

19 DR. KRESS: To clarify this.

20 MR. FLOYD: It's an issue that needs to be in  
21 here.

22 DR. APOSTOLAKIS: No, this is an important issue  
23 in my view.

24 MR. FLOYD: Right.

25 DR. APOSTOLAKIS: This is one of the most

1 important issues --

2 MR. FLOYD: Right.

3 DR. APOSTOLAKIS: -- because just because the  
4 numbers are there and you don't have any other numbers, it  
5 doesn't mean you have to start using them to do certain  
6 things for which they were not intended.

7 I thought the issue of the applicability of the  
8 goals in the individual plants had been settled. We were  
9 discussing this.

10 MR. KING: It was settled in 1174. It was raised  
11 as a policy issue, and the Commission said yes. They said  
12 yes in the context of 1174. They haven't said yes in the  
13 context of revising the regulations.

14 DR. APOSTOLAKIS: So the Commission is allowed to  
15 have selective implementation.

16 MR. KING: But you're only going to raise this as  
17 a policy issue. I mean, I think clearly, this is something  
18 the Commission needs to weigh in on.

19 MR. FLOYD: Especially if you're going to be risk  
20 informed and you realize that not every plant needs a ten to  
21 the minus fourth core damage frequency to meet the  
22 quantitative health objectives and the safety goal.

23 DR. APOSTOLAKIS: That's my concern, too.

24 MR. KING: That's our concern.

25 DR. APOSTOLAKIS: It may turn out to be a measure

1 of inadequate protection, not adequate. That's not the  
2 original intent. See, if it's adequate protection, it's  
3 risk based. If it's a measure of inadequate, then it's  
4 still risk informed.

5 MR. BRADLEY: And 1.174 was written to go beyond  
6 adequate protection.

7 DR. APOSTOLAKIS: I can play the word game as well  
8 as you can. I'm sorry, Biff.

9 MR. BRADLEY: 1.174 Contains a discussion of the  
10 fact that it was intended to establish measures beyond  
11 adequate protection. It's not intended to define what is  
12 adequate protection.

13 DR. APOSTOLAKIS: That's true.

14 MR. BRADLEY: Yeah.

15 MR. FLOYD: Our third bullet really goes -- is a  
16 corollary to the second bullet, and it's the policy issue.  
17 We think that is a departure to apply again the subsidiary  
18 objectives of the safety goal on an individual plant basis,  
19 and that was our read as to what it looked like it was going  
20 towards.

21 The last bullet, I think, is perhaps one that's a  
22 little bit interesting, and it goes to what Tom was talking  
23 about in his presentation about the application of the  
24 backfit rule. I don't think anybody in the industry  
25 disagrees that if there is an outstanding issue out there

1 that does show a cost benefit for being a provision in one  
2 of the Option 3 risk informed changes that it's appropriate  
3 to put it in, that's fine. We don't see any clear guidance  
4 yet in the framework document, which would suggest that  
5 additions that want to be made to requirements that aren't  
6 included today would, indeed, have to pass some sort of  
7 threshold criteria, and what is that criteria before they  
8 would be imposed under the Option 3 framework.

9 I mean, our understanding is that under the Option  
10 3 framework, we are looking for, you know, improvements in  
11 the effectiveness and the efficiency of the regulation by  
12 removing unnecessary burden and by focusing the regulation  
13 on that which is important. While our understanding is that  
14 with this double edged sword, we're only going to be allowed  
15 to make minor changes, we think if there are significant  
16 additions to the requirements, they ought to have a criteria  
17 of what level of significance do they have to add value for.  
18 Otherwise, they just become potentially another candidate  
19 for a reduction at a later date because they're not  
20 effective, and we don't know what that criteria is at this  
21 point.

22 Overall, and these words probably more come from  
23 our working group than anybody else. What we're really  
24 looking for in Option 3 is a pragmatic versus a more  
25 theoretical approach. We really think that the best

1 approach in Option 3 is to use generic risk insights. In  
2 fact, when we think about what the role of the regulations  
3 is to be applicable to a fleet of plants, we're not sure  
4 that you need a great deal of plant specific detailed PRA  
5 information to adopt Option 3. What you ought to be  
6 looking at are broad, generic insights from PRA results  
7 across a fleet or a subset of the fleet of plants rather  
8 than being too focused on the actual plant specific PRA  
9 results. Now, there may be certain cases where that's  
10 appropriate, depending on how the regulation is written, but  
11 in general, we think it ought to be a generic application  
12 for a generic rulemaking.

13 As we've said, we want to make sure that we do  
14 preserve the risk informed philosophy and make sure we don't  
15 get too risk based in this by focusing too much again on  
16 numbers and plant specific PRA results.

17 DR. SHACK: Would that mean, for example, that you  
18 don't particular like the alternative two approach to 5044,  
19 where it would be very plant specific?

20 MR. FLOYD: Yes. We think it would be better to  
21 have a generic rulemaking which stands back and looks in the  
22 big picture, what are the important things for -- maybe it  
23 doesn't apply to all the fleet of plants, but maybe you have  
24 to break it up into subsections of a fleet of plants, that  
25 these are the items that our insides tell us are important

1 to pay attention to from a public health and safety  
2 perspective, and then write a generic rulemaking around that  
3 framework.

4 DR. SHACK: Just coming back to your bullet in the  
5 previous page where you've objected to the quantitative  
6 basis. Now, is that the particular number or just the  
7 notion of a quantitative basis?

8 MR. FLOYD: No, I think it's the particular number  
9 focused on a plant specific result as opposed to -- yeah,  
10 certainly we think it may not be inappropriate to have a  
11 quantitative basis for it. That's applied generically based  
12 upon insights from a population of plants. Biff and Adrian,  
13 jump in here is you have any problems with that. No, okay.

14 Our recommendations under Option 3, as we had in  
15 our letter, were to complete the ongoing efforts that are  
16 going on in hydrogen control and the fire protection, 50.48  
17 Appendix R effort. The greatest -- we did a survey of the  
18 industry last fall, and all our indications are is that the  
19 results of that survey are not any different today. The  
20 feedback we're getting is that people think the areas that  
21 are most right for improvement are codes and standards under  
22 50.55(a) and the large break loca analysis, 50.46.

23 DR. KRESS: Can I ask you a question about that?  
24 Let's take the large break loca. We've got the 50.46 rule  
25 and Appendix K, which imposes certain requirements on the

1 plants. Now, if they're going to risk inform that, then  
2 there will be another kind of rule with different  
3 requirements imposed. In order to get a benefit estimate,  
4 you must have had some sort of notion of what this new rule  
5 is going to look like in order to determine what you're  
6 going to be allowed to change and do. I'm not sure, without  
7 your having the actual new risk informed rule, I'm not sure  
8 what assumption was made in, say, the NEI letter where these  
9 showed up. How were these cost estimates arrived at?

10 That's my question.

11 MR. HEYMER: On the 50.46, most of the responses  
12 were from -- not all the responses, but most were from the  
13 Westinghouse plants, who used the data that they developed  
14 under the owners group approach to define what the benefit  
15 might be from the Westinghouse owners group activity  
16 associated with the large break loca. In that, they'd made  
17 some preliminary assumptions and from their preliminary  
18 work, they thought that they could get down to a specific  
19 break size in redefining the large break, and based on that.

20 DR. KRESS: They made some assumptions.

21 MR. HEYMER: Yes, they made some assumptions.  
22 Now, obviously, the larger the break size, perhaps the lower  
23 the benefit, but I mean, that's what they based it on, and  
24 some of the other owners groups who provided information to  
25 us said they didn't think they could go that way, but they

1 felt there may be some benefit if they applied the follow-on  
2 activities from a large break. Whether or not they came  
3 down to the same size at the Westinghouse owners group was a  
4 matter of debate. So, there was some provisional -- it was  
5 preliminary. We acknowledge that, but at least it gave us  
6 some indication of where we might go.

7 DR. KRESS: It gave you an indication.

8 MR. HEYMER: Yes.

9 DR. KRESS: Probably good enough numbers for doing  
10 prioritization, anyway.

11 MR. HEYMER: Yeah, and then once you get into it,  
12 you know, you re-assess that as you go along.

13 DR. KRESS: As I said, after the rule just some  
14 conformity.

15 MR. HEYMER: And obviously before the executives  
16 say move on. They want some harder numbers still.

17 DR. KRESS: Thank you.

18 MR. FLOYD: Some of the non-Westinghouse plants  
19 also were looking at elimination of the requirement to  
20 consider a loss of off site power coincident with the double  
21 ended guillotine break as one approach, as well as removing  
22 some of the conservatisms, the known conservatisms in the  
23 Appendix K analysis.

24 DR. KRESS: Eliminating the loss of off site  
25 power. Is that because you've got it down to such a low

1 probability that it's not --

2 MR. FLOYD: Yes. If you look at the probability  
3 of the large break size coincident with the loop, you're  
4 pretty far down.

5 DR. KRESS: Pretty far down. Okay, thank you.

6 MR. HEYMER: Just a quick point on the codes and  
7 standards. It wasn't really clear from the survey when we  
8 went back to people and asked questions whether the benefits  
9 that they were quoting were really just from what they might  
10 achieve under Option 3 or what they might achieve through  
11 Option 2 as well. Some people who put numbers in there  
12 hadn't implemented ISI or IST-type of activities.

13 MR. FLOYD: And then obviously, the desired  
14 approach that the industry really has is they think if we  
15 could focus on the codes and standards and large break rule,  
16 that that will probably flush out the preponderance of the  
17 policy issues and the degree of rigor that will have to be  
18 demonstrated to make these changes, and then they will be in  
19 a better position at that point to look at prioritization  
20 for remaining regulations.

21 We actually think while that sounds like that's a  
22 slowing down of the effort, we really think that would  
23 actually result in a speed-up of the overall effort because  
24 we'll either know the benefit is there and as the desire to  
25 move forward or not. When we get the results from these

1 first two efforts, then we'll know the magnitude of the  
2 policy issues that will have to be likely dealt with.

3 This next one, again, this is just a perception.  
4 Perhaps it's because we've had a lot more dialogue with the  
5 staff on Option 2 than Option 3. The timing is a little bit  
6 different on the two efforts, at least with respect to our  
7 involvement and interactions. We do see, at the front end,  
8 maybe a little bit different and fundamental approach.

9 We see the research effort perhaps, again our view  
10 being a little bit more focused on the plant specific PRA  
11 results and the importance of the number. That's an  
12 impression that we have, and we see the NRR side. While  
13 that's certainly an element, we see them very much more  
14 concerned, perhaps, about some of the other elements that  
15 are not covered by the PRA being brought in.

16 Perhaps, as I said, it's a function of the level  
17 of dialogue that we've had to date on Option 2 versus Option  
18 3 that's driving that, but that's an early perception that  
19 we have. If that fundamental difference does indeed exist,  
20 then we think it would be of great benefit to sort that out  
21 and make sure that we have a consistent approach from both  
22 offices in the agency.

23 I will comment, and I think this is just the  
24 nature of the beast that we're dealing with on the second  
25 bullet, that most of the meetings we've had to date on

1 Option 2 really wind up focusing on what do you do with the  
2 stuff that your risk categorization process tells you is not  
3 very important, and sometime I know we're going to have to  
4 get over that, but at some point in time, we really need to  
5 start paying attention to what's the stuff that we all think  
6 is important and making sure that we're dealing with that  
7 correctly and figure out how to not spend so much time  
8 worrying about the unimportant or less important stuff.

9 DR. SHACK: How comfortable are you with you  
10 agreement over what it's going to take to decide what's  
11 important and what's not important?

12 MR. FLOYD: Do you want to address that, Biff?

13 MR. BRADLEY: How comfortable we are with the  
14 agreement?

15 DR. SHACK: The categorization.

16 MR. BRADLEY: Well, I think really that's the  
17 driver of this issue. To some degree it's a degree of  
18 confidence in the categorization process.

19 DR. SHACK: Oh, well I thought the argument was on  
20 the actual treatment that you would give to the low risk  
21 significant.

22 MR. BRADLEY: Right.

23 DR. SHACK: But not whether on what you decide.

24 MR. BRADLEY: We're more comfortable with the  
25 categorization element than we are with the treatment

1 element. It seems that -- I think, you know, we've done  
2 categorizations of more of a limited scope thing, a  
3 maintenance rule, ISI, IST. Those are, you know,  
4 categorization, graded QA. There's some sense of you can do  
5 that and success.

6           There seems to be more controversy and more  
7 difficulty trying to decide what do you do with it once  
8 you've binned it, you know, and there's not a -- you know,  
9 you can always be really conservative in the categorization  
10 process to take care of any disagreement, but then once  
11 you've done that, you know, that in itself doesn't give you  
12 anything. You've got to do something with the two bins, and  
13 that's where the difficulty is, more controversy.

14           So, it's also where the whole benefit would  
15 evolve. So, just having an agreement and a mutual  
16 understanding on how to categorize doesn't tell us  
17 everything we need to know to have success, you know, and  
18 widespread buy-in into these efforts.

19           I think we'll get there. It's always difficult,  
20 and there's a long history to some of these things, and  
21 change is difficult, but you know, I believe we can get  
22 there. Steve's right, you know. There seems to be an  
23 inordinate focus on things that everyone seems to agree on  
24 low safety, you know, significant in the categorization  
25 process.

1 MR. HEYMER: When the NRC staff are planning some  
2 visits to plants to look at some of the programs that will  
3 be applicable to the low safety significance, and I think  
4 once they've seen those, I think it will ease the path of  
5 resolution. There will be a better understanding from the  
6 NRC side of what we really mean by commercial or commercial  
7 nuclear practices. I think one we've got through that  
8 phase, there will be a much better understanding, and we'll  
9 have a better idea of where we're going and how far we can  
10 go.

11 MR. FLOYD: And just a final observation, and it  
12 really goes to what Dr. Apostolakis referred to just a  
13 little bit ago, and that is there is, we think, a limited  
14 window of opportunity for getting general support within the  
15 industry for these initiatives. It's expensive to be a  
16 pilot plant. It's expensive to kind of go out on your own,  
17 as South Texas has. The longer that review takes, the more  
18 resources that are applied to it.

19 If we could show some timely resolution on 5044  
20 and action on the South Texas exemption request, I think  
21 that will spur the rest of the industry on to be much more  
22 interested and engaged in applying risk technology, and will  
23 probably promote better PRA models and a desire to upgrade  
24 PRA models and get better information, which personally, we  
25 think, is to the benefit of the overall industry and public

1 health and safety. We think there's just so much  
2 information that's available from the insights that you get  
3 from risk analysis, that we'd like to see a strengthening of  
4 those abilities within the industry.

5 That concludes our formal remarks.

6 DR. KRESS: We certainly thank you and ask if any  
7 of the committee members wish to ask any more questions.  
8 Any comments from research or NRR? Anybody in the audience  
9 want to make a comment?

10 Seeing none, I wish to thank the NEI  
11 representatives. We hope you can make our full committee  
12 meeting on the review of the framework document.

13 With that, I'm going to declare this meeting  
14 adjourned.

15 [Whereupon, at 3:05 p.m., the meeting was  
16 concluded.]

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REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

NAME OF PROCEEDING: RELIABILITY AND PROBABILISTIC  
RISK ASSESSMENT

CASE NO:

PLACE OF PROCEEDING: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

  
\_\_\_\_\_

Mark Mahoney

Official Reporter

Ann Riley & Associates, Ltd.

REVISED 6/26/00

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
MEETING OF THE SUBCOMMITTEE ON PROBABILISTIC RISK ASSESSMENT  
ROOM T-2B3, 11545 ROCKVILLE PIKE, ROCKVILLE, MD  
JUNE 28-29, 2000**

ACRS Contact: Michael T. Markley (301) 415-6885

**- PROPOSED SCHEDULE -**

**June 28, 2000**

	<b><u>TOPIC</u></b>	<b><u>PRESENTER</u></b>	<b><u>TIME</u></b>
1)	<b>Introduction</b>		8:30-8:35 am
•	Review goals and objectives for this meeting	G. Apostolakis, ACRS	
•	Review points raised in ACRS report dated March 25, 1999; ACRS member assignments for reviewing the proposed Standard	G. Apostolakis, ACRS	
2)	<b>ASME Presentation</b>		8:35-10:00 am
•	Introductory remarks	G. Eisenberg, ASME	
•	Discussion of revised ASME document entitled, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications," including proposed use of industry certification programs.	S. Bernsen, Chairman ASME CNRM R. Simard, ASME Project Team Leader Others, TBD	
•	Reconciliation of comments (ACRS, NRC, industry, and public) on draft #10		
•	Public comments from the June 27, 2000 public workshop on the revised Standard.		
	<b>** BREAK **</b>		10:00-10:15 am
3)	<b>ASME Presentation - continued</b>		10:15-12:00 noon
•	Discussion of technical issues associated with the proposed Standard and its use, including the use of expert opinion, peer review, quantitative and qualitative aspects, methods and models.	ASME, TBD	

- |           |   |                      |
|-----------|---|----------------------|
|           | <b>** LUNCH **</b>  | 12:00-1:00 pm        |
| <b>4)</b> | <b>General Discussion and Recess</b>  | 1:00-2:30 pm         |
| •         | General discussion and comments by Members of the Subcommittee; items for July 12-14, 2000 ACRS meeting | G. Apostolakis, ACRS |

**June 29, 2000**

- |           | <b><u>TOPIC</u></b>  | <b><u>PRESENTER</u></b>                              | <b><u>TIME</u></b> |
|-----------|--|--|--------------------|
| <b>5)</b> | <b>Introduction</b>  |  | 8:30-8:35 am       |
| •         | Review goals and objectives for this meeting   | G. Apostolakis, ACRS                                 |                    |
| •         | Review points raised during March 2000 ACRS meeting and issues noted in ACRS report dated October 12, 1999         | G. Apostolakis, ACRS                                 |                    |
| <b>6)</b> | <b>NRC Staff Presentation</b>  |  | 8:35-10:15 am      |
| •         | Discussion of public comments on proposed 10 CFR 50.69 and associated Appendix T (Option 2)                        | C. Carpenter, NRR<br>T. Bergman, NRR<br>T. Reed, NRR |                    |
| •         | NRC staff perspective on proposed industry peer certification process and draft NEI guideline on special treatment |  |                    |
| •         | Plans to brief the Commission in September 2000 on proposed reconciliation of public comments.                     |  |                    |
|           | <b>** BREAK **</b>   |  | 10:15-10:30 am     |
| <b>7)</b> | <b>Industry Presentation</b>   |  | 10:30-11:30 am     |
| •         | Petition for rulemaking to 10 CFR 50.44 concerning combustible gas control systems                                 | B. Christie, Performance Technology, Inc.            |                    |
|           | <b>** LUNCH **</b>   |  | 11:30-12:30 pm     |
| <b>8)</b> | <b>NRC Staff Presentation</b>  |  | 12:30-2:00 pm      |
| •         | Discussion of proposed revision to 10 CFR Part 50 (Option 3) and 10 CFR 50.44 concerning combustible gas control   | T. King, RES<br>M. Cunningham, RES<br>M. Drouin, RES |                    |

systems

- Status of 10 CFR 50.44 rulemaking petition C. Carpenter, NRR
- **\*\* BREAK \*\*** 2:00-2:15 pm
- 9) **Industry Presentation** 2:15-2:45 pm
  - Industry perspective on proposed revision to 10 CFR 50.69 and Appendix T S. Floyd, NEI  
A. Heymer, NEI
  - Issues and priorities noted in the NEI letter dated January 19, 2000
  - Status of industry guidance development
- 10) **General Discussion and Adjournment** 2:45-3:00 pm
  - General discussion and comments by Members of the Subcommittee; items for July 12-14, 2000 ACRS meeting G. Apostolakis, ACRS

**Note:** Presentation time should not exceed 50% of the total time allocated for a specific item. Number of copies of presentation materials to be provided to the ACRS - 35.

INTRODUCTORY STATEMENT BY THE CHAIRMAN OF THE  
SUBCOMMITTEE ON RELIABILITY AND PRA  
11545 ROCKVILLE PIKE, ROOM T-2B3  
ROCKVILLE, MARYLAND  
JUNE 28-29, 2000

The meeting will now come to order. This is the second day of the meeting of the ACRS Subcommittee on Reliability and Probabilistic Risk Assessment. I am George Apostolakis Chairman of the Subcommittee.

ACRS Members in attendance are: Mario Bonaca, Thomas Kress, William Shack, Jack Sieber and Robert Uhrig.

The purpose of this meeting is to discuss the status of risk-informed revisions to 10 CFR Part 50, including proposed revision to 10 CFR 50.44 concerning combustible gas control systems, issues in the Nuclear Energy Institute letter dated January 19, 2000 (Option 3), and public comments related to the Advance Notice of Proposed Rulemaking on 10 CFR 50.69 and Appendix T (Option 2). The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee. Michael T. Markley is the Cognizant ACRS Staff Engineer for this meeting.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the *Federal Register* on May 16, 2000.

A transcript of the meeting is being kept and will be made available as stated in the Federal Register Notice. It is requested that speakers first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

We have received no written comments from members of the public. However, Mr. Bob Christie of Performance Technology, Inc. has requested time to make a presentation concerning proposed revision to 10 CFR 50.44.

(Chairman's Comments-if any)

We will now proceed with the meeting and I call upon Ms. Cynthia Carpenter, NRR, to begin.

Advisory Committee on Reactor Safeguards  
Subcommittee on Probabilistic Risk Assessment

Petition for Rulemaking  
Combustible Gas Control

June 29, 2000  
Two White Flint, Rockville, MD

Bob Christie

Performance Technology  
P. O. Box 51663  
Knoxville, TN 37950-1663  
(865) 588-1444  
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## Agenda

- A. Letter from Bob Christie to Tom King, 5/30/00
- B. Introduction/Background
- C. San Onofre Task Zero Safety Evaluation Report
- D. Other Exemption Requests
- E. Key Points
- F. Petition for Rulemaking
  - 1. 10CFR50, Appendix A, GDC 41
  - 2. 10CFR50.44
- G. Summary

RJC  
5/30/00

Attachment to Letter from Bob Christie, Performance Technology, to Dr. Tom King,  
Office of Research, dated 5/30/00

## Slide 23

### Agreement:

The hydrogen monitoring system can be commercial grade and not "safety-related."

### Disagreement:

I believe that there should be no NRC requirements for hydrogen monitoring. The nuclear units may continue to have equipment for hydrogen monitoring for severe accident management but this equipment is not "safety significant" and should have no NRC requirements. Hydrogen concentration is not a primary indicator but rather only a confirmatory indicator. I do not believe that the hydrogen monitors have any significant impact of "reasonable assurance of adequate protection of public health and safety."

It appears that the NRC staff believes there should be NRC requirements for hydrogen monitoring in the long term and, while the monitors would not be "safety related" but rather commercial grade, the hydrogen monitors would still have to meet some "functional" requirements in the long term and be subject to NRC inspection and enforcement. As indicated above, I disagree with this position.

## Slide 24

### Agreement:

Containment air mixing should continue to be covered by other regulations with no changes. No changes should be made to containment air mixing systems.

## Slide 25

### Agreement:

Remove post LOCA hydrogen control from 10CFR50.44.

RJE  
5/30/00

## Slide 26

Agreement:

All nuclear reactors should continue to have high point vents as currently called for in the regulations.

## Slide 27

Agreement:

Mark I and Mark II Boiling Water Reactors should continue to remain inerted as currently called for in the regulations.

## Slide 28

I am unsure what agreement or disagreement exists because this slide was not clear as to what was being discussed. I have included some words in my petition for rulemaking regarding the capability of large dry containments during severe accidents. I do not know whether the NRC staff believes that my words are the wrong words and they want to change my words or add words to what I proposed, or exactly what is the concern of the NRC staff. This slide needs better definition as to what is being discussed.

To me it is not clear exactly what the NRC staff is concerned about with respect to Station Blackout at the ice condenser plants and Mark III Boiling Water Reactors. In any case, I believe any additional requirements on the igniters for Mark III Boiling Water Reactors and ice condenser plants should be addressed by the backfit process, 10CFR50.109.

## Objective - Pilot Programs

The objective of the pilot programs will be to demonstrate a more objective and efficient way to maintain adequate protection of public health and safety, to promote the common defense and security, and to protect the environment than the present detailed prescriptive regulatory process.

# Integrated Approach

## "Whole Plant"

Cost

Generation

Risk

# BASIS

- The primary responsibility for the “public health and safety” of a nuclear unit lies with the people at the site who are running the nuclear unit.
- The regulatory process that oversees the nuclear unit must ensure “adequate protection of public health and safety.”

# PUBLIC HEALTH RISK

1. Is different for each nuclear unit.
2. Changes with time.

Dr. Thomas Pigford, Kemeny Report, October 1979, Separate views.

16. The Major Problems with NRC's Approach to Reactor Safety

The Commission (Kemeny) report has identified many mistakes by NRC personnel in their handling of the TMI-2 accident and deficiencies in NRC's regulatory practices. However, this criticism does not reach some essential elements of the problem. I believe that the following are some of the more important problems at NRC:

... Lack of quantified safety goals and objective. When a safety concern is postulated, there is no yardstick to judge the adequacy of mitigating measures.

... Inability to set priorities and to allocate resources in proportion to the estimated risk to the public. In my view, a disproportionate effort is being required for some issues which have only a marginal impact upon risk to the public.

... Lack of experienced staff. An undesirably large proportion of NRC staff and management have little or no practical experience in designing or operating the equipment which they regulate.

... Arbitrary requirements. Too many of the NRC requirements are mandated without valid technical back-up and value-impact analysis.

... A stifling adversary approach. The existing process inhibits the interchange of technical information between the NRC and industry. It discourages innovative engineering solutions.

... Ineffective evaluation of operations. NRC has no effective system for evaluating data from operating plants. Data should be analyzed systematically to identify trends and patterns.

... Lack of a comprehensive system approach to the whole plant. A large percentage of the NRC staff are specialists focusing upon narrow topics. There are relatively few systems engineers within NRC who can integrate individual safety features into an overall concept and who can place issues into perspective.

... An overwhelming emphasis on conservative models and assumptions. Realistic analyses are needed to identify the margins of safety and to aid competent decisions.

ISSUES FOR NUCLEAR PLANTS IN A  
DEREGULATED ELECTRIC UTILITY INDUSTRY

by

J. D. SHIFFER  
Executive Vice President (Retired)  
PACIFIC GAS & ELECTRIC COMPANY

AMERICAN NUCLEAR SOCIETY  
INTERNATIONAL TOPICAL MEETING ON  
SAFETY OF OPERATING REACTORS  
SAN FRANCISCO, CALIFORNIA

OCTOBER 11-14, 1998

10/23

Excerpt from the San Onofre Task Zero Safety Evaluation Report:

"The overall public risk and radiological consequences from reactor accidents is dominated by the more severe core damage accidents that involved containment failure or bypass."

11/23

Excerpts from the San Onofre Task Zero Safety Evaluation Report:

"Subsequent risk studies have shown that the majority of risk to the public is from accident sequences that lead to containment failure or bypass, and that the contribution to risk from accident sequences involving hydrogen combustion is quite small."

"As mentioned in the previous section, the risk associated with hydrogen combustion is not from design-basis accidents but from severe accidents."

Excerpts from the San Onofre Task Zero Safety Evaluation Report:

"Although the recombiners are effective in maintaining the Regulatory Guide 1.7 hydrogen concentration below the lower flammability limit of 4 volume percent, they are overwhelmed by the larger quantities of hydrogen associated with severe accidents which are typically released over a much shorter time period (e.g., 2 hours)."

"From this information, the NRC staff concludes that the quantity of hydrogen, prescribed by 10CFR50.44(d) and Regulatory Guide 1.7, which necessitates the need for hydrogen recombiners and its backup the hydrogen purge system is bounded by the hydrogen generated during a severe accident. The NRC staff finds that the relative importance of hydrogen combustion for large, dry containments with respect to containment failure to be quite low. This finding supports the argument that the hydrogen recombiners are insignificant from a containment integrity perspective."

Excerpt from the San Onofre Task Zero Safety Evaluation Report:

"In a postulated Loss of Coolant Accident, the San Onofre Nuclear Generating Station Units 2 and 3 Emergency Operating Instructions direct the control room operators to monitor and control the hydrogen concentration inside the containment after they have carried out the steps to maintain and control the higher priority critical safety functions. The key operator actions in controlling the hydrogen concentration are to place the hydrogen recombiners or hydrogen purge system in operation which involves many procedural steps. These hydrogen control activities could distract operators from more important tasks in the early phases of accident mitigation and could have a negative impact on the higher priority critical operator actions."

# Key Points - Combustible Gas Control

## Public Health Risk

Severe Accidents - Not Design Basis Accidents

Containment integrity when fission products present

Existing hydrogen recombiners and purge ineffective

Existing procedures can distract operators

## Combustible Gas Control Configurations

Unit	Monitors	Hydrogen % action level	Design pressure Failure pressure (psig)	Repressurization	Purge	Permanent Recombiners	Movable Recombiners
Unit 1	90 minutes	3.5%	59/153	NA	NA	primary inside containment	NA
Unit 2	90 minutes	3.5%	55/140	primary portable blowers 2 psig	primary 6" mini purge	NA	backup off site
Unit 3	30 minutes	3.0%	36/85	primary permanent dilution blowers 18 psig	primary 4"	NA	backup off site
Unit 4	30 minutes	3.0%	59/140	NA	NA	NA	primary on site
Unit 5	varies according to EOP	3.0%	55/137	backup portable blowers 1 psig	backup 48" butterfly	primary Intermediate Building	NA
Unit 6	90 minutes	3.0%	54/141	NA	NA	Primary inside containment	NA

16/23

# Observations

(on six sites evaluated so far - all large dry containments)

Wide variation in implementation of 10CFR50.44.

Use of repressurization/purge and movable recombiners. Implementation of design basis LOCA requirements (FSAR) could result in significant detriment (public health risk and worker health risk) during severe accidents for some plants.

Containment capability more than adequate (IPE).

Hydrogen monitoring safety function only for repressurization/purge or recombiners.

## Personal Belief

Personnel at the nuclear electric power units should not be in the position where implementation of design basis LOCA hydrogen requirements would be detrimental to public health risk and worker health risk during severe accidents especially with respect to repressurization/purge and movable recombiners. This impacts how personnel at the nuclear unit prepare accident procedures and emergency plans and might impact how personnel would respond in an actual severe accident.

In my opinion, immediate action to remedy this situation is warranted.

18/23

My proposed revised 10CFR50, Appendix A, General Design Criteria 41, Containment atmosphere cleanup, is as follows:.

As necessary, systems to control fission products, hydrogen, oxygen, and other substances which may be released into the reactor containment shall be provided, consistent with the functioning of other associated systems, to assure that reactor containment integrity is maintained for accidents where there is a high probability that fission products may be present in the reactor containment.

My proposed revised 10CFR50.44, Standards for combustible gas control system in light-water-cooled power reactors, is as follows:

- a.) An inerted reactor containment atmosphere shall be provided for each boiling light-water nuclear power reactor with a Mark I or Mark II type containment.
- b.) Each licensee with a boiling light-water nuclear power reactor with a Mark III type of containment and each licensee with an ice condenser type of containment shall provide its nuclear power reactor containment with a hydrogen control system. The hydrogen control system must be capable of handling (based on realistic calculations) the hydrogen equivalent to that generated from a metal-water reaction involving 75% of the fuel cladding surrounding the active fuel region (excluding the cladding surrounding the plenum volume).

My proposed revised 10CFR50.44, Standards for combustible gas control system in light-water-cooled power reactors, is as follows:

- c.) All light water reactors with other types of containment than in (a) or (b), must demonstrate that the reactor containment (based on realistic calculations) can withstand, without any hydrogen control system, a hydrogen burn for accidents with a high probability of causing severe reactor core damage. If such an evaluation of reactor containment capability can not be demonstrated, then the licensee shall provide a hydrogen control system per the backfit process. This hydrogen control system must be capable of handling (based on realistic calculations) the hydrogen equivalent to that generated from a metal-water reaction involving 75% of the fuel cladding surrounding the active fuel region (excluding the cladding surrounding the plenum volume)

My proposed revised 10CFR50.44, Standards for combustible gas control system in light-water-cooled power reactors, is as follows:

- d.) Each light-water nuclear power reactor shall be provided with high point vents for the reactor coolant system, for the reactor vessel head, and for other systems required to maintain adequate reactor core cooling if the generation of noncondensable gases in these systems would realistically lead to severe reactor core damage during an accident. High point vents are not required, however, for the tubes in U-tube steam generators.

## SUMMARY

Sufficient knowledge exists to change the regulations for Combustible Gas Control.

Focus must be on severe accidents.

Petition for rulemaking is a combination of:

- Retain what is effective and efficient.

- Add where necessary.

- Delete what is not effective and efficient.

Implementation of the petition will be "risk positive."

Note: Rulemaking is a result of a letter I sent to the NRC Commissioners on October 7, 1999. The letter was changed to a petition for rulemaking with my agreement. Implementation does not depend on "Option 3."



**PECO ENERGY**

DOCKETED  
USNRC

00 MAY 25 8:30 AM

PECO Energy Company  
Nuclear Group Headquarters  
965 Chesterbrook Boulevard  
Wayne, PA 19087-5691

May 17, 2000

OFFICE  
OF  
ADJUDICATION

Secretary  
U.S. Nuclear Regulatory Commission  
Attn: Rulemakings and Adjudications Staff  
Washington, DC 20555-0001

DOCKET NUMBER  
PROPOSED RULE **PP 21, 50, 52, 54 + 100**  
**(65FR11488)**

Subject: Comments Concerning "Risk-Informing Special Treatment Requirements"  
(65FR11488, dated March 3, 2000)

Dear Sir/Madam:

This letter is being submitted in response to the Nuclear Regulatory Commission's (NRC) request for comments concerning "Risk-Informing Special Treatment Requirements," which was published in the Federal Register (i.e., 65FR11488, dated March 3, 2000). The NRC is considering new regulations that would provide an alternative risk-informed approach for special treatment requirements in the current regulations. This action is a result of the Commission's continuing efforts to risk-inform its regulations.

PECO Energy appreciates the opportunity to comment on the petition for rulemaking. PECO Energy supports the comments submitted on behalf of the nuclear energy industry, by the Nuclear Energy Institute.

If you have any questions, please do not hesitate to contact us.

Very truly yours,

James A. Hutton, Jr.  
Director - Licensing



*United States  
Nuclear Regulatory Commission*

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**Risk-Informed 50.44**  
***“Standards for Combustible Gas Control System in Light-  
Water-Cooled Power Reactors”***

<p>Mary Drouin, Alan Kuritzky Office of Nuclear Regulatory Research Mike Snodderly Office of Nuclear Reactor Regulation</p>	
<p>John Lehner Vinod Mubayi Trevor Pratt Brookhaven National Laboratory</p>	<p>Allen Camp Jeff LaChance Sandia National Laboratories Eric Haskin ERI</p>

Presentation to  
ACRS Subcommittee

June 29, 2000

# OUTLINE

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- Stakeholder (NEI) input
- Approach
- Overview of 50.44
- Risk significance
- Risk-informed options
- Potential Issues
- Schedule

# STAKEHOLDER INPUT

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- Letter from J. Colvin (NEI) to Chairman Meserve, dated January 19, 2000
  - General support for NRC approach (SECY-99-264)
  - Need to complete risk-informed projects on fire protection, security and technical specifications
  - Option 3 focus should initially be on 50.46 and 50.44
  
- NRC response
  - Framework in SECY-00-0086 is Revision 0 and being updated to better clarify such items as defense-in-depth, safety margin, treatment of uncertainties
  - Top priority is 50.44 (trial implementation)
  - Work initiated on:
    - ▶ 50.46
    - ▶ Special treatment requirements
    - ▶ Prioritizing remaining regulations

# APPROACH

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- Balanced high-level defense-in-depth (prevention/mitigation)
- Quantitative guidelines
  - Prevention/mitigation
  - Four strategies

# APPROACH

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- Selection of regulation for risk-informing
- Development of risk-informed options
  - Based on current requirements
  - Based on defined objective of the regulation
- Evaluation of options and development of alternatives

# FRAMEWORK IMPLEMENTATION

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- Identify the concern
- Identify the strategy that addresses the concern
- Identify the relative importance of the concern against the quantitative guidelines for each strategy
- Develop options:
  - a single accident class does not contribute more than 10% (of the quantitative guidelines) and
  - accounts for both prevention and mitigation

# 50.44 REQUIREMENTS

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- Analytical Requirements
  - postulated LOCA
  - degraded core accidents
  - H<sub>2</sub> source term based on fuel cladding oxidation
  - H<sub>2</sub> source term based on 5%/75% metal-water reaction
- Physical Requirements
  - measure H<sub>2</sub> concentration in containment
  - insure mixed atmosphere in containment
  - control combustible gas concentrations (recombiners)
  - inert Mark I and II containments
  - install high point vents
  - install H<sub>2</sub> control system (igniters) for Mark III and ice condensers

# 50.44: Licensee Compliance

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Physical Requirement	Predominant Means of Compliance
Measure H2 concentration	Safety-grade continuous H2 monitors
Mixed containment atmosphere	Natural convective cooling, air return fans, or containment spray
Post-LOCA H2 control (recombiners)	Safety grade recombiners
Inert Mark I and II containments	Nitrogen inerting system
High point vents	Vents installed per 50.44
H2 control for Mark III and ice condenser containments (igniters)	Safety-grade AC powered igniters

# 50.44: Related Regulations and Implementing Documents (Examples)

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- Appendix E to Part 50: *“Emergency Planning and Preparedness for Production and Utilization Facilities”*
  - Continuous H<sub>2</sub> monitoring required for Emergency Response Data System
- 50.46(b): *“Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors”*
  - Specifies maximum H<sub>2</sub> generation in postulated LOCA for purpose of complying with ECCS acceptance criteria
- RG 1.97: *“Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident”*
  - Establishes that hydrogen concentration in the containment and drywell is a Type C variable (i.e., safety grade)

# RISK SIGNIFICANCE

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- Each core damage/melt accident can potentially produce combustible gases (both H<sub>2</sub> and CO) because of loss of coolant inventory
  - fuel cladding oxidation
  - core-concrete interaction
- WASH-1400
  - Accidents (e.g., transients) other than LOCAs contribute to CDF
  - Significant H<sub>2</sub> generation
  - High conditional containment failure probability from H<sub>2</sub> combustion
- Severe Accident Research Program (SARP)
  - Post TMI Accident - Confirmatory Research
  - Confirmed ignition limits for variety of H<sub>2</sub>/air/steam mixtures
  - Evaluated effectiveness of H<sub>2</sub> mitigative systems
  - Established basis for detonability of H<sub>2</sub>
  - Studied H<sub>2</sub> transport and mixing

# RISK SIGNIFICANCE

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- Severe Accident Risk Assessment (NUREG-1150)
  - Other accidents (e.g., SBO) also found to contribute to CDF
  - H2 combustion significant contributor to early containment failure for Mark III and ice condenser during SBO
  - H2 combustion not a challenge to large volume containments
- Insights derived from IPEs (NUREG-1560):
  - Wide range of accident initiators found to contribute to CDF
  - H2 combustion from SBO accident sequences a significant contributor to containment failure
- Research (DCH Issue Resolution)
  - Analysis of the challenge to containment integrity from DCH for large dry and ice condenser containments
  - H2 combustion found to be a challenge to containment integrity for ice condensers during SBO
- Internal fire and seismic CD sequences have the characteristics of SBO

# PWR LARGE VOLUME AND SUBATMOSPHERIC CONTAINMENTS

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- H2 combustion not a challenge to containment integrity in short term
  - NUREG-1150 found early failure probability of 0.01 for Surry and Zion
  - NUREG-1560, IPE results indicate early failure probabilities from all causes less than 0.15 for most plants (HPME with H2 combustion important challenge)
  - Recent DCH research indicates HPME not a viable challenge
- Combustible gas concentration may be sufficient to challenge containment in long term
  - NUREG-1560, IPE results identified combustion events (in conjunction with existing high pressure) as late failure mechanisms for some plants

# BWR MARK I AND MARK II CONTAINMENTS

- H<sub>2</sub> combustion not a challenge to containment integrity during early stages of core melt accident due to inerting
- H<sub>2</sub> combustion may challenge containment during late stages
  - O<sub>2</sub> generation from radiolysis can lead to combustible containment atmosphere

# BWR MARK III

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- If igniters are operating H<sub>2</sub> combustion is not a challenge to containment integrity early or late for most accidents
  - NUREG-1150 found early failure (before vessel breach) probability <0.1 for Grand Gulf
  - Exception is accidents with high pressure at the time of vessel breach (i.e., failure probability in range of ~0.2-0.5)
- If igniters are not operating, large H<sub>2</sub> concentration can accumulate
- SBO a dominant contributor to core damage (NUREG-1150 and IPEs)
  - Conditional containment failure probability given a SBO
    - ~0.4 for short-term      ⇒ NUREG-1150
    - ~0.8 for long term

# PWR ICE CONDENSER CONTAINMENTS

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- NUREG-1150 and IPE (NUREG-1560) results indicate early failure probabilities  $<0.1$  with or without igniters
- NUREG/CR-6427 (i.e., DCH Issue resolution report) results indicate early failure probabilities of  $\sim 0.2$ -to  $>0.9$  given an SBO accident
- SBO a dominant contributor to CDF (NUREG-1150 and 1560)
  - Conditional containment failure probability given a SBO  $\sim 0.1 \Rightarrow$  NUREG-1150

# A RISK-INFORMED 50.44

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- Accident types
  - ⇒ core melt accidents
- Combustible gases source term
  - ⇒ realistic calculations
  - ⇒ fuel cladding oxidation and core-concrete interaction
- Controlling combustible gases
  - ⇒ both early and late

# RISK-INFORMED 50.44

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## **Analytical Requirements will:**

- Account for core melt accidents
- Account for combustible gas generation from fuel cladding oxidation and core concrete interaction
- Specify the amount and rate of combustible gas generation based on realistic calculations

# RISK-INFORMED 50.44

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## *Physical Requirements:*

- Alternative 1: Modify the individual requirements
  - Eliminate requirement for safety-grade, continuous monitors
  - Add capability to measure long-term H<sub>2</sub> conc. under degraded core conditions
  - Insure mixed atmosphere for risk significant accidents (e.g., SBO)
  - Eliminate post-LOCA H<sub>2</sub> control (recombiners)
  - Add long term H<sub>2</sub> control for risk significant core melt accidents
  - Insure H<sub>2</sub> control for risk-significant core melt accidents (e.g., SBO) for Mark III and ice condensers
  
- Alternative 2: Eliminate the individual requirements
  - Replace with performance-based requirement to control combustible gases for all light-water reactors for the risk significant accidents

# RISK-INFORMED 50.44 (cont'd)

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## *Physical Requirements:*

- Alternative 3: Eliminate the individual requirements
  - Replace with performance-based framework strategies to control combustibles gases for all light-water reactors:
    - ▶ Demonstrate containment integrity not challenged from combustible gases by (in order of preference) limiting the radionuclide release, or core damage accidents or the initiating events, or ensuring emergency preparedness
- Require conforming changes in other regulations

# Potential Implementation Issues

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- Policy:
  - Selective implementation
  - Role of the backfit rule
  - Application of risk-informed guidelines
  - Current or future plants
  
- Technical:
  - Treatment of long term containment performance
  - Guidelines for:
    - Defense-in-depth
    - Safety Margins
    - Treatment of uncertainties

# Future Plans

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- Complete evaluation of 10 CFR 50.44 and provide recommendations to Commission in August 2000, including any policy issues
- Continue evaluation of 10 CFR 50.46 and special treatment requirements and conduct workshop (Sept. 2000)
- Report to Commission in December 2000
- Recommend priority and schedule for remaining evaluations

June 19, 2000

**MEMORANDUM TO:** Ashok C. Thadani, Director  
Office of Nuclear Regulatory Research

**FROM:** Samuel J. Collins, Director */RA Signed by S. Collins/*  
Office of Nuclear Reactor Regulation

**SUBJECT:** REQUEST FOR ASSISTANCE IN REVIEW OF NEI 00-02,  
"PROBABILISTIC RISK ASSESSMENT PEER REVIEW PROCESS  
GUIDANCE" (TAC NO. MA8899)

We request the assistance of the Office of Nuclear Regulatory Research (RES) in the review of NEI 00-02, "Probabilistic Risk Assessment Peer Review Process Guidance," submitted by the Nuclear Energy Institute (NEI) on April 24, 2000. NEI has requested review of this document for applicability to the risk-informed categorization and treatment of nuclear plant equipment as described in SECY-99-256. Since the quality required of a probabilistic risk assessment (PRA) is directly related to the application for which the PRA results and insights are to be applied, NEI 00-02 will be reviewed in conjunction with NEI's *Industry Guideline for Risk-Informed Categorization and Treatment of Structures, Systems, and Components*, and with the staff's draft version of Appendix T to 10 CFR Part 50.

This memorandum documents our specific needs for your assistance. Review tasks are discussed below. Note that some of these tasks contain subtasks that may not be directly related to the review of NEI 00-02, but are related to establishing guidance on how the NRC staff is to use the results of the PRA peer review process. This review scope accommodates situations where there may be compensatory measures (or "tradeoffs") which can be used by a licensee when certain elements of the PRA do not fully conform to staff expectations.

#### REQUESTED ACTIONS

The outline of the overall staff review is described in the attachment to this memorandum. Based on discussions between the Office of Nuclear Reactor Regulation (NRR) and RES staff, we request that RES review the PRA technical elements and requirements given in NEI 00-02 to determine if they provide sufficient information for categorization of structures, systems, and components (SSCs) for application to the risk-informing of 10 CFR Part 50 (RIP 50) Option 2 effort. High-level characteristics and attributes required for an acceptable PRA should be used as the basis for this review. We also request that RES review the NEI 00-02 subtier criteria against typical industry and NRC good practices as reflected in various guidelines including the proposed ASME PRA standard. Review results should address discrepancies and their potential impact on Option 2 activities. This request corresponds to Task 2 of the attached outline. NRR staff will take the lead for Tasks 1, 3, and 4 which address the application of the PRA Certification process to RIP 50 Option 2.

Ashok Thadani

CONTACT: Joseph Williams  
415-1470

NRR will provide your staff with a proposed outline of our assessment report. This outline can be used to format your contributions in as close to final form as possible. We will coordinate development of our overall assessment with your staff, and will request RES comments on our product. As we proceed in our review, we will also need your support for technical meetings with NEI, the Advisory Committee on Reactor Safeguards (ACRS), and for NRC management briefings, such as the Risk-Informed Licensing Panel (RILP).

### SCHEDULE

We request that you initiate your activities as soon after receipt of this memorandum as possible. Projected future milestones are as follows:

- Support discussion of high-level issues during the June 27 meeting with NEI.
- Review comments submitted to the project manager: July 31.
- Letter to NEI forwarding comments: August 21.
- Report inputs: 6 weeks after resolution of comments.
- Final assessment report and letter to NEI: 10 weeks after comment resolution.

The overall schedule is dependent on the scope of issues the staff develops in its comments on the guideline, and the time required for NEI's response. The peer review and Option 2 guidelines will be discussed at an upcoming meeting with NEI scheduled for June 27. Additional meetings are anticipated after issuance of the NRC comment letter, and as NEI completes its response. As NEI responds to the comments, we expect to promptly assess the responses and forward additional issues to NEI within about a month of receipt of the response.

We plan to request RILP briefings on the comment letter content and on the final assessment report. Additional briefings may be scheduled, if required.

At this time, we expect that we will forward our assessment to NEI with a letter documenting our findings with respect to the acceptability of the process for application to the Option 2 pilot program. On completion of the pilot program, lessons learned will be incorporated into the guidance documents. Eventually, we expect to describe acceptable methods for PRA quality, and SSC categorization and treatment in a regulatory guide that can be used for implementation of the Option 2 rule changes.

### RESOURCES

From discussion with your staff, we understand that RES will perform this review effort in tandem with its current tasks on PRA standards and PRA quality. We understand that the review of NEI 00-02 will not affect RES's efforts and schedules on other NRR user needs.

**Ashok Thadani**

**The NRR project manager for this activity is Joseph Williams, who may be reached at 415-1470.**

**Attachment:  
As stated**

## Outline for Review of NEI 00-02

### Probabilistic Risk Assessment Peer Review Process Guidance

#### Task 1: Process Review

- a. Review the objectives, the mechanics of the peer review process, review team qualifications, required documentation, etc., to determine if the process is consistent with staff expectations of the characteristics and attributes of a peer review process.
- b. Determine if the elements of the review process for determining "quality assurance" of the PRA are consistent with the requirements provided in Section 2.5 of Regulatory Guide 1.174.

#### Task 2: Review the technical elements and requirements for application to Option 2.

- a. Determine if the technical requirements in NEI 00-02 are sufficient to provide assurance that the staff's high level expectations for the "characteristics and attributes of an acceptable PRA" can be satisfied.
- b. Review the subtier criteria for "Grade 3" PRAs and compare to typical industry and NRC good practices as reflected in various guidelines including the ASME PRA standard. Document the differences. Provide relevance of the differences with respect to RIP 50 Option 2 applications.
- c. Provide insights into other applications which a "Grade 3" PRA will support and the applications that it may not be good enough to support.

#### Task 3: Review the requirements for SSC categorization as required by RIP 50 Option 2. Determine the quality of PRA needed in light of the other requirements of the RIP 50 Option process.

- a. Review the draft Appendix T requirements as well as NEI's categorization guidance document. From these documents:
  - i) define the decision to be made;
  - ii) define the decision-making process, specifying the role of PRA results (what results are to be used, and how are they to be used); and
  - iii) identify what is needed of the PRA to give confidence in the results in the context of the decision.
- b. In conjunction with the findings of Tasks 2(b) and 3(a) above, determine if a PRA for which the peer review team has assigned a "Grade 3" for all its elements, can be used for the categorization of SSCs in the context of Option 2. Perform this review in light of: the risk exposure (e.g., backstops, controls, extent of change

permitted, etc.); performance monitoring requirements (e.g., measures and criteria, timely detection and corrective action, margin to safety, etc.); use of traditional engineering analyses (e.g., defense-in-depth, safety margins, issue-specific engineering analyses, licensing basis calculations, etc.); and use of an integrated decision-making panel to appropriately utilize the PRA insights.

Note that, not all review elements have to be assigned a Grade 3 or higher for the PRA to be usable for Option 2. Some elements may be determined to be unimportant for Option 2 applications. Even if important elements (as defined by Task 2(b)) are non-conforming, there may be "tradeoffs" that a licensee may choose, e.g., when a PRA element does not meet a certain requirement, there could be different mechanisms to compensate for this non-conformance. Task 3(c) discusses the application-specific tradeoffs (i.e., tradeoffs that would apply for all applications in RIP 50 Option 2), and Task 3(d) discusses the decision-specific tradeoffs (i.e., tradeoffs that could result because of differences and variations in the plant-specific PRAs).

- c. Define measures which could be used to compensate for cases when NEI 00-02 review elements are not consistent with staff expectations.
  - i) Define sensitivity studies and other deterministic approaches that could be used in place of "consensus" PRA approaches (e.g., seal LOCA modeling, use of the MAAP code, etc.).
  - ii) Determine if the sensitivity studies as currently specified in Appendix T and in NEI's categorization guidance document are sufficient to compensate for the non-use of consensus approaches in HRA modeling, CCF modeling and parameter estimation.
- d. In the review of Option 2 applications, it is expected that the staff will have to address variations (on a plant-to-plant basis) in the level of conformance to the NEI 00-02 guidelines. For PRA elements that do not conform to "Grade 3" requirements and which are amenable to tradeoffs, define guidance for the staff review of these tradeoffs (e.g., use of conservatism, more reliance in defense-in-depth or margins, better monitoring, etc.).

**Task 4: Review the documentation requirements (and define level of staff review)**

- a. Using the NEI 00-02 documentation requirements, determine the peer review documentation that should be included as part of the Option 2 submittal to the NRC, and the documentation that should be available at the plant site and available for NRC audit. Suggest additional documentation requirements if necessary.
- b. Relate the level of NRC review for Option 2 submittals to the results obtained from the peer review of the PRA supporting that submittal. Under what conditions is the "no-prior staff review and approval" option feasible?

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## **Risk-Informed Part 50 Option 2**

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Presentation for the ACRS Subcommittee on  
Probabilistic Risk Assessment  
June 29, 2000

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## **Agenda**

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- ANPR comments
  - Preliminary staff views on industry guideline and PRA peer certification process
  - Status/Schedule
- 

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## **ANPR Comments**

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- **11 comment letters, over 200 comments**
    - Licensees and industry groups (6)
    - Law firms (2)
    - Consulting firms (1)
    - Professional societies (1)
    - Public (1)
- 

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## **ANPR Comments - continued**

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Approach

- General agreement on the list of rules identified, with a proposal to risk-inform them in a phased approach
  - Be performance-based, optional, and allow for selective implementation
  - Limited NRC prior review and approval
  - Backfit rule should be applied to Option 2
-

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## **ANPR Comments - continued**

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Categorization - Appendix T

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- Unduly detailed, prescriptive, and burdensome
  - Should not identify the consensus PRA standards as only acceptable method
  - Should minimize levels of risk significance
  - Allow for functional categorization
  - Address the use of results from PRAs or tools with different levels of conservatism and uncertainty
- 

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## **ANPR Comments - continued**

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Treatment

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- Additional treatment for safety significant attributes should be determined by licensees and should rely on existing licensee programs
  - Commercial programs provide sufficient treatment for LSS SSCs
  - Rulemaking should eliminate existing commitments for LSS SSCs
  - Risk-informed change process should be included in new rule
- 

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## **ANPR Comments - continued**

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Pilot Program

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- Final rule should not be backfit on pilot plants with reviewed and accepted processes
  - STP has demonstrated the risk-informed process for many different types of systems and components; no need to include strict requirements for other pilot plants to do so
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## **Industry Implementation Guidance Documents for Option 2**

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Background

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- Categorization guidance (draft) provided on March 29, 2000
    - Provided preliminary feedback in April
  - NEI 00-02 submitted on April 24, 2000
    - Provided preliminary feedback in June
  - Treatment guidance (draft) submitted on June 7, 2000
    - Provided preliminary feedback in June
-

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## **PRA Peer Certification**

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NRC Review of NEI 00-02

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- Process review
  - Technical elements and requirements
  - Option 2 categorization requirements
    - Appendix T and NEI categorization guidance review
    - Assess "Grade 3" for application to Option 2
    - Define "trade-offs," and compensatory measures
  - Documentation and review requirements
- 

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## **PRA Peer Certification**

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NEI 00-02 Topics

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- NRC will review subtier criteria
  - Integration of peer review results into categorization process
  - Applicability of previous peer reviews
  - Independent decisionmaking panel
- 

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## **Categorization & Treatment Guideline**

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Categorization

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- PRA Scope and Quality
  - Role of importance analysis
  - Role of the integrated decision-making panel
  - Treatment of low safety-significant SSCs within current special treatment scope (RISC-3)
  - Role of monitoring and feedback
- 

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## **Categorization & Treatment Guideline - continued**

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Treatment

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- Definition of "commercial practices"
  - Preservation of design basis
  - Change control
  - Adequate assurance of RISC-2 capability
  - Adequate assurance of RISC-3 functionality
-

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## **Categorization & Treatment Guideline - continued**

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Treatment - continued

- 
- Staff is developing guidance for review of the STP exemption
  - Staff to develop Option 2 treatment acceptance criteria
  - Level of agreement between STP and NEI proposals
- 

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## **Status/Schedule**

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RIP50, Option 2

- 
- August 2000 - ANPR comments & issues paper
  - September 2000 - Commission briefing
  - December 2000 - final acceptance criteria
  - January 2001 - initiate pilot program
  - August 2001 - proposed rulemaking to Commission
  - December 2002 - final rulemaking to Commission

## Option 2 Issues

- **Legal issues**
  - Differentiation of design basis from special treatment
  - Part 21 applicability to RISC-3
- **Commercial treatment for RISC-3**
  - Preservation of design function
  - Level of detail for regulatory control
- **Treatment of prior commitments**
  - Rulemaking alone will not explicitly address
  - Industry commitment management guidelines



## Option 3 NRC Framework

- **Thoughtful effort by NRC staff and contractors to quantify all elements of regulatory structure**
  - Approach is more risk-based than risk-informed
  - Would establish regulation to the safety goal subsidiary objectives on individual plant basis
  - Establishment of quantitative licensing basis is fundamental departure from current approach
  - Previously dispositioned technical issues are reintroduced



## **Option 3 - Preferred approach**

- **Pragmatic versus theoretical**
- **Use generic risk insights to improve current requirements**
  - Example: design basis accident assumptions
- **Preserve existing risk-informed philosophy**
  - Integrated consideration of risk insights, traditional engineering approaches, safety margin



## **Option 3 - Industry Priorities**

- **Complete ongoing efforts**
  - Hydrogen control (§50.44)
  - Fire protection (§50.48, Appendix R)
- **Focus on areas of greatest potential benefit**
  - Codes and standards (§50.55a)
  - Large Break LOCA (§50.46)
- **Further activities based on demonstrated success with above**



## Observations

- **RES and NRR approaches present fundamental differences**
  - Industry confidence and potential for success would be improved through a consistent agency approach
- **NRC discussions continue to focus on low safety significant functions, rather than those of high safety significance**



## Observations

- **Successful applications will create incentive for widespread use of risk-informed methods and improvements to models**
  - 10 CFR 50.44 rulemaking (Option 3)
  - STP exemption request (Option 2)



# Risk-Informed Regulation

Steve Floyd

NEI

June 29, 2000



## Option 2 Issues

- **Industry PRA peer review process**
  - All US plants will be peer reviewed by end of 2001
  - Submitted for NRC review to support option 2 application
  - NRC review plans discussed in 6/28 meeting
- **Correlation with STP exemption request**
  - Processes are essentially similar
  - Industry reviewing comparison matrix developed by STP

