

**NUCLEAR REGULATORY COMMISSION**

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516th Meeting

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS**

**October 8, 2004**

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

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

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516th MEETING

+ + + + +

FRIDAY

OCTOBER 8, 2004

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ROCKVILLE, MARYLAND

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The meeting was convened in Room T-2B3 of Two White Flint North, 11545 Rockville Pike, Rockville, Maryland, at 8:30 a.m., Dr. Mario V. Bonaca, Chairman, presiding.

MEMBERS PRESENT:

- MARIO V. BONACA Chairman
- GRAHAM WALLIS Vice Chairman
- F. PETER FORD ACRS Member
- RICHARD S. DENNING ACRS Member
- THOMAS S. KRESS ACRS Member
- GEORGE E. APOSTOLAKIS ACRS Member
- GRAHAM M. LEITCH ACRS Member
- DANA A. POWERS ACRS Member

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## 1 MEMBERS PRESENT: (CONT.)

2 VICTOR H. RANSOM ACRS Member

3 STEPHEN L. ROSEN ACRS Member-at-Large

4 WILLIAM J. SHACK ACRS Member

5 JOHN D. SIEBER ACRS Member

6

## 7 NRC STAFF PRESENT:

8 SAM DURAISWAMY Technical Assistant,

9 ACRS/ACNW, Designated

10 Federal Official

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

8:29 a.m.

CHAIRMAN BONACA: This meeting will now come to order. This is the second day of the 516<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards.

In today's meeting the Committee will consider the following, technology neutral framework for future planned licensing, assessment of the quality of the NRC Research Projects, divergence in regulatory approaches and requirements between the U.S. and other countries, future ACRS activities, and report of the planning and procedures sub-committee, reconciliation of ACRS comments and recommendations in preparation of ACRS reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Sam Duraiswamy is the designated Federal Official for the initial portion of the meeting.

We have received no written comments from members of the public regarding today's sessions. We have received a request from Mr. Jim Riccio, Public Citizens Group for time to make oral statements regarding technology neutral framework for future

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1 plant licensing.

2 A transcript of the portion of the meeting  
3 is being kept. And it is requested that the speakers  
4 use one of the microphones, identify themselves, and  
5 speak with sufficient clarity and volume so that they  
6 can be readily heard.

7 Coming to our agenda, the first item on  
8 the agenda is the technology neutral framework for  
9 further plant licensing. Dr. Kress is going to take  
10 us through the presentation.

11 Be aware that some time will be needed for  
12 Mr. Riccio's statements.

13 MEMBER KRESS: Thank you, Mr. Chairman.  
14 Today I think members ought to view this is as bit of  
15 a status report and a briefing as to where -- the  
16 progress they've made in this issue.

17 We don't intend to have a letter at this  
18 time. But I'm sure that these good people would like  
19 oral feedback, verbal feedback on what they have to  
20 say.

21 We did have a sub-committee meeting, I  
22 guess it was in June.

23 PARTICIPANT: Yes, June 24<sup>th</sup>.

24 MEMBER KRESS: June 24<sup>th</sup>. And, as part of  
25 that sub-committee, I wrote up some of my own personal

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1 comments. I hope the members have had a chance to at  
2 least look at those and think about them, see what you  
3 think.

4 But, anyway, this is both a very important  
5 and interesting subject. And I'm pleased, once again,  
6 to welcome Mary and Tom and people. So, with that, I  
7 guess I'll turn it over to you, Mary.

8 MS. DROUIN: Thank you. My name is Mary  
9 Drouin with Office of Research. At the table with me  
10 is Tom King, also with Research, and Stuart Rouben,  
11 also with Research.

12 But, as you can see, on this first view-  
13 graph, there are quite a few people who are involved  
14 in this program. And there are names here that aren't  
15 here, that are involved. So, this has been a major  
16 effort with lots of input from many, many people.

17 We are only in the preliminary stages of  
18 this program. So, we are going to be receiving, you  
19 know, more input from a broader audience as we move  
20 forward both internally and externally.

21 Today, just for information of where we  
22 are in the framework policy issues. Because, most of  
23 the framework is dealing with policy. And so, we want  
24 to go through and update you where we are in the  
25 implementation of these various issues as they are

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1 implemented in the framework.

2 We will have a paper going forward in  
3 December that has several things in it. It will  
4 forward this first -- what I would call a working  
5 draft of this framework to the Commission, because we  
6 plan on releasing this working draft to the public at  
7 the end of December.

8 MEMBER KRESS: Would this be the first  
9 time that the Commission has heard about what you're  
10 doing?

11 MS. DROUIN: No.

12 MEMBER KRESS: Or have you briefed them  
13 before?

14 MS. DROUIN: No. I'm going to go through  
15 that in a minute. We do have a policy statement from  
16 the Commission and the advanced reactor policy  
17 statement that had directed the Staff to engage  
18 stakeholders very early into the process.

19 So, that being in concert, and meeting  
20 that expectation by the Commission is why we want to  
21 release this to the public and start engaging their  
22 input as we move forward.

23 But it is very much of a working draft.  
24 We feel what we've done to date is enough to show the  
25 feasibility of developing a technology neutral

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1 framework.

2 So, when I say working draft, as we go  
3 through, and we get into the details, these are what  
4 I would call starting points. We have another year  
5 and a half on the schedule before we finalize this  
6 document.

7 So, potentially a lot of the details could  
8 change over time. Everything is open for discussion.  
9 The paper is going to talk about the seven policy  
10 issues.

11 There were four that were previously  
12 approved by the Commission. So, this is going to get  
13 into how we are implementing those four. There were  
14 two policy issues that the Commission asked for more  
15 information.

16 We spoke to you on those in the past. We  
17 are going to give you more on those today. They asked  
18 for more information that was on integrated risk and  
19 containment.

20 Then there was the seventh issue that the  
21 Commission did not approve, and that was on  
22 international codes and standards. We also have  
23 identified some new policy issues.

24 We will be making preliminary  
25 recommendations to the Commission. We had said in a

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1 previous paper the reason we are doing preliminary is  
2 that we want to engage stakeholder input before we  
3 make a final recommendation to the Commission for  
4 consideration.

5 And, as I said, the paper will go forward  
6 in December. We are coming back to the ACRS in  
7 December. And, at that point in time, we will be  
8 asking for a letter.

9 Okay. Just real quick, there has been  
10 four major -- well, three major SECYs that have gone  
11 forward with one SRM. The first SECY, which was 0047,  
12 you've seen at many times in the past.

13 And that was the one that delineated the  
14 seven policy issues in there that I just talked about.

15 MEMBER KRESS: Did you mean to move the  
16 slides?

17 MS. DROUIN: Oh, yes, thank you.

18 MEMBER KRESS: Okay.

19 MEMBER ROSEN: Well, we all have copies.

20 MEMBER KRESS: Yes.

21 MS. DROUIN: In 0047 there were the seven  
22 policy issues. The four issues that were -- okay,  
23 seven policy issues. The first one was to develop a  
24 definition on defense in-depth.

25 The second was the use of a probabilistic

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1 risk approach for the licensing basis, scenario  
2 specific source terms for licensing decisions, the  
3 advisability of revision of emergency planning zone.

4 And, as I said, there was also the  
5 International Codes and Standards, and then integrated  
6 risk and licensing without a containment building.

7 Those were the seven policy issues that  
8 were discussed in that paper for non-LWRs. The SRM  
9 came back on that policy -- sorry, on that SECY paper.

10 Those first four were approved. Their  
11 national codes was disapproved. And the Commission  
12 asked for more information on the latter two on  
13 integrated risk and containment.

14 A status paper went forward in 103. And  
15 that one was strictly talking about integrated risk  
16 and the containment. We had some preliminary  
17 recommendations on integrated risk.

18 But, as you recall, we came to the ACRS,  
19 you all gave us another option to consider. So, at  
20 that point, instead of having a recommendation, we  
21 just gave the status to give us time to evaluate and  
22 take into account the ACRS recommendation.

23 MEMBER KRESS: As I recall, the ACRS had  
24 two opposing reservations.

25 MS. DROUIN: Yes, they were opposing.

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1 MEMBER KRESS: Okay.

2 MS. DROUIN: But you had an additional  
3 recommendation in there though.

4 MEMBER KRESS: It was addition to what you  
5 had --

6 MS. DROUIN: Right, correct. Then very  
7 shortly --

8 MEMBER KRESS: I hope you didn't take it  
9 too seriously.

10 MEMBER ROSEN: Half the committee hopes  
11 you took it seriously.

12 MEMBER KRESS: Not for nothing.

13 MS. DROUIN: Well, we took it seriously  
14 enough that we didn't make a recommendation back in  
15 June.

16 MEMBER KRESS: Okay.

17 MS. DROUIN: We are prepared to make a  
18 recommendation though now. And we will get into that  
19 later on.

20 MEMBER APOSTOLAKIS: So where are you now?  
21 What slide are you on?

22 MS. DROUIN: Background history.

23 MEMBER APOSTOLAKIS: Okay.

24 MS. DROUIN: Then we had --

25 MEMBER KRESS: Kind of on that one and

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1 four at the same time.

2 MS. DROUIN: We had SECY 04157 that came  
3 shortly thereafter, 103. Because 103 just focused on  
4 giving the status of those two policy issues. 0157  
5 gave more of a status of the framework.

6 And there's a summary of the framework in  
7 that document. We did talk about the four policy  
8 issues and how they were going to be implemented. And  
9 we primarily also raised three new additional policy  
10 issues in that paper.

11 Level of safety, dealing with security,  
12 and selected implementation were three new issues  
13 identified in that paper. And we indicated that, in  
14 the next paper coming forward at the end of December,  
15 we would have preliminary recommendations on those  
16 three new policy issues, which we will speak of today  
17 also.

18 MEMBER KRESS: The document we've been  
19 reviewing, is it one of these status reports? It  
20 doesn't have a number on it.

21 MR. BLEY: I think he's speaking to the  
22 draft of the framework.

23 MEMBER KRESS: The draft of the framework,  
24 yes. That's not in here.

25 MEMBER APOSTOLAKIS: It's not one of the

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1 SECYs, is it?

2 MS. DROUIN: No.

3 MEMBER APOSTOLAKIS: So what is it?

4 MEMBER KRESS: It's just a draft of the  
5 framework. Is it going to be a NUREG?

6 MS. DROUIN: The intention is to make it  
7 a NUREG, yes. Did you --

8 MEMBER KRESS: Is that what we'll have to  
9 review in the December meeting?

10 MEMBER APOSTOLAKIS: It's NUREG, yes. It  
11 will be a NUREG.

12 MS. DROUIN: It will be a NUREG.

13 MEMBER APOSTOLAKIS: So it will contain  
14 all of these, the technical part of these?

15 MS. DROUIN: Yes.

16 MR. KING: For the December meeting, what  
17 you're going to get is the draft SECY. And the  
18 attachments will be the draft NUREG, as long as some  
19 separate attachment's talking about the various policy  
20 issues.

21 MEMBER KRESS: Great.

22 MR. KING: So you're going to get the  
23 whole nine yards in December to look at -- will be  
24 looking for a letter in December.

25 MS. DROUIN: The intent is to give it to

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1 you in early November.

2 MEMBER APOSTOLAKIS: That's good.

3 MS. DROUIN: Because, I believe our date  
4 is December the 2<sup>nd</sup> that we're scheduled to come back.

5 MEMBER KRESS: Will we need a sub-  
6 committee on that, do you think, before the full  
7 committee? It seems to me like we would.

8 MS. DROUIN: I don't think so, because  
9 we've had a lot of meetings on these issues. This is  
10 another one. And, again, I can't iterate enough that  
11 these are not final positions.

12 We're going to have many more meetings  
13 with the committee, with the public to start really  
14 getting into detailed discussions on these issues, you  
15 know, and the technical details of them.

16 So, there's nothing final here. All we're  
17 trying to do is release it so we can start these  
18 discussions.

19 MEMBER KRESS: What would be the nature of  
20 your meetings of the public? Would these be  
21 workshops?

22 MS. DROUIN: A myriad of different forms,  
23 workshops. I mean, it's all to just -- whatever is  
24 the right form to engage the right kind of discussion  
25 at the time.

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1 MEMBER KRESS: Okay.

2 MS. DROUIN: Okay. I think we can  
3 probably skip over this one pretty quick. This is  
4 more the outline of today's presentation. These are  
5 all the policy issues that we're going to be  
6 discussing.

7 As I said, there are three groups of them.  
8 The first one, where the first four, where the  
9 Commission has approved these. So we're going to go  
10 through how we plan to implement them.

11 The Commission at a high level agreed on  
12 our approach, but we haven't discussed how we're going  
13 to implement them. The next two, we did come and give  
14 you back in June a detailed briefing on these two.

15 We've done a lot more work. We've taken  
16 into account the ACRS views. So we're going to  
17 discuss those two. And then, as I said, in the second  
18 part of 57, we identified three potential new issues.

19 And we're going to discuss those today  
20 also. Okay, the first one, defense in depth. What we  
21 raised in 0047 was we felt that we ought to have a  
22 description or a definition for defense in depth, and  
23 that this definition ought to be incorporated into a  
24 policy statement.

25 The Commission came back in SRM and

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1 approved the development of a definition or a  
2 description, and to be incorporated they felt though,  
3 instead of a separate policy statement, that it should  
4 be incorporated in the PRA policy statement.

5 We aren't to the point yet where we're  
6 ready to do that part of it. But we have done the  
7 first part in terms of developing a description for  
8 defense in depth.

9 And, if you have a draft copy of the  
10 framework, you'll see that's all chapter five. It's  
11 interwoven in through the entire framework. But  
12 chapter five goes into detail the staff approach for  
13 defense in depth.

14 MEMBER ROSEN: My comment on that, Mary,  
15 is it seems appropriate. Are we talking about the  
16 1995 policy statement on PRA? Is that the one we're  
17 talking about?

18 MS. DROUIN: Yes.

19 MEMBER ROSEN: The difficulty I have with  
20 that approach -- not that I would ever consider  
21 thinking true what the Commission has already decided  
22 -- but that policy statement is like one paragraph.

23 It's so incredibly concise and, I think,  
24 emancipating. And I'm worried about trying -- and it  
25 mentions defense in depth and the rest of it. But I'm

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1 puzzled about how one could incorporate a new  
2 description of defense in depth into that policy  
3 statement without making it a long document.

4 Am I wrong? Isn't the policy statement  
5 really short?

6 MS. DROUIN: The policy --

7 MEMBER ROSEN: Maybe there's an addendum  
8 or something.

9 MS. DROUIN: I don't think the policy  
10 statement is that short. It's a couple of paragraphs.  
11 But this may not be the best path, to put it in that  
12 policy statement.

13 We haven't even gotten to the point now of  
14 looking to see whether we agree with the Commission,  
15 if this is the best place to put it.

16 MEMBER ROSEN: Well, I would just caution.  
17 I think the policy statement is a wonderful policy  
18 statement. But, to try to deal with this topic in the  
19 policy statement itself is very hard to do I think.

20 MS. DROUIN: The intent, though, of what's  
21 to go in the policy statement is something that would  
22 be brief. Not this whole thing that would be  
23 developed would go in the policy statement --

24 MEMBER ROSEN: Oh, okay.

25 MS. DROUIN: -- because we would have the

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1 detail part in the framework document. What goes in  
2 the policy statement would be some type of high level  
3 summary that's a definitional type of statement or  
4 statements.

5 But it's not intended to be this long  
6 thing.

7 MEMBER ROSEN: Well, I was envisioning  
8 that you would go into some detail in talking about  
9 what defense in-depth really means. You know, it may  
10 be with some examples.

11 MEMBER KRESS: I think figure 5.1 in the  
12 document is a pretty good illustration of what their  
13 intent is, or defense in depth.

14 MEMBER APOSTOLAKIS: Well, actually, I  
15 think there are some minor inconsistencies among the  
16 figures. Figure 2.1 -- unfortunately you don't have  
17 the figures in the slides.

18 But, if you have the document, figure 2.1,  
19 page 2-2, talks about protective strategies and risk,  
20 and then both feed into defense in depth. On page 29  
21 there is a description of protective strategies and  
22 administrative extensive regulations that come from  
23 protection against accounting for different kinds of  
24 uncertainty.

25 So, it would seem to me that a protective

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1 strategist and administrative regulations are part of  
2 the defense in depth. Aren't they?

3 MS. DROUIN: They are.

4 MEMBER APOSTOLAKIS: But, the way figure  
5 2-1 is structured, doesn't make it clear. Maybe that  
6 was your intent, but unless --

7 MS. DROUIN: I hope that if these kind of  
8 shortcomings in the document that I'm hoping we --  
9 this is one that we have picked up on.

10 MEMBER APOSTOLAKIS: Oh, okay.

11 MS. DROUIN: And, I don't know if the  
12 version you have with --

13 MEMBER APOSTOLAKIS: It's the latest we  
14 got.

15 MS. DROUIN: I know it's not the latest  
16 version because the latest version, you know, the team  
17 just got it two days ago.

18 MR. KING: I'm not sure they're  
19 inconsistent. I understand your question. When you  
20 go back to chapter five and look at the model of  
21 defense in depth, it incorporates the protective  
22 strategy and the risk guideline.

23 So, I think in 2.1 all of that is feeding  
24 into defense in depth. And, when you go to chapter  
25 five, you see how it all I incorporated in a defense

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1 in depth model. But, if it's confusing we need --

2 MEMBER APOSTOLAKIS: When I went to  
3 chapter five, then it struck me that the previous  
4 chapter were not entirely consistent. That's all I'm  
5 saying.

6 I'm sure that, in your minds, you know  
7 what it is. But I'm just pointing it out that, in the  
8 report, maybe it would be a little better to describe.

9 And also, why on figure 2.1 there is no  
10 mention of the administrative strategies? I don't  
11 understand that, I mean, since protective strategies  
12 and administrative strategies are both elements of  
13 defense in depth.

14 And, administrative strategies appear to  
15 be a very important element here.

16 MS. DROUIN: They are mentioned in the new  
17 version.

18 MEMBER APOSTOLAKIS: Okay.

19 MS. DROUIN: When you come down to the  
20 block that's on chapter six --

21 MEMBER APOSTOLAKIS: Okay. I'm just  
22 commenting on the document I have. If you have  
23 already taken care of it, that's fine.

24 MS. DROUIN: That has been taken care of.

25 MEMBER APOSTOLAKIS: Okay. Now, again, in

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1 figure 2-1, under defense in depth, you say PRA  
2 evaluates a specific protective strategies. So, well,  
3 but then before that it says defense in depth  
4 decisions are based on results of PRA and DBA  
5 calculations.

6 I guess I would like to see it made very  
7 clear that PRA itself is -- the PRA thinking is part  
8 of the definition of a structure elements of defense  
9 in depth, which it is because you are talking about  
10 initiating event frequencies.

11 You are talking about barrier integrity.  
12 And, you know, all that stuff is really PRA thinking.  
13 It sounds like nit-picking. But, since it's a first  
14 document where these concepts are presented --

15 MS. DROUIN: I think that comment has also  
16 been taken into account. But I'm curious, with the  
17 version you have, does your version have a section, no  
18 it wasn't chapter two, that compares the PRA --

19 MEMBER APOSTOLAKIS: Well, my impression  
20 was that chapter five was really the one that was very  
21 serious about defense in depth and all of that and was  
22 very nicely done.

23 The previous chapter were probably more  
24 descriptive. Or, I don't know what they were. But,  
25 there needs to be some better consistency, if I can

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1 put it that way. That's all.

2 MS. DROUIN: Good comment.

3 MEMBER APOSTOLAKIS: Chapter five actually  
4 makes it clear what you mean.

5 MS. DROUIN: Okay. What our approach is  
6 on defense in depth, and, again, we weren't trying in  
7 today's presentation to get into the details on all of  
8 these policy issues, otherwise we'd be here for two  
9 days.

10 But to, you know, at a high level kind of  
11 give you the concept of what our approaches are.

12 CHAIRPERSON GEOFFREY: Let me just say  
13 that that may still raise the issue of whether or not  
14 we should have a sub-committee meeting before  
15 December, I mean, because this meetings are likely to  
16 blossom into need for many hours, because there is a  
17 lot of interest on the department member on this  
18 issue.

19 MEMBER APOSTOLAKIS: And we can't really  
20 go into the details like I just did, because we slow  
21 down the whole thing. We need a sub-committee meeting  
22 where you will have the latest figures on the screen  
23 and we discuss.

24 MR. KING: Behind each one of the slides  
25 you are going to see, there is a lot of detail that

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1 could be talked about. Today we were really trying to  
2 look at the broader issue of, do we have the right  
3 issues, is there something we are missing.

4 MEMBER APOSTOLAKIS: Right. So, what I'm  
5 saying, for the December meeting, I think probably a  
6 sub-committee meeting before that would be  
7 appropriate.

8 MS. DROUIN: We're more than prepared to  
9 hold a sub-committee meeting. What I hope would not  
10 happen, though, is that -- to be honest -- that  
11 there's something where we're maybe not in agreement  
12 with and then we can't move forward in December,  
13 because, again, I would like to keep reminding the  
14 committee, we are at a starting point here. This is  
15 a working draft.

16 MEMBER APOSTOLAKIS: You mean you could  
17 have a very short meeting. Then if we have a  
18 disagreement we don't discover -- I think the overall  
19 principles, as you said, and the overall approach, we  
20 have seen a few times.

21 So, the letter in December will probably  
22 address those. And, if there are specific comments,  
23 they will be just comments.

24 MEMBER KRESS: We'd like to --

25 MEMBER APOSTOLAKIS: I don't think that

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1 the recommendations will be rely too much on specific  
2 details.

3 MEMBER KRESS: We kind of like to view  
4 this pretty much the way we did the -- 74 exercises.

5 MEMBER APOSTOLAKIS: Yes.

6 MS. DROUIN: Oh, yes. And I hope that we  
7 have all the series of working meetings --

8 MEMBER KRESS: Okay.

9 MS. DROUIN: -- as we go through.

10 MEMBER APOSTOLAKIS: In fact, I have a lot  
11 of those comments. And I don't think it's appropriate  
12 to raise them now. Is there any way I can communicate  
13 --

14 MEMBER KRESS: Just put them down on paper  
15 and give them to them and give us a copy of them. Put  
16 your name on it so --

17 MEMBER APOSTOLAKIS: The Staff has to  
18 approve that. But, we'll see.

19 MEMBER POWERS: As far as the sub-  
20 committee meeting, when do you think, like later  
21 November?

22 MEMBER KRESS: Well, let's --

23 MEMBER APOSTOLAKIS: the last Thursday in  
24 November, perhaps.

25 MEMBER KRESS: A couple of weeks after we

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1 get the documents.

2 MEMBER APOSTOLAKIS: Yes, we have to have  
3 the document two weeks before.

4 CHAIRPERSON GEOFFREY: And there are a  
5 bunch of -- already. There are some sub-committees  
6 scheduled for that time of year, so we can attach on  
7 that.

8 Okay. Our approach, you know, the first  
9 was we established what we called these defense in  
10 depth principles. And there were four of them that we  
11 have defined right now.

12 No, actually there's five. See, I'm  
13 already out of date. We did have four originally.  
14 And the four were provide accident prevention and  
15 mitigation capability, that's laying out our  
16 protection strategies.

17 The key safety function should not be  
18 dependent upon a single element of design,  
19 construction maintenance or operation. Three, account  
20 for uncertainties and equipment and human performance  
21 in assessing reliability and risk goals.

22 The last one, citing schedule facilitate  
23 protection of public health and safety.

24 MEMBER APOSTOLAKIS: These are principles?

25 MS. DROUIN: We call them principles.

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1 MEMBER APOSTOLAKIS: What is the single  
2 element? When you say single element, what do you  
3 mean? I mean, in 1174 it says don't rely too much on  
4 administrative measures. Is that what you mean?

5 MR. KING: Well, that's part of it. And  
6 part of it is we don't have a design that relies on  
7 one feature for some particular safety function.

8 MEMBER APOSTOLAKIS: But that's more.

9 MR. KING: It's both design and  
10 administrative.

11 MEMBER APOSTOLAKIS: So this is a  
12 generalized version of the single failure criteria  
13 now? Or what it is, higher level single failure  
14 criteria?

15 MR. KING: It's really consistent with  
16 what the Commission has as its definition and  
17 strategic plan, which basically says the same thing.

18 MEMBER APOSTOLAKIS: But, as I recall,  
19 AP1000, one of the dominant contributors was large  
20 LOCA. And the only safety feature that was supposed  
21 to mitigate that was the accumulators.

22 So that would not be approved in something  
23 like -- the frequency was pretty low. So, according  
24 to this defense in depth idea, you would not accept it  
25 because only the accumulators have the protective

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1 system.

2 MR. KING: Well, if the frequency range is  
3 outside the range of things that need to be considered  
4 in design, then it wouldn't be counted in terms of --

5 MEMBER APOSTOLAKIS: Oh, so you are  
6 referring to design basis here?

7 MR. KING: We're referring to -- we've  
8 come up with some criteria for what needs to be  
9 considered in the design, probabilistic criteria,  
10 frequency criteria in terms of categories of events  
11 that need to be considered.

12 There is a cut-off on that. Anything  
13 below that cut-off doesn't need to be considered. So,  
14 defense in depth wouldn't apply, along with everything  
15 that wouldn't apply.

16 But, within those things that do need to  
17 be considered, defense in depth does apply. And, I'm  
18 not that familiar with the AP1000 design.

19 MEMBER APOSTOLAKIS: You see, the thing  
20 that saved them there was that the frequency of a  
21 large LOCA, according to an Idaho report, was ten to  
22 the minus six.

23 So, you know, the fact that accumulators  
24 performed successfully or not was really not that  
25 relevant. It was a low frequency. But, if you

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1 doubted that ten to the minus six, then you enter a  
2 different domain, right?

3 I mean, if it's higher than that. So, I  
4 guess you will find out more about these things when  
5 you go to an actual implementation and specific  
6 examples.

7 MR. KING: Yes.

8 MS. DROUIN: When you go into the  
9 framework document itself, and we list these different  
10 principles, there's a whole discussion on trying to  
11 explain what is meant by these principles.

12 And what my question would be to any  
13 stakeholder, because what we're trying to do in having  
14 a description of these principles, is move away from  
15 ten different people having ten different  
16 interpretations of what these are meant.

17 We're trying to make these as clear and  
18 consistent understanding across the board. And we've  
19 added in the latest version, the framework, a lot more  
20 discussion and description under each of these  
21 principles.

22 We've tried to give examples to further  
23 clarify what these principles mean.

24 MEMBER APOSTOLAKIS: When will we get  
25 this?

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1 MS. DROUIN: You will get this at the  
2 first of November.

3 MEMBER APOSTOLAKIS: November.

4 MS. DROUIN: That's the version that will  
5 be going through the concurrence chain.

6 CHAIRPERSON GEOFFREY: See, that's the  
7 trouble with this presentation, each one of these  
8 words, you know, wets our appetite. And you have the  
9 document in front of you, so you might have some  
10 information. So we're kind of anxious -- so,  
11 November.

12 MS. DROUIN: Correct.

13 CHAIRPERSON GEOFFREY: Correct.

14 MS. DROUIN: I had said that, you know,  
15 your version only has four principles in it. We now  
16 have five principles because one of the things that  
17 has come out in the discussion was to expedite a  
18 little bit quicker integrating security into the  
19 framework.

20 So that's one of the things we've been  
21 working very hard in the last couple of months since  
22 we were last here. And we did come up with a  
23 principle for security, which was measures against  
24 intentional as well as inadvertent events should be  
25 provided.

1 MEMBER APOSTOLAKIS: Now, is this -- I'm  
2 sorry.

3 MS. DROUIN: There's discussion on that in  
4 the document.

5 MEMBER APOSTOLAKIS: I guess this is the  
6 right place then to raise another concern. In the  
7 protective strategies success criteria are based on  
8 the function of performance required to limit damage  
9 on the core control nuclide release.

10 Are you including, or are you going to be  
11 explicit about including in the evaluation safety  
12 margins and evaluation of the probably of the fact  
13 that some temperature will exceed the limit and so on?

14 Or that will be done as it is done today,  
15 as part of the deterministic mechanistic calculation?  
16 And, when you say PRA, you really mean failure rates,  
17 human errors. Is that clear, the question?

18 MS. DROUIN: Yes.

19 MEMBER APOSTOLAKIS: There's a certain  
20 probability that the temperature -- the peak clad  
21 temperature in an LWR will actually be below 2,200  
22 degrees or be above it

23 MR. KING: What we've tried to do is  
24 define confidence levels for the various types of  
25 parameters that have to be calculated and compared

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1 against acceptance criteria.

2 MEMBER APOSTOLAKIS: I saw that. And my  
3 comment is, why not bring it into the PRA? Bring  
4 those probabilities into the PRA?

5 MR. KING: Well, I mean, you need the PRA  
6 to calculate those probability. You need the PRA to  
7 calculate the uncertainty distribution. And then from  
8 that you can determine whatever confidence level you  
9 want using the PRA.

10 MEMBER APOSTOLAKIS: The way I see it is,  
11 yes, the PRA defines the convex, because you look at  
12 the sequence and then you say, now does the  
13 temperature exceed.

14 That last part I agree. The PRA has  
15 defined convex. But, that last part, the way it's  
16 described here, is a mechanistic calculation. But you  
17 are including some uncertainty.

18 You want high confidence that you don't  
19 exceed. And you leave it at that. So it's still  
20 separate from the PRA. I would bring those  
21 probabilities into the PRA.

22 MS. DROUIN: I don't know why you say it's  
23 separate. That's an integral part of it.

24 MEMBER APOSTOLAKIS: But you don't include  
25 it in the frequencies. For example, at the end where

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1 you have the frequency consequence curve, these  
2 probabilities will not be there. They are done  
3 separately.

4 MS. DROUIN: I don't think so.

5 MEMBER APOSTOLAKIS: That's the way I  
6 understood it.

7 MEMBER KRESS: Frequency and consequence  
8 is an acceptance curve. It doesn't have that much to  
9 do with the PRA.

10 MEMBER APOSTOLAKIS: No, but you will do  
11 PRA calculation to see whether you meet it.

12 MEMBER KRESS: To see if you meet it.

13 MEMBER APOSTOLAKIS: That's what I'm  
14 saying.

15 MEMBER KRESS: That's true.

16 MEMBER APOSTOLAKIS: So, in that  
17 calculation, it seems to me that kind of thing should  
18 be there.

19 MS. DROUIN: But, the uncertainty of that  
20 is there.

21 MEMBER APOSTOLAKIS: Not in the final  
22 result.

23 MS. DROUIN: Dennis, you look like you  
24 want to say something.

25 MR. BLEY: I think we agree with you.

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1 CHAIRPERSON GEOFFREY: You need to  
2 identify yourself.

3 MR. BLEY: Oh, I'm sorry. Dennis Bley.  
4 I'm a contractor at Brookhaven, who is contractor to  
5 Staff on this work. We are trying to make it say  
6 that.

7 It will ruin demand looking at those  
8 uncertainties.

9 MEMBER APOSTOLAKIS: I think that --

10 MR. BLEY: And, if we didn't do that, we'd  
11 have to go back and look.

12 MEMBER APOSTOLAKIS: My impression that  
13 the way it's in there now, that's kind of a separate  
14 calculation that includes uncertainty. But then you  
15 don't bring it back. That's fine.

16 MR. BLEY: I think maybe the problem is we  
17 don't anywhere in this document yet say exactly  
18 everything that's in the PRA. But we do when we talk  
19 about the limits.

20 We try to say that you have to include  
21 uncertainty in the calculation whether you meet them  
22 or not. Now, what we didn't say is how much of that's  
23 in the PRA.

24 And I don't think we've really defined all  
25 the content of a PRA anywhere in the document. Maybe

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1 that's what you're getting at.

2 MEMBER APOSTOLAKIS: Anyway, this is just  
3 another impression I had.

4 CHAIRPERSON GEOFFREY: We need to  
5 understand what kind --

6 MS. DROUIN: We are more than delighted to  
7 have these kind of --

8 CHAIRPERSON GEOFFREY: -- presentation we  
9 are having.

10 MS. DROUIN: -- discussions.

11 CHAIRPERSON GEOFFREY: Yes. I thought was  
12 an -- and a work in progress. We have to look at --  
13 you have a long presentation.

14 MS. DROUIN: I mean, we were not prepared  
15 today to come in and to have these detailed. But  
16 we're more than --

17 MEMBER KRESS: We'll do that in the next  
18 sub-committee meeting. We'll get into that kind of  
19 detail in the sub-committee meeting.

20 MEMBER APOSTOLAKIS: It would be nice for  
21 them to know.

22 MEMBER KRESS: I'm no discouraging you,  
23 George. Go ahead and make these comments.

24 MEMBER APOSTOLAKIS: Okay.

25 MS. DROUIN: Do you want me to go ahead

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1 and move forward? Or do we want to spend more time on  
2 this one?

3 CHAIRPERSON GEOFFREY: The thing we don't  
4 want to do is move backward.

5 MS. DROUIN: Okay.

6 CHAIRPERSON GEOFFREY: Forward if fine, or  
7 stay the same.

8 MS. DROUIN: Okay. Then let's go ahead  
9 and go to the next issue. We've kind of divided up  
10 the presentation today. Tom was going to take over at  
11 this point.

12 MR. KING: Okay. I'm going to talk about  
13 the next five or six slides, starting off with some  
14 issues with the Commission, improved in concept our  
15 approach last year.

16 And now what we're talking about is how  
17 are we going to implement that concept through the  
18 framework. The first one is the probabilistic  
19 approach for establishing a licensing basis.

20 That includes identifying the event  
21 sequences that need to be considered in the design,  
22 selecting from those some things that we're still  
23 going to treat as design basis accidents using a  
24 probabilistic scheme for safety classification and  
25 doing away with the single failure criteria, replacing

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1 that with looking at the even sequences that come out  
2 of the PRA.

3 So, in the document, we have defined three  
4 event categories that are defined by the frequency of  
5 the events that come out of the PRA. And we could  
6 categorize those as frequent, infrequent, and rare  
7 categories.

8 And, in the document you will see the  
9 proposed frequency numbers that go along with each of  
10 those. In effect the frequency -- the frequent events  
11 you can consider equivalent to the anticipated  
12 operational currents that we call today, the  
13 infrequent to the design basis accident range, and the  
14 rare to the beyond design basis accident range.

15 And, anything beyond rare would not have  
16 to be considered in the design. Within the infrequent  
17 category, and the frequent category, we have a scheme  
18 to select sort of the worst events from each of those  
19 categories and label them AOOs or DBAs, and treat them  
20 in a deterministic fashion for two reasons.

21 One, this is a risk informed approach, so  
22 we still feel we need some deterministic test, and  
23 two, we have interfaces with other parts of the  
24 regulations, particularly part 100, that require  
25 design basis accident definitions and calculations.

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1 For the safety classification scheme,  
2 we're trying to build upon 50-69. Hopefully the words  
3 are settled down now with the Commission about ready  
4 to take action on that.

5 And this would be a scheme that would use  
6 risk importance measures to go through and look at all  
7 the system structures and components, not just in the  
8 design basis range, but all the way through the rare  
9 category, and identify those basically two bins, you  
10 know, important to safety or not important to safety.

11 The details of how we're going to do that,  
12 like I said, are going to depend upon the final words  
13 in 50-69. So, that's clearly work in progress.

14 MEMBER ROSEN: Are you absolutely settled  
15 on important to safety and not important to safety?

16 MR. KING: No, I just --

17 MEMBER ROSEN: Because, I could suggest  
18 the risk significant and not risk significant.

19 MR. KING: Yes. I just threw those words  
20 out here for a lack of anything better.

21 MEMBER ROSEN: And because the importance  
22 of safety has all kinds of other connotations that are  
23 not important to safety if you do the acronym, it's  
24 cute but --

25 MR. KING: I will withdraw those words.

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1 MS. DROUIN: The biggest thing that we  
2 have decided on is that will be two categories, not  
3 four.

4 MEMBER ROSEN: Okay.

5 MS. DROUIN: So, what the words are,  
6 whether it is risk significant, safety important, you  
7 know, there's just two categories. It's not the four  
8 categories that you see in 50-69.

9 MR. KING: Okay, as far as the single  
10 failure criteria, the idea would be to look at the  
11 event sequences that need to be considered in design.

12 If they have two failures, three failures,  
13 that needs to be considered. If they have zero  
14 failures, that's what needs to be considered.

15 MEMBER APOSTOLAKIS: So Tom, what exactly  
16 will be the licensing basis in this case? The PRA  
17 will be part of the licensing basis?

18 MR. KING: Yes.

19 MEMBER APOSTOLAKIS: And, so for a  
20 selected number of sequences, which you will declare  
21 as design basis accidents, you will demand to see  
22 thermal hydraulic calculations, reactor physics  
23 calculations, ready criteria, all that stuff?

24 MR. KING: Right.

25 MEMBER APOSTOLAKIS: But, for the other

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1 sequences, you will just look at the PRA and convince  
2 -- or you will ask the licensee to convince yourself  
3 that the probabilities are appropriately used, that  
4 the consequences are appropriate, but you will not go  
5 into the actual success criteria of the mechanistic  
6 calculations. Is that the correct understanding?

7 MR. KING: The PRA will have to meet, you  
8 know, certain quality tests defined by the ASME  
9 standards.

10 MEMBER APOSTOLAKIS: I understand.

11 MR. KING: In the results of the PRA there  
12 are some risk acceptance criteria that we talk about  
13 in there. And, cumulatively, everything that comes  
14 out of the PRA will have to meet those risk criteria.

15 MEMBER APOSTOLAKIS: But you will not go  
16 into the mechanistic calculations? You will do that  
17 only for design basis accidents.

18 MR. KING: At this point --

19 MEMBER APOSTOLAKIS: Otherwise what's the  
20 distinction? What's the difference between the DBAs  
21 and some other sequence.

22 MR. KING: Well, I think the difference in  
23 the DBAs is one we're going to require a little higher  
24 level of confidence that they meet the acceptance  
25 criteria.

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1 MEMBER APOSTOLAKIS: Oh, so you will have  
2 mechanistic requirements on all sequences?

3 MR. KING: No, just for the ones you pick  
4 out and call DBAs. Instead of using a mean value as  
5 a test against the acceptance criteria or the success  
6 criteria, we're proposing a 95 percent confidence  
7 value.

8 MEMBER APOSTOLAKIS: I understand that.  
9 For the DBAs I understand it. But, it's the other  
10 sequences that confuse me a little bit. If they are  
11 part of the licensing basis, and the licensee submits  
12 a PRA, they will -- those PRAs will be reviewed the  
13 way we review them now without -- I mean, if the  
14 licensee says, for these sequence, my success criteria  
15 are A, B, C, you will accept that statement, or you  
16 will actually demand to see proof.

17 MR. KING: I'm not sure we've though far  
18 enough ahead to answer your question.

19 MEMBER APOSTOLAKIS: Because then  
20 everything becomes a DBA if you demand for the other  
21 sequences too. Then the whole thing is a design  
22 basis.

23 MEMBER ROSEN: Well, in a PRA context that  
24 might be true. But, I think the labeling of certain  
25 things as DBAs has enormous consequences in terms of

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1 quality assurance and testing, and the maintenance,  
2 and all the structure you get with components that are  
3 now safety related because they are part of the design  
4 basis.

5 And so, in my view, where you're heading  
6 with that is dividing things into two classes, things  
7 that are DBA that respond to a DBA are going to be,  
8 maybe not safety related, maybe you'll call the safety  
9 related, will have all the accoutrements that go along  
10 with being safety related.

11 And things that are beyond design basis  
12 may be not. Is that where you're headed?

13 MR. KING: Well, something that's labeled  
14 DBA doesn't necessarily mean it's going to get the  
15 safety importance label. Chances are it probably will  
16 since we're picking the worst scenarios and calling  
17 them the DBA scenarios, but not necessarily.

18 That's going to depend upon the importance  
19 measures that come out of that safety classification.  
20 You know, so there's not a --

21 MEMBER ROSEN: there may not be a one-to-  
22 one correlation, but there'll be high congruents, I  
23 would expect.

24 MEMBER APOSTOLAKIS: But there's more to  
25 it than just what the group that you mentioned Steve.

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1 I think that the mechanistic calculations that will be  
2 required will probably be different.

3 I mean, all these codes, you can't expect  
4 them to submit complete analysis of every sequence to  
5 be considered and subject it to the review that DBA  
6 now is --

7 MR. KING: Well, at the high level we are  
8 talking in principle. I think you are right. We  
9 haven't explicitly addressed your point. I understand  
10 your question.

11 And I think we need to think about that  
12 and decide what we're going to do. But, you're right,  
13 it doesn't make any sense to take every sequence in  
14 the PRA and treat it like a DBA.

15 MEMBER APOSTOLAKIS: It would be  
16 tremendous burden on the Staff too.

17 MR. KING: And we need to think about  
18 that. Okay, next slide. The second issue the  
19 Commission approved in concept last year was to use a  
20 scenario specific licensing source term.

21 By licensing source term I mean what's the  
22 source term you're using when you're doing deciding  
23 calculations and comparing against part 100? What  
24 we're proposing there is, again, from the PRA,  
25 defining a set of design basis accidents.

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1           Those will be the accidents that are  
2 allowed to use a scenario-specific source term in  
3 calculating whether they meet the part 100 guidelines  
4 or not.

5           Basically, what we're proposing is, for  
6 each scenario, the applicant could calculate a best  
7 estimate source term with a quantification of  
8 uncertainties, and then take a 95 percent confidence  
9 value on that calculated source term, and test that  
10 against the part 100, those guidelines.

11           Again, the burden is going to be on the  
12 applicant to come up with experimental data and  
13 analysis tools that provide some confidence that we  
14 can really calculate that source term.

15           So this is not a -- in my view, not some  
16 big burden relief on an applicant. It really adds  
17 some burden.

18           MEMBER POWERS: That means it demands --  
19 it's demanding on the licensee only to the extent the  
20 Staff is skeptical, that is, if the Staff accepts  
21 plausibility arguments, then it's a pencil whip job.  
22 I could do it tomorrow afternoon.

23           MR. KING: True.

24           MEMBER POWERS: The Staff doesn't question  
25 and demand some proof of what's being proposed.

1 MR. KING: You're right, it could be a  
2 pencil whip job. But I'm not sure -- you know, I  
3 haven't seen the Staff unskeptical in very many  
4 situations.

5 MEMBER POWERS: I would be glad to point  
6 you to several.

7 MEMBER DENNING: I apologize for not  
8 really being adequately prepared to having read  
9 material on this. But, with regard to the scenario-  
10 specific source term, you talked about what sounded  
11 like a realistic source term for a design basis  
12 accident, which historically have had really trivial  
13 realistic consequences.

14 And there has been a pseudo DID. I mean,  
15 really what we've done is we've used severe accident  
16 source terms to do this. Are you suggesting that we  
17 would actually use, not the rare category types of  
18 source terms for citing purposes or whatever the  
19 purposes are?

20 You would actually use realistic source  
21 terms?

22 MR. KING: Actually use realistic source  
23 terms with consideration of uncertainty.

24 MEMBER DENNING: That sounds to me like a  
25 trivial exercise and of limited value in that --

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1           MEMBER KRESS: Normally all that does is  
2 set your leak rate out of the containment. That's  
3 about all it's good for.

4           MEMBER DENNING: Yes, but, in your design  
5 basis accident, you're going to have trivial -- truly  
6 trivial realistic source terms. The way it has worked  
7 in the past has been we had this artificial source  
8 term that we applied to design basis accidents.

9           And it allowed us to make meaningful  
10 requirements on the containment. If we had used  
11 realistic source terms for LOCAS or other design basis  
12 accidents, what if he gets the gap release and not  
13 really all of that either.

14           You know, so I'm wondering -- I don't know  
15 whether the ACRS has reviewed this question with you  
16 before. But, it sounds to me like we're just doing  
17 away with -- realistic source terms for design basis  
18 accidents are trivial.

19           MR. KING: A couple things you have to  
20 consider. One, this framework is from more than LWRs,  
21 a sodium reactor, for example, where you dump highly  
22 radioactive sodium form a pipe leak.

23           That's not a trivial source term. The  
24 HTGR where it's sort of a continuum of what comes out  
25 of the fuel, depending upon the temperature of the

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1 core and how long it stays at that temperature, may  
2 not be a trivial source term.

3 The other thing is, for a rare category,  
4 which is for things we're calling design basis  
5 accidents at this point in time. We're not forgetting  
6 about those.

7 They still have some overall risk criteria  
8 that have to be met in terms of -- not just only for  
9 prevention, but for mitigations. It's the source  
10 terms from the rare events do have to be considered.

11 And there is a proposed criteria in the  
12 document that deal with mitigation of that release.

13 MEMBER DENNING: Do they then enter into  
14 protective --

15 MR. KING: Yes, and they would have to be  
16 considered in the emergency preparedness. Yes, and  
17 they would have to be considered in the emergency  
18 preparedness.

19 MEMBER DENNING: I mean, I think that the  
20 thing that you're impacting is the defense in depth of  
21 the containment that we currently have. That's what  
22 I think you're impacting by taking realistic source  
23 terms for design basis accidents.

24 MR. RUBIN: When we get to the options for  
25 containment design, I think one of the options will

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1 bring in the kinds of source terms that you're  
2 referring to as an option for events in a rare  
3 category, or even beyond the so-called cliff edge  
4 events, should those be appropriately included in the  
5 design basis for purpose of containment design.

6 To include them, then how would you  
7 analyze them in terms of a mechanistic source term?  
8 Would you do it on a realistic basis with  
9 uncertainties for those cliff edge events?

10 But, that is one of the options. So, not  
11 to kind of disagree with the containment, but --  
12 excuse me, with the framework. But, that will come up  
13 as one option.

14 And, for some designs, like HTGRs, when  
15 you get into those events, it does impact the  
16 containment design. If you ignore those cliff edge  
17 events, you have a fairly leaky containment.

18 If you include those cliff edge events,  
19 you can have a confinement. But it has to be rather  
20 low leakage after the initial source term. So, it can  
21 affect the containment design if you include it.

22 And I would add that some designers are  
23 including those cliff edge events in our HTGR design,  
24 and some are not.

25 MEMBER KRESS: My feeling about this was,

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1 when you use a full range FC acceptance criteria, that  
2 incorporate the design basis accidents, as well as the  
3 other range of accidents.

4 And, in order to see whether you meet that  
5 at the right confidence level, you have to use  
6 whatever source term you expect to get out of each  
7 sequence.

8 And that's the way I was interpreting this  
9 thing, that, in order to meet an FC acceptance  
10 criteria for design basis accidents in all of them,  
11 you use the right source term.

12 I don't know what we do with inventing  
13 other source terms, frankly.

14 MR. KING: We're trying to get away from  
15 inventing other source terms.

16 MEMBER KRESS: I think that's a good idea.

17 MR. KING: But, I understand your comment.  
18 I think we have to see how all of this plays out.

19 MEMBER APOSTOLAKIS: That's the concern,  
20 that -- well take. What would we do with it?

21 MR. KING: All right. We'll go onto the  
22 next slide.

23 MEMBER APOSTOLAKIS: So that would be part  
24 of defense in depth. And, if you invent something  
25 more severe -- wouldn't it not? If you impose

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1 something more severe than what you have, yes.

2 MR. KING: Offsite emergency preparedness,  
3 what the Commission agreed to last year was, in the  
4 near term we don't need to make any changes to EP,  
5 because, one, any near term plan is probably going to  
6 go on an existing site, which already has EP.

7 And, two, we already have provision and  
8 regulations for HTGRs to allow some flexibility. But,  
9 in the long term, they agreed to let's think about EP,  
10 how we would change EP, and the context of thinking  
11 defense in depth.

12 And if we could come up with some criteria  
13 to do that, they would entertain that. So that's what  
14 we're doing. We're looking at the long-term aspects.

15 In the document you will see some proposed  
16 criteria. We do want you to go to the Commission in  
17 the December paper and give them a chance to look at  
18 these criteria before we go out in a public form and  
19 start talking about them, since this is a very  
20 sensitive topic.

21 MEMBER DENNING: Is there a threshold of  
22 which you could have no emergency preparedness, like  
23 an inherently safe design?

24 MR. KING: The design -- some designers  
25 are proposing I don't need anything offsite. So we're

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1 faced with that question from designers. Our view at  
2 this point is, we need something.

3 Now, that something may be in the extreme  
4 would be a plan to do ad-hoc offsite evaluation. But  
5 you can't just ignore the offsite. But maybe you can  
6 back off in terms of the size of the EPZ, the  
7 requirement for sirens and drills, and all that,  
8 that's what we're talking about.

9 MEMBER ROSEN: What about a plant -- I was  
10 involved in the design effort at one point in my  
11 career on a plant whose principle design basis was you  
12 would not need offsite preparation.

13 It would be designed, in fact, to meet  
14 that specific goal.

15 MR. KING: Yes.

16 MEMBER ROSEN: And I think that would be  
17 a case of the technology-neutral framework.

18 MR. KING: We're trying to address that  
19 case in this document so that, if that designer comes  
20 in and tries to make that case, these criteria would  
21 define --

22 MEMBER ROSEN: There is a huge incentive  
23 for that. And that was the point of the study I was  
24 involved with.

25 MEMBER APOSTOLAKIS: But there could be a

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1 defense in depth measure?

2 MEMBER KRESS: Yes, you can design the  
3 system to meet all your criteria without the emergency  
4 -- and then impose it as a defense in depth.

5 MEMBER APOSTOLAKIS: A defense in depth  
6 definition --

7 MR. KING: You get the revised document in  
8 early November. You will find the discussion of EP in  
9 the defense in depth chapter.

10 MEMBER APOSTOLAKIS: Good.

11 MEMBER DENNING: Well, let me just make  
12 one comment about this added as a defense in depth.  
13 And that is that there's a rationale that says that we  
14 will never have a major commitment again to nuclear  
15 power plants because of their concern of severe  
16 accidents.

17 And, part of that rationale says you have  
18 to have passably safe reactors that have features that  
19 say that there is no -- there's' not going to be a  
20 significant off-site release and that we have enough  
21 confidence -- we have a high confidence in that.

22 And that's the way you convince people to  
23 accept a new generation of reactors. But then, if you  
24 then say, but, we have to have emergency procedures  
25 for offsite response, defense in depth, it totally

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1 takes away the argument that says we have sufficient  
2 confidence that you can't have this big release.

3 And, you know, so I think we have to be  
4 very careful in that with a defense in depth type of  
5 approach, one could completely destroy that approach  
6 towards a nuclear future.

7 MEMBER APOSTOLAKIS: I'm having a problem  
8 with that thinking. Let me tell you why. My  
9 understanding from talking to old timers is that, in  
10 the 60's the industry was arguing that the containment  
11 was not needed because it would never -- damage event  
12 was unthinkable.

13 And then, the other thing that happened in  
14 the last 30 years or 35 years is we have been  
15 surprised a few times by the things that have  
16 happened.

17 So, I don't know how you can demonstrate  
18 with very high confidence that you don't need  
19 emergency planning. You have new designs, new ideas  
20 that --

21 MEMBER ROSEN: Let me suggest a way for  
22 the study that I was involved with.

23 MEMBER APOSTOLAKIS: Yes?

24 MEMBER ROSEN: It's not a fission reactor,  
25 so there's no fission products.

1 MEMBER APOSTOLAKIS: Well, I mean, then  
2 you do have high confidence.

3 MEMBER ROSEN: Yes, that's what I'm trying  
4 to tell you. There's a way.

5 MEMBER APOSTOLAKIS: But they can  
6 accommodate that in the framework. I mean, if/it's a  
7 physical law, if something's not there, then I'm all  
8 for it.

9 MEMBER ROSEN: That's the case.

10 MEMBER APOSTOLAKIS: But, if it's a matter  
11 of analysis, I would be more skeptical.

12 MEMBER DENNING: Well, George, I totally  
13 agree with you that it's a -- puts a tremendous burden  
14 on the regulator to have a level of confidence that's  
15 extremely difficult to achieve.

16 But I don't think that we should  
17 necessarily preclude that at this point when we're  
18 looking towards future plants.

19 MEMBER APOSTOLAKIS: Absolutely.

20 MEMBER KRESS: A similar comment can be  
21 made about containment.

22 MEMBER APOSTOLAKIS: Of course.

23 MEMBER KRESS: It is almost the exact same  
24 thing.

25 MR. KING: That's why these are policy

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1 issues. Ultimately the Commission has weighed all of  
2 this and make a decision.

3 MEMBER APOSTOLAKIS: We probably need a  
4 sub-committee meeting on each.

5 CHAIRPERSON GEOFFREY: I think we need to  
6 look at this presentation and the next one.

7 MEMBER APOSTOLAKIS: Oh, there's one more?

8 CHAIRPERSON GEOFFREY: Yes, we have 35  
9 minutes left.

10 MR. KING: Yes, we better move along. He  
11 needs 15 minutes for containment.

12 MEMBER KRESS: Yes, we better move along.

13 MS. DROUIN: We can come back to the new  
14 issues.

15 MR. KING: Okay, two slides on integrated  
16 risk. You know the background on it in terms of the  
17 Commission -- for additional information on should we  
18 treat integrated risk?

19 How should we treat it for modulator  
20 reactors? That's all we were talking about.

21 MEMBER APOSTOLAKIS: That's when the ACRS  
22 was defeated.

23 MR. KING: The ACRS came in and sort of  
24 issues a letter to broaden the scope of that issue.  
25 Basically what we're going to say, what we're

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1 proposing to say in the December package is to limit  
2 our recommendation to the module reactor, the original  
3 issue, and to ask the Commission -- you know, point  
4 out the issues raised in the ACRS letter and ask them  
5 if they want us to expand our evaluation to look at  
6 that issue for non-modular reactors, which could  
7 effect existing plants, as well as future large size  
8 plants.

9 You know, there could be a lot of  
10 implications in doing that. And we're not prepared at  
11 this point to go jump in and start that exercise  
12 without the Commission saying they want us to spend  
13 resources on doing that.

14 So that's our proposal for treating issues  
15 raised in your letter of earlier this year. In terms  
16 of dealing with the issue for modular reactors, we're  
17 saying we do think integrated risk needs to be  
18 considered.

19 It needs to be considered when you're  
20 looking at the accident prevention measures, as well  
21 as the accident mitigation measures. And for the  
22 accident mitigation measures, plant size needs to be  
23 considered.

24 It's not strictly a frequency exercise.  
25 So, you'll see the words on this, the separate

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1 attachment on this in the December paper. So, --

2 MEMBER APOSTOLAKIS: Is this the right  
3 place to make a comment on the frequently consequence  
4 curve, the curve that is here?

5 MR. KING: Sure.

6 MEMBER APOSTOLAKIS: It seems to me there  
7 is a little bit of a disconnect between that figure  
8 and another figure you have, in terms of individual  
9 risk where you say we are going to go with the three  
10 regions.

11 The FC curve doesn't have three regions,  
12 does it?

13 MR. KING: No.

14 MEMBER APOSTOLAKIS: It should though,  
15 should it not? I mean, that's the curve you're going  
16 to be using, in fact. You are claiming that you will  
17 have three.

18 MR. KING: That's the top of the bottom  
19 region.

20 MEMBER KRESS: That was one of my  
21 comments, George.

22 MEMBER APOSTOLAKIS: It seems to me, with  
23 the figure of three regions, in fact, you are much  
24 more flexible in your decision making. And, I mean,  
25 if you want to go with a three region approach, that's

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1 where you should do it.

2 MEMBER KRESS: That was my comment, yes.

3 MEMBER APOSTOLAKIS: And going back to  
4 what we were just discussing regarding emergency  
5 planning, with LWRs, when we calculate the individual  
6 risk from the PRA, we include evacuation, don't we?

7 MR. KING: Yes.

8 MEMBER KRESS: Yes.

9 MEMBER APOSTOLAKIS: When you do the same  
10 thing in the new framework, with the FC curves, do you  
11 or don't you?

12 MR. KING: We've tried to lay things out  
13 in here with the assumption there is no off-site  
14 evacuation.

15 MEMBER APOSTOLAKIS: There is no off-site  
16 evacuation?

17 MR. KING: If you look at the frequently,  
18 the proposed -- and CDF numbers we have in here are  
19 based upon no evacuation. But we've also put a  
20 qualifier in here that, if a designer wants to come in  
21 and take credit for EP, he could propose some  
22 different numbers.

23 MEMBER APOSTOLAKIS: Different numbers for  
24 what? For the acceptance criteria?

25 MR. KING: For the risk acceptance

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1 criteria. If he wants to take credit for off-site  
2 evacuation, he could propose something different.

3 MEMBER KRESS: We wouldn't want him to  
4 change the acceptance criteria.

5 MEMBER APOSTOLAKIS: Yes.

6 MEMBER KRESS: We might want him to change  
7 how he calculates whether or not he meets it.

8 MEMBER APOSTOLAKIS: Yes, but, they don't  
9 like that. They want the applicant not to use  
10 evacuation.

11 MEMBER KRESS: Yes, but if he wants to  
12 take credit for it --

13 MEMBER APOSTOLAKIS: Then they say you  
14 have to propose something else. But, how can the  
15 licensee or the applicant propose different acceptance  
16 criteria. I mean, that's our job.

17 MEMBER KRESS: Yes, that's our job.

18 MR. KING: Well, they can do that today.

19 MEMBER APOSTOLAKIS: Oh, you mean during  
20 the deliberations?

21 MR. KING: During an actual application  
22 they can propose an exemption to an acceptance  
23 criteria.

24 MEMBER APOSTOLAKIS: Exemption from the FC  
25 curve? I mean, for heaven's sakes.

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1 MEMBER KRESS: That's too --

2 MEMBER ROSEN: Well, you'd have to go  
3 through 5012, right?

4 MR. KING: Yes, the provision is there  
5 today for anybody to come in and ask for an exemption  
6 in anything in the regulation.

7 MEMBER KRESS: You could imagine places  
8 where it might be appropriate. Suppose they stuck one  
9 of these plants out in the desert, and nobody around  
10 them for 50 miles --

11 MEMBER SHACK: Like Yucca Mountain?

12 MEMBER KRESS: Yes, like Yucca Mountain.  
13 They might want to get an exception to get an FC curve  
14 under conditions like that. I can envision conditions  
15 like that.

16 MEMBER APOSTOLAKIS: Yes, okay. The  
17 regulations allow it. But, my god, there have to be  
18 certain fundamental things that the Commission  
19 believes are --

20 MEMBER ROSEN: You have to show good  
21 cause. And that's their fundamental thing. I think  
22 there's enough in 5012 that prevent --

23 MEMBER APOSTOLAKIS: So, somebody can come  
24 and say --

25 MEMBER ROSEN: I want an exemption but it

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1 has to give you all the reasons why -- 5012, and it  
2 would prevent --

3 MEMBER APOSTOLAKIS: I have very good  
4 reasons why I shouldn't comply with defense in depth.  
5 They would listen to them.

6 MEMBER ROSEN: Well, yes, because they are  
7 going to put s on the moon. I mean, there has to be  
8 some reason.

9 MR. KING: We're going to move on. We're  
10 going to containment next. Stu will take over.

11 MR. RUBIN: Stu Rubin, Office of Research.  
12 This next topic -- has shown is non-light/ water  
13 reactors containment functional performance  
14 requirements and criteria.

15 This is one of the two policy issues that  
16 we're going to be sending up in the December paper for  
17 Commission decision, along with integrated risk. In  
18 terms of what I'm going to be focusing on today, it's  
19 going to be on the function of our preliminary  
20 thinking on a technology neutral requirements and  
21 criteria for reducing radiological releases and not on  
22 many of the other functions that the containment has.

23 By way of background, the SRM to the SECY-  
24 03-0047, in that the Commission asked the Staff to  
25 develop options or alternatives for containment

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1 performance requirements and criteria for these  
2 containment designs.

3 And they further directed that the Staff  
4 should, in developing these options or alternatives,  
5 to consider other important attributes of plants, such  
6 as the fuel and the core, and cooling system  
7 characteristics, and to consider that in an integrated  
8 way in developing the options, and to account for  
9 different approaches to safety and fission product  
10 containment.

11 And they also requested that the Staff  
12 interact with industry experts and other stakeholders  
13 in developing and also assessing these options, and  
14 then to submit them for our consideration.

15 We plan to do that in December. Next  
16 slide. And so, the Staff has, in fact, had a number  
17 of meetings, public meetings, with experts within  
18 industry, and others over the past year.

19 This slide shows that. We've also gotten  
20 a number of written comments from industry and others.  
21 And this have been, I must say, very helpful to us in  
22 identifying what the functions are of containment  
23 designs and insights into what is perceived as what  
24 should be the performance requirements that go with  
25 those functions.

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1           One of the things is that these meetings,  
2 we coordinate them with the meetings on framework.  
3 And that was intended to ensure that these options  
4 would be consistent with or compatible with the  
5 framework after all.

6           In June we provided a status report to the  
7 Commission, as you know. And, in addition to these  
8 meetings, we did review a lot of documents and safety  
9 information on past reactor designs, current, light  
10 water reactor designs, proposed new reactor designs in  
11 our containments to try to get a good understanding of  
12 what the functions are and what the various  
13 performance requirements are in these various designs.

14           And, also, by the way, we did take a look  
15 at what the Committee recommended, which was to look  
16 at the containment or confinement approach of the end  
17 reactor in the Savannah River, reactor plant to  
18 understand what the insights were from safety from  
19 that.

20           Next slide. Now, from these efforts, it's  
21 kind of been concluded that, what I'll call  
22 containment for now, has a number of functions, a  
23 number functional rows that either directly or  
24 indirectly supports safety functions.

25           And these involve both preventive

1 functions, accident prevention functions, as well as  
2 accident mitigation functions. And this lists some of  
3 them, or what we see as the functions.

4 They include things like protecting safety  
5 related systems against external and internal hazards,  
6 such as tornadoes and floods, seismic events, higher  
7 energy sources outside the containment, high energy  
8 breaks inside the containment, and pipe whip,  
9 protection against internal missiles like -- also a  
10 containment has a kind of function that may be obvious  
11 or not so obvious.

12 And that is to support or show support of  
13 important SSCs so that they can perform our safety  
14 functions, things like the reactor vessel and the  
15 accident heat removal systems have to maintain their  
16 positioning during accidents, or the behavior of  
17 accident removal may be negated, to protect plant  
18 personnel from radiation sources, or radiation hazards  
19 within the reactor containment building.

20 There's also a connection to physical  
21 protection, SSCs, that's provided directly or  
22 indirectly by containment.

23 CHAIRPERSON GEOFFREY: How is this  
24 different from bullet one?

25 MR. RUBIN: Well, one is the traditional

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1 internal or external events. I think in this bullet  
2 here we are talking about physical protection,  
3 security, sabotage, that aspect.

4 CHAIRPERSON GEOFFREY: Okay.

5 MR. RUBIN: There's a function or a role  
6 to support, and sometimes provide for heat removal,  
7 both during normal operation and accidents to ensure  
8 that safety limits are not exceeded.

9 And the final one, which is really the  
10 focus of this meeting, the paper in December will  
11 cover all of these and propose functional performance  
12 requirements and technology neutral way for all these  
13 functions.

14 But, the focus here is on reducing nuclide  
15 releases to the environs. And I've highlighted  
16 certain words in red here to draw attention to the  
17 fact that there are accident prevention functions and  
18 accident mitigation functions. Next slide.

19 MEMBER ROSEN: Now, just one quick one,  
20 Stu, this is normal for normal operation, as well as  
21 accidents?

22 MR. RUBIN: Yes.

23 MEMBER ROSEN: Okay.

24 MR. RUBIN: The full spectrum of the  
25 licensing --

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1 MEMBER ROSEN: All operational modes?

2 MR. RUBIN: Right.

3 MEMBER ROSEN: Okay.

4 MR. RUBIN: Now, to be sure, there was a  
5 lot of controversy in the meetings as to what do we  
6 call this thing. It turns out that certain words like  
7 containment, confinement, reactor building, has  
8 certain connotations as to what are the functional  
9 performance requirements that may not apply to other  
10 kinds of designs.

11 And everybody, all the designers has  
12 problems with all of them. And so, the Commission and  
13 the SRM, or at least in some of the Commissioners'  
14 comments, developing the SRN advised the Staff to be  
15 very careful what we're calling this thing, not to  
16 lead to certain requirements just by calling it that,  
17 or false expectations in calling it that.

18 So, what I tried to do for purposes of  
19 this paper is develop a term that universal and  
20 technology neutral. And it encompasses both the  
21 prevention and mitigation roles, as well as the fact  
22 that these roles are carried out by both structural  
23 and systems.

24 And, since the main focus is fission  
25 product reduction as the key area, and considering a

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1 third level, I coined this term to get away from the  
2 connotations.

3 It's kind of burdensome. Call it what you  
4 want after we're done and we pick the functional  
5 requirements. But, for now, to get rid of that  
6 controversy, I'm calling it a third level prevention  
7 mitigation building system.

8 MEMBER ROSEN: The acronym is un-  
9 pronounceable.

10 MR. RUBIN: It certainly is. This acronym  
11 has a half-life of probably about -- anyway, once we  
12 decide what the requirements will be. But, for now,  
13 this is what I'm calling it.

14 So, it's a proposed requirement in the  
15 area of reducing radionuclide release. It's very  
16 simple. The third level prevention mitigation  
17 building system must be adequate so that radionuclide  
18 releases to the environment do not exceed the dose  
19 criteria for the selected events in the event  
20 categories.

21 Now, having said that, it doesn't say  
22 anything about what is the true capability of this?  
23 What is the independence of this? That plays out in  
24 the criteria.

25 We start to see that there's more expected

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1 of this thing as we progress through the criteria.

2 MEMBER ROSEN: And, again, this is the  
3 reason I asked that earlier question about all modes.  
4 In that prior slide, you talk about selected events  
5 and event categories.

6 Is one of the selected events normal  
7 operation?

8 MR. RUBIN: Certainly.

9 MEMBER ROSEN: Okay.

10 MR. RUBIN: In the frequent category.

11 MEMBER ROSEN: This TLPMBBS has a role  
12 during normal operation, including shut-down, without  
13 any --

14 MR. RUBIN: Yes. But, the focus here in  
15 developing the requirements is on the issue of the  
16 design basis category.

17 MEMBER ROSEN: What I'm saying is the  
18 design basis includes normal operation and shut-down.

19 MR. RUBIN: Yes.

20 MEMBER ROSEN: Because there are  
21 functional requirements on --

22 MR. RUBIN: Yes.

23 MEMBER ROSEN: -- the containment for  
24 those operating modes, even when you're totally within  
25 the normal operating envelope.

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1 MR. RUBIN: Yes.

2 MEMBER APOSTOLAKIS: So, in the previous  
3 slide you had the word requirement in italics. That  
4 means you have additional things that come up --

5 MR. RUBIN: No, it's intended to say  
6 there's a distinction between the requirement and a  
7 criteria which is, in my view, how do you meet that  
8 requirement?

9 What are the demands in meeting that  
10 requirement?

11 MEMBER APOSTOLAKIS: But later on, like in  
12 a couple slides, you will talk about defense in depth  
13 and all that.

14 MR. RUBIN: Yes.

15 MEMBER APOSTOLAKIS: So these are  
16 additional considerations to this?

17 MR. RUBIN: No, they actually will  
18 establish the independence of this third level  
19 prevention mitigation building system to prevent  
20 release.

21 MEMBER APOSTOLAKIS: If you say to ensure  
22 the dose criteria are met, you are making the TL --

23 MR. RUBIN: Whatever.

24 MEMBER APOSTOLAKIS: It sounds Greek to  
25 me. You are making that part of the measures you will

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1 use to meet the dose criteria. And, what if you meet  
2 them otherwise, but you still want some sort of a  
3 TLPMBs for defense in depth?

4 MR. RUBIN: Well, that's right. This  
5 starting point simply says we have to meet the dose  
6 criteria.

7 MEMBER APOSTOLAKIS: So there are  
8 additional, then, requirements.

9 MR. RUBIN: And, on its own, it could have  
10 no barrier capability, effectively if the other  
11 mechanistic barriers are over the full range of  
12 licensing basis events, are sufficient to meet the  
13 dose criteria.

14 It doesn't get say what the capability and  
15 independence -- that plays out in the criteria.  
16 Because we are, in fact --

17 MEMBER APOSTOLAKIS: So I feel that it  
18 will have in them --

19 MR. RUBIN: Yes, you will see how that  
20 plays out. And it ranges through a progression where,  
21 in the final option, and I can jump to it, it gives no  
22 credit for the other barriers.

23 And it has to, of its own, meet the  
24 requirement, giving no credit for the other  
25 mechanistic barriers. That is the fourth option. The

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1 other options -- well, let's go through that.

2 MEMBER APOSTOLAKIS: Sure.

3 MR. RUBIN: Okay, all I try to do in the  
4 previous slide was to capture some the ground rules in  
5 developing the performance criteria. We're going to  
6 use the frequently consequence curve to limit risk in  
7 the various event categories.

8 We'll use a probabilistic approach to  
9 identify design basis events, deterministic --

10 MEMBER KRESS: Your consequences, do you  
11 still intend that to be a dose in that FC? One of the  
12 comments I made is that maybe you may have some  
13 advantages if you use activity release, rather than a  
14 dose.

15 MR. RUBIN: Okay.

16 MEMBER KRESS: But, think about it.

17 MEMBER APOSTOLAKIS: Let's go to the  
18 fourth bullet.

19 MR. RUBIN: This is intended to simply  
20 pull out of the framework.

21 MEMBER APOSTOLAKIS: But the fourth  
22 bullet, it seems to me, is related to my earlier  
23 comment with regarding safety margins, that this could  
24 be in the PRA.

25 But another comment, when you say 95

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1 percent confidence level for making the criteria, you  
2 will not allow any uncertainty in the criteria, you  
3 will say the criteria will be X and the whole  
4 uncertainty is in your calculations.

5 But X itself may be a very conservative  
6 value.

7 MR. KING: Yes, that's true. We talked  
8 about should we have some sort of distribution of  
9 uncertainty on the acceptance criteria. We have sort  
10 of arrived at the point where, no, we're not going to  
11 do that, that's too complicated.

12 You know, the acceptance criteria in there  
13 is 25 rim TEDI at the exclusionary boundary and at the  
14 LPZ for analyzing containment performance. And we're  
15 proposing to keep those.

16 We're not changing part 100 at this point.  
17 And they don't have any uncertainty on them. But you  
18 want to be confident when you calculate whether you  
19 meet that or not you're very confident that --

20 MEMBER APOSTOLAKIS: But, shouldn't the  
21 requirement of a 95 percent confidence level have some  
22 sort of consistency with the conservatism in the  
23 acceptance criteria, which I understand you don't want  
24 to touch?

25 But still, if you have acceptance criteria

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1 awfully conservative, maybe 95 percent confidence on  
2 the applicant is too much. I think there has to be  
3 some connection.

4 MR. KING: Well, we're interfacing with  
5 existing acceptance criteria. We're not proposing to  
6 change those like the part 100,

7 MEMBER APOSTOLAKIS: But you must have  
8 some understanding of how conservative they are.

9 MR. KING: I think those are where policy  
10 judgment. I mean, those aren't based upon, you know,  
11 some observed health effects or something. They're  
12 set at the level where, hopefully you don't have any  
13 health effects.

14 MEMBER APOSTOLAKIS: Yes. So, why 95  
15 percent confidence? Why not 80 percent if you have  
16 never seen anything like that?

17 MR. KING: Anyway, my point, we don't have  
18 to debate this particular issue. But my point is  
19 that, because you will have that in other areas too,  
20 my point is that when you set confidence levels, you  
21 have to take into account how conservative your  
22 acceptance criteria is.

23 Like the 2,200 degrees Fahrenheit for the  
24 P-clad temperature apparently is extremely  
25 conservative, right? I heard somewhere in your report

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1 that now they find that in 3,200 -- after 3,200  
2 degrees there is no failure. You have it somewhere.

3 MR. KING: I don't know about that. But  
4 it is conservative. We all agree it is conservative.

5 MEMBER APOSTOLAKIS: I thought it was --

6 MR. KING: It does show up in the report,  
7 you're right.

8 MEMBER APOSTOLAKIS: It's in passing, as  
9 if it's something that's trivial.

10 MR. KING: Yes, it's used as an --

11 MR. KING: I just was looking at it trying  
12 to figure out whether it was a typo.

13 MEMBER POWERS: Could we go back to the  
14 slide please? When you come back here in this fourth  
15 bullet that's been discussed here, it says that you're  
16 going to use best estimate deterministic analyses and  
17 uncertainty analyses to assess this alphabet soup.

18 And I'm wondering, when you do your  
19 uncertainty analysis, whether you would take into  
20 account things like anticipated manufacturing flaws.  
21 And I bring that up because it seems to be the  
22 vulnerability of containment designs.

23 And we discover these manufacturing flaws  
24 are more proliferent as we go through the license  
25 renewal process. What that leads one to suspect is

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1 the applicant's paper design will be far more perfect  
2 than the reality is.

3 And, do you explore that at all in setting  
4 up this technology neutral framework? I mean, this  
5 experience that we're deriving from the license  
6 renewal process.

7 MR. RUBIN: Well, from the containment  
8 performance or criteria point of view, the last two  
9 options do bring in a strong structureless element for  
10 completeness uncertainty to cover things that were not  
11 accounted for, specifically to cover things that we're  
12 not aware of.

13 MR. KING: I think the general answer to  
14 your question is no, we haven't considered  
15 manufacturing flaws in the PRA. Maybe Mary wants to  
16 expand on that.

17 MS. DROUIN: Some people would probably  
18 argue that they are considered when you start looking  
19 at the data. The reliability of that equipment takes  
20 into account --

21 MEMBER POWERS: We're not talking about a  
22 piece of equipment, we're talking about a major  
23 barrier here.

24 MS. DROUIN: Now, in terms to a piece of  
25 structure, which is now what you're referring to, I

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1 would say some of them are considered in the PRA and  
2 some of them are not considered in the PRA.

3 And it would depend on them. I would say  
4 it's considered in the overall framework by the fact  
5 that we have defined these four strategies. And all  
6 four strategies have to be met.

7 And that is to account for things that we  
8 haven't thought about, or don't know about. /

9 MEMBER KRESS: It's awfully difficult in  
10 my mind to anticipate the extent of a flaw in your  
11 design like --

12 MS. DROUIN: That is correct.

13 MEMBER KRESS: -- something wrong with the  
14 containment. And I don't see how you can really  
15 incorporate that concept in a PRA. You take care of  
16 that it seems like now your quality assurance and your  
17 inspections -- and if you find one of these things,  
18 then it kind of invalidates your PRA results. /

19 So then you have to use your reactor  
20 oversight process to make it get fixed someday. But  
21 I don't know how you do it ahead of time.

22 MEMBER POWERS: Well, I might agree with  
23 you on the abstract. But we are accumulating a  
24 database here. We used to accumulate databases by  
25 just running these integral pressurization tests.

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1           Whether we do that in the future or not,  
2 I guess it's a little open in question. And it was a  
3 non-trivial number of flaws that were found. And, as  
4 we go through the license renewal process, we find  
5 additional flaws in the construction.

6           Turkey Point certainly springs immediately  
7 to mind. Today we are accumulating a database that  
8 says there are certain kinds of design features that  
9 I can anticipate will be just difficult to manufacture  
10 and will have a certain probability of being flawed.

11           MEMBER KRESS: Well, you certainly could  
12 incorporate that in a PRA. One of the things you do  
13 is calculate the probability of containment failure.  
14 And that probability could very well incorporate some  
15 concept like that.

16           MEMBER POWERS: Well, my fundamental  
17 problem with that probability of containment failure  
18 is that you would probably do that based on an abacus  
19 fragility analysis.

20           MEMBER KRESS: Certainly. That's how it  
21 is done now.

22           MEMBER POWERS: And, when we try to  
23 validate that abacus, fragility analysis, we always do  
24 it against the set of experiments. In every case,  
25 those experiments have shown failures at flaws below

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1 the level of resolution of the abacus analysis.

2 So now, how does that validate the  
3 analysis?

4 MEMBER KRESS: It makes you go back and  
5 rethink your probability.

6 MEMBER APOSTOLAKIS: I don't think the PRA  
7 can accommodate this issue.

8 MEMBER KRESS: It would be difficult.

9 MEMBER APOSTOLAKIS: It does not. And  
10 that's why --

11 MEMBER POWERS: Then, don't we have a  
12 fundamental difficult here with the approach on one of  
13 the major elements of the defense in depth strategy.  
14 It's got to be addressed somehow.

15 MEMBER APOSTOLAKIS: Well, I guess one way  
16 it is being addressed -- and that may not be the only  
17 way -- is that, first of all, this is a risk informed  
18 thing, so there would be all sorts of inspections in  
19 quality assurance requirements. Second, --

20 MEMBER POWERS: How can you say that  
21 George? I mean, won't somebody come back and say,  
22 look, I looked at the risk achievement worth of this  
23 containment.

24 And, based on that, please relieve me from  
25 doing this inspection or this integral pressurization

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1 test. I mean, isn't that the way the argument is  
2 going to go?

3 MEMBER APOSTOLAKIS: Then people can raise  
4 the question of the other elements.

5 CHAIRPERSON GEOFFREY: But the design  
6 basis capability of the containments are tested under  
7 pressure conditions.

8 MEMBER RANSOM: For the last ten years  
9 they haven't been.

10 MEMBER SHACK: But you're not testing the  
11 design basis capability. They'll always meet the  
12 design basis capability. What Ben is arguing about is  
13 the real capability.

14 CHAIRPERSON GEOFFREY: Well, I mean, the  
15 containment was sealed with voids in it. I mean, the  
16 are tested for the design basis accidents, I mean, for  
17 whatever is the design value.

18 Beyond that, we have no confidence that  
19 they will give you a response as we are now typically  
20 credited in this containments in PRAs.

21 MS. DROUIN: I would also come back and  
22 argue one. You know, you do have those protective  
23 strategies in place. And they are done in such a  
24 manner as you would do in a what if thinking process.

25 Starting off, you know, what if -- looking

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1 at the event. You know, what if you do have these?  
2 Well, we have protective strategies. Well, what if  
3 those don't work?

4 You go into the barrier. Well, what if  
5 your barrier, your containment, you know, doesn't work  
6 as you thought. Then we have our accident magnitude.

7 So, you do have these protective  
8 strategies that are there meant to capture this type  
9 of issue. But also, on top of that, if you go back  
10 and look at what we have defined in defense in depth,  
11 the last part of defense in depth is the feedback and  
12 is the monitoring and feedback.

13 And that's the essential element that's in  
14 our defense in depth approach, is that, even though  
15 you might have these protective strategies, and yes  
16 you do use risk insights to help you decide on the  
17 extent, we have the defense in depth principles.

18 But, after all that is said and done, we  
19 still come back and say, we need for you to monitor  
20 and feedback to make sure that you're meeting these  
21 things.

22 CHAIRPERSON GEOFFREY: Okay.

23 MS. DROUIN: So you don't just walk away  
24 from it.

25 MEMBER APOSTOLAKIS: It would be

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1 interesting, though, as a side remark to see a case of  
2 current -- where a licensee requested something and he  
3 passed the risk criteria and the Staff rejected them  
4 in the name of defense in depth.

5 MEMBER SHACK: it happens all the time.

6 MEMBER APOSTOLAKIS: It does?

7 MEMBER SHACK: Yes.

8 MEMBER APOSTOLAKIS: Like which one?

9 MEMBER SHACK: AIRPLANE-600 containment  
10 spread.

11 MEMBER APOSTOLAKIS: That was in the early  
12 days.

13 MEMBER SHACK: Lots of risk informed  
14 inspections are done basically in defense in depth  
15 basis. You could never justify them on risk.

16 MEMBER APOSTOLAKIS: You're talking about  
17 a high level. I'm talking about specific cases.

18 MEMBER SHACK: That's a pretty specific  
19 case when you come in and tell the guy he's got to  
20 inspect his piping, whether he can demonstrate that it  
21 has no risk significance whatsoever, but he's going to  
22 inspect --

23 MEMBER APOSTOLAKIS: I remember that case.

24 MR. RUBIN: Okay, Mary, next slide. Let  
25 me just draw your attention to the last bullet. And

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1 the -- after this are in fact the options. These  
2 options basically -- in turn each one demonstrates or  
3 provides a progressively increasing capability to  
4 mitigate the release of fission products to the  
5 environment.

6 And, in doing that, it provides  
7 progressively increased level of defense in depth in  
8 that arena. So, let's just go look at those now, just  
9 the four options.

10 Mary, the next slide. Okay. The first  
11 option is the TLPMBs must be adequate to reduce  
12 radionuclide releases to the environment so, again,  
13 the onsite and offsite doses criteria are met for the  
14 events.

15 The event selection process would follow  
16 the framework description. And the consequences would  
17 be evaluated against the acceptance criteria. This  
18 particular option the performance of the third level  
19 barrier would clearly be dependent on the performance  
20 of the other barrier.

21 So, it doesn't provide for an independent  
22 capability in this particular one. And the  
23 capability, furthermore, would be tied to judgments at  
24 the time of submittal and the review as to what events  
25 should be within what categories.

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1           So this, in a way, gives a lot of freedom  
2 to the designer, and really to the staff in making  
3 decisions on deterministic engineering judgment on  
4 what events to include and deterministic engineering  
5 judgment on the mechanistic source term calculation  
6 and see how terms come out.

7           MEMBER KRESS: I think three and four tend  
8 to exclude filtered event containments.

9           MR. RUBIN: Well, let me go through the  
10 next one if we could. The next option, option two,  
11 deviates somewhat from the framework in that it has  
12 the same requirement but, if the Commission approved  
13 this, the Commission would say I want bounding events  
14 -- the design basis of a containment.

15           Those events that have a potential for  
16 large source terms and large consequences, and I want  
17 the containment and all the barriers taken credit for,  
18 however, to be able to meet the dose criteria.

19           Now, this particular option is consistent  
20 with the SRM of ten years ago when the Commission  
21 said, for example, for the MHTGCR it wanted to include  
22 in the containment performance assessment a severe  
23 ingress event where you could have natural circulation  
24 of air through the core and severe oxidation of  
25 graphite.

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1           If one looks at the probabilities of that  
2 kind of an event, the analysis would probably show it  
3 doesn't fall strictly within the frequently band for  
4 design basis events, and probably quite a bit far  
5 away.

6           But it is a challenging event for that  
7 particular plant design. And so, this would be one  
8 where, because you are putting in bounding type  
9 events, perhaps a failure of rare frequently, you  
10 would challenge all the mechanistic barriers,  
11 including the third level barrier, to see if you could  
12 meet the dose criteria.

13           If not, you would target that third level  
14 barrier to provide that additional capability, to keep  
15 it within the dose criteria. The third option  
16 basically says it must be adequate to reduce  
17 radionuclide releases for the events in the event  
18 categories but have a capability for low leakage and  
19 controlled release of the delayed accident source term  
20 radionuclides.

21           Some people for HTGR have called this a  
22 hybrid type containment design where you allowed  
23 venting initially but shortly thereafter you would  
24 require that the containment assume a leak tightness  
25 something approaching a traditional containment

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1 design.

2 This would add an independence to that  
3 barrier that doesn't exist in the previous two. It  
4 would require a specific capability regardless of the  
5 performance of the other barriers, and we add kind of  
6 a structuralist element of defense in depth that you  
7 wouldn't necessarily see in the other two.

8 The final option is a traditional leak-  
9 tight pressure retaining containment. And it would  
10 have to be so for both the prompt source term and a  
11 delayed source term.

12 And this would clearly provide a fully  
13 independent capability regardless of the capability of  
14 the other mechanistic barriers. Again, it's  
15 radionuclide release.

16 It is a very conservative structuralist  
17 element. Now, I have not evaluated pros and cons of  
18 each of these. We are finalizing that. There  
19 certainly are advantages and disadvantages to each one  
20 in terms of compatibility with specific designs with  
21 the issue of defense in depth provided by this barrier  
22 with previous Commission policies, like don't be  
23 prescriptive.

24 We the performance based for flexibility  
25 designs we're going to consider all those facets in

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1 evaluating each of those and give you the ups and  
2 downs of each one.

3 But, ultimately, those are four that we're  
4 looking at.

5 MEMBER POWERS: Didn't we already have  
6 essentially number three for BWRs?

7 MR. RUBIN: I don't think so.

8 MEMBER POWERS: Don't we vent PWRs in the  
9 emergency plans -- emergency procedures for BWRs have  
10 statements to the effect of regardless of radiological  
11 consequences?

12 MR. RUBIN: Are you thinking of the Mark-  
13 ls, the hardened vents?

14 MEMBER POWERS: Yes.

15 MR. RUBIN: Yes, they allow some venting,  
16 yes.

17 MEMBER POWERS: There is this nice  
18 statement in the BWR group regardless of radiological  
19 consequences.

20 MR. RUBIN: But, I guess I wouldn't --  
21 they don't start off by venting.

22 MEMBER POWERS: I think they actually can.

23 MR. RUBIN: They probably could.

24 MEMBER POWERS: In the maintenance group.  
25 I mean, I don't think that's the NRC regulations. But

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1 I think the emergency procedures will allow you to  
2 vent early and then seal it up.

3 MR. RUBIN: They only vent, as I  
4 understand it, if they need to. You know, it depends  
5 on the accident sequence that takes place.

6 MEMBER POWERS: You might want to look at  
7 the emergency procedures to be absolutely certain on  
8 that point.

9 MR. RUBIN: Okay. Three, we weren't  
10 thinking the Mark-1 vented containments. We were  
11 thinking more like the HTGRs that maybe have some sort  
12 of large relief when the helium first comes out.

13 But then you could seal that back up for  
14 preventing air ingress, for preventing any future  
15 long-term radionuclide release.

16 CHAIRPERSON GEOFFREY: Okay, let's --

17 MS. DROUIN: Okay. We're going to now  
18 come back to the policy issues that were identified as  
19 potentially new. We did identify three. But they've  
20 been paired down to just one.

21 The first one was on the level of safety.  
22 And, if you go back to SECY 157 -- sorry, the SRM  
23 0047, the Commission did approve the Staff  
24 recommendation on implementation of the Commission's  
25 expectation for enhanced safety and future reactors.

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1 But, the Commission did not give any  
2 direction on how to implement that expectation. And  
3 so, it's the implementation of that expectation which  
4 we have identified as a policy issue.

5 And, what our approach is, basically is to  
6 develop requirements to achieve the level of safety as  
7 defined by the safety goal QHOs, it's that figure two.

8 We talked a little bit about it earlier in  
9 the day -- today's presentation. But we want to write  
10 the requirements to achieve the safety goal. That's  
11 the policy that we're going to go forward to the  
12 Commission.

13 We think this is consistent with the  
14 advanced reactor policy statement. There's two things  
15 in there. The Commission says that they expect the  
16 advanced reactor designs will comply with the safety  
17 goal policy, and that advanced reactors will provide  
18 enhanced margins of safety.

19 So, we feel that, you know, writing the  
20 requirements to the safety goal achieves these. We do  
21 plan --

22 MEMBER APOSTOLAKIS: I guess that raises  
23 a question of what exactly the Commission means by  
24 expectation for enhanced safety. Certainly, if you  
25 meet the QHOs, you are better than some of the LWRs

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1 are out there now.

2 But you're not better than all of them.  
3 Some of them are way below the QHOs. So, when the  
4 Commission says expectation, we expect enhanced  
5 safety, they mean better than all existing LWRs,  
6 better than some of them, or a general notion that,  
7 yes, the new reactors are better.

8 Now, in reality what's going to happen is  
9 I think you're going to see some 10 to the minus  
10 sevens all over the place, because we see that already  
11 in the evolutionary plans.

12 So you can imagine how -- the GEN-4 come  
13 before us, if ever. So, I don't know what the  
14 Commission means. This is sort of general statement.

15 MR. KING: I'm not sure we can say exactly  
16 what the Commission meant either. But I think the  
17 issue is what they said was in the form of a policy  
18 statement, which is not a requirement.

19 And what we're proposing to do is take  
20 that word expectation that's in a policy statement  
21 now, and write requirements that would be required,  
22 not expectations to achieve that level of safety.

23 So, it would go from an expectation to a  
24 requirement.

25 MEMBER APOSTOLAKIS: Oh, okay.

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1 MR. KING: I mean, to me that's the real  
2 policy.

3 MEMBER APOSTOLAKIS: But, you said  
4 something interesting. I don't know what that means  
5 because it's in the Commission's policy statement. So  
6 you've never tried to understand what the Commission  
7 means.

8 MR. KING: Well, I mean, I have my own  
9 interpretation. But, I don't know what was in the  
10 Commission's minds when they wrote it.

11 MEMBER APOSTOLAKIS: If it's a policy  
12 statement?

13 MR. KING: If it's a policy statement, its  
14 --

15 MR. RUBIN: You're asking the wrong guy,  
16 George.

17 MEMBER APOSTOLAKIS: Forgive me.

18 MS. DROUIN: This one has a lot of  
19 questions and controversy. And we do plan to solicit  
20 stakeholder input on this one before we go forward  
21 with a final recommendation.

22 This is our preliminary recommendation.  
23 It's not a final one.

24 MEMBER APOSTOLAKIS: It really bothers me.  
25 What are the criteria? Not what is the criteria, what

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1 are the criteria.

2 CHAIRPERSON GEOFFREY: Change the slide.

3 MS. DROUIN: Thank you. Security was  
4 raised in SECY 157 as a potential policy issue. Since  
5 that time, this issue has been evaluated. And there  
6 is a paper being written.

7 We will participate in it. That's going  
8 to go up to the Commission. And, on this particular  
9 issue, how the Commission responds in direct is what  
10 we intend to follow.

11 So this has now been removed out our SECY  
12 paper on the framework as a policy issue. Selected  
13 implementation was also noted as a potential policy  
14 issue. It was not --

15 MEMBER APOSTOLAKIS: Wait a minute. How  
16 can you have security in a risk informed framework  
17 when the prevailing thinking in higher up is that you  
18 cannot touch the probability of attack?

19 MR. KING: You can have a -- just like  
20 Mary said, we have a fifth principle now under defense  
21 in depth that tries to address the physical protection  
22 issue. So maybe it's a deterministic judgment.

23 MEMBER APOSTOLAKIS: It's a deterministic  
24 judgment.

25 MR. KING: But it's still part of a risk

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1 informed process.

2 MEMBER APOSTOLAKIS: Well, I don't know  
3 about that.

4 MEMBE SIEBER: Maybe that's why they took  
5 it out of the framework.

6 MEMBER APOSTOLAKIS: Sorry?

7 MEMBE SIEBER: Maybe that's why they took  
8 it out of the framework, to put it in another shoebox.

9 MS. DROUIN: There's a lot of issues  
10 associated with this. And, if I start getting into  
11 them, we're going to have to -- it's going to get into  
12 other papers.

13 And we're going to have to close the  
14 meeting because it will get into sensitive areas. So  
15 I deliberately tried to keep this high just to let you  
16 know it's no longer -- it's for us.

17 I'm not saying it's not a policy issue.  
18 I'm saying it's being addressed in a different form.  
19 We are coordinating very closely with them. And what  
20 comes out of that is what we will follow.

21 MEMBER APOSTOLAKIS: All right.

22 MS. DROUIN: On selected implementation,  
23 we have built a framework that's very much integrated  
24 together and allowing licensees to pick and choose we  
25 didn't think was a liable path forward.

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1 But, in doing that, in saying that we were  
2 not trying to preclude the exemption process. And so,  
3 since the exemption process is part of all of this,  
4 this is truly not a policy issue.

5 So, we have no longer considered it one.  
6 And it has been removed. Plan and schedule, where we  
7 are going from here, as I said, we have a preliminary  
8 framework drafted.

9 We call it a working draft. I want to  
10 emphasize all it's trying to do at this point is  
11 indicate the feasibility, that it is feasible to  
12 develop a technology neutral framework.

13 And we feel that we've done enough work to  
14 show that feasibility. And we want to start engaging  
15 stakeholder input. This is a direction coming out the  
16 advanced reaction policy statement there.

17 I'll just try to give you the quote. The  
18 Commission encourages early as possible interaction of  
19 applicants, etcetera. We have had several public  
20 meetings, but they have been at a very high level.

21 We want to now start sharing this working  
22 draft to solicit comments as we move forward in the  
23 next year and a half. We have our SECY paper that it  
24 will be going forward in December.

25 We plan to come back. I believe the date

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1 that's scheduled is December the second.

2 CHAIRPERSON GEOFFREY: But we want to see  
3 an intermediate bullet there for a sub-committee.

4 MEMBER KRESS: Yes, pencil in the sub-  
5 committee in between those two.

6 CHAIRPERSON GEOFFREY: Yes. And we will  
7 have opportunities, I believe, throughout the last  
8 part of November. Meetings are already scheduled. We  
9 can attach an extra day.

10 MR. KING: Right, provided we get the  
11 document by mid-November.

12 CHAIRPERSON GEOFFREY: But, I mean, if we  
13 don't and we don't have a sub-committee, we can't  
14 schedule it for December 2<sup>nd</sup>, because there will be  
15 1,000 questions and discussion of this issue. So we  
16 need to have a sub-committee.

17 MR. KING: So we should work with -- to  
18 set up some times. There will be only 500.

19 CHAIRPERSON GEOFFREY: Maybe. I mean, I  
20 think a time for an issue like this -- is enough.

21 MEMBER KRESS: Or 750.

22 CHAIRPERSON GEOFFREY: I think we should.

23 MEMBER KRESS: Tomorrow we need to -- I  
24 think we have some comments from the members.

25 CHAIRPERSON GEOFFREY: Well, thank you for

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1 your presentation. Do you have any slides or anything  
2 for which --

3 MR. RICCIO: No, no slides. I messed up  
4 my presentation, so I'll email it to you.

5 MEMBER ROSEN: Could we turn up the light?

6 MR. RICCIO: Good morning.

7 CHAIRPERSON GEOFFREY: Good morning.

8 MR. RICCIO: You need this, I suppose?

9 CHAIRPERSON GEOFFREY: Yes.

10 MR. RICCIO: Just to start off, a few of  
11 the things I have written in here were before I  
12 realized that security had actually crept into the  
13 thinking of NRR.

14 MEMBER ROSEN: Please identify yourself.

15 MR. RICCIO: I'm sorry, my name is James  
16 Riccio. I am the new head policy analyst for Green  
17 Peace.

18 MEMBER ROSEN: Could we have the lights  
19 taken off so they are not in his eyes?

20 MR. RICCIO: I did participate in the --  
21 basically I was the only member of the public to do  
22 so, at least of the non-industry public. Three years  
23 ago, 19 suicidal terrorists hijacked four airliners  
24 and flew three of them into the World Trade Center and  
25 the Pentagon.

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1           In the wake of these horrific attacks, the  
2 propagandists in the nuclear industry and in this  
3 Agency repeatedly claimed that nuclear plants were not  
4 at risk, due to the containment domes that surrounded  
5 their reactors.

6           Over the last three years, both the NRC  
7 and the nuclear industry have had to temper their  
8 praise for containments. The NRC has had to back off  
9 their original claims after 9/11 and acknowledge that  
10 96 percent of the reactors in the U.S. were not  
11 designed to withstand an airliner impact.

12           While Sandia Labs was forced to  
13 acknowledge to the New York Times that the nuclear  
14 industry had misused their study to claim that  
15 reactors were invulnerable.

16           When asked whether a study showed that a  
17 plane could not penetrate a dome, the Sandia  
18 spokesperson stated, quote, we have been trying like  
19 heck to shoot down this rumor.

20           That test was designed to measure the  
21 impact force of a jetfighter. But the wall was not  
22 being tested. No structure was being tested. Yet we  
23 continually hear the propaganda being spewed forth.

24           Now, despite the propaganda and the lack  
25 of voracity, and the claims made by the NRC in the

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1 industry, the public still values containment.  
2 Although imperfect, flawed, these containments are our  
3 last line of defense.

4 In fact, we have a petition before the  
5 Agency now to basically sure up the Mark-1 and Mark-2  
6 containments from airliner attack. Your own documents  
7 -- or the NRC's own documents show that they are  
8 extremely vulnerable.

9 But, we are aware of the flaws with  
10 containment. We still think they are valuable. To  
11 listen to the NRC staff's plan to allow new reactor  
12 designs to be constructed without this last line of  
13 defense, I often wonder whether these nuclear  
14 bureaucrats have slept through the last three years.

15 How, in good conscience, can the NRC state  
16 that it is protecting the public health and safety  
17 while paving the way for the licensure of advanced  
18 reactor designs that lack the very containment domes  
19 this agency was lauding after 9/11.

20 According to the NRC staff, the new  
21 framework will address risks from full power  
22 operation, low power operation, risks from shut-down,  
23 and risks from spent fuel.

24 They are going to try and do in 30 months  
25 that which the Agency hasn't done in 30 years. NRC

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1 staff claims that the new framework includes risks  
2 from both internal and external events.

3 And they created a list. You know, they  
4 have earthquakes, fires, floods, high winds, and  
5 tornadoes. What's missing from this list of external  
6 events?

7 What about terrorism? To sit through the  
8 NRC staff's workshop in this framework, you would have  
9 thought that 9/11 never occurred. NRC staff says that  
10 ultimately it will envision the new regulatory  
11 framework will address safeguards and security.

12 However, the initial focus is on  
13 protecting the public health and safety in the  
14 environment. Ultimately? When the hell is  
15 ultimately?

16 It has been three years since the attacks  
17 on 9/11. And I'm glad to see that security is now  
18 creeping into NRR's thinking. But, at the same time,  
19 I now see that I'm going to be excluded from the  
20 conversation.

21 Your reactors -- get to the point where I  
22 really think that the guys who are doing PRA just  
23 don't get it. Your reactors are no longer just  
24 critical infrastructure.

25 They are pre-positioned weapons of mass

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1 destruction that terrorists would use to harm this  
2 country. How can the NRC say that this framework  
3 addresses public and safety while ignoring or  
4 postponing consideration of the terrorist threat?

5 Even prior to the attacks of September  
6 11<sup>th</sup>, the ACRS stated that the lack of containment in  
7 many of these advanced design constituted a major  
8 safety tradeoff.

9 The ACRS at that time did not buy into the  
10 argument that these reactors could abandon  
11 conventional containment. Regardless, the NRC staff  
12 is back here once again asking you to ignore the  
13 safety flaws you have already identified and accept  
14 the licensing framework that would abandon  
15 containment, at least the containment domes as we know  
16 them.

17 Does anyone other than NEI and NRC think  
18 this is a good idea? The ACRS wasn't alone in their  
19 concerns over the new designs. Even the NRC  
20 Commissioners recognize that abandoning containment  
21 structures and the regulatory philosophy of defense in  
22 depth that they represent was a bad idea.

23 Former NRC Commissioner Forest Remick  
24 stated in a presentation at MIT on the possibility of  
25 a future generation, that, without containment or

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1 other mitigating features, I believe that the DOE  
2 sponsored designs will face considerable public  
3 opposition.

4 He went on to voice his concerns that,  
5 quote, efforts to reduce cost may be causing designers  
6 to forget the lessons learned. I'm here today because  
7 I believe that this Committee represents the last line  
8 of defense the public has against the nuclear  
9 bureaucrats in the NRC.

10 I'm asking you, do not allow the Agency to  
11 bow to industry pressure and accept an inadequate  
12 design merely to help promote the illusion of a  
13 nuclear renaissance.

14 Reject this framework that would allow NRC  
15 to abandon defense in depth that these containments  
16 provide. And send the NRC and the Staff a message  
17 that security must be addressed before they certify  
18 and license any new design.

19 Building these reactors without  
20 containment domes was a bad idea before the attacks of  
21 September 11<sup>th</sup>. Nuclear reactors are dangerous enough  
22 when trained professionals are attempting to operate  
23 them without incident, accident, or atomic  
24 catastrophe.

25 Now that the terrorists are targeting U.S.

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1 nuclear power plants, we should not abandon the  
2 defense in depth that conventional containments  
3 provide.

4 I thank the committee for its time and its  
5 consideration of our comments. And I'd be happy to  
6 answer any questions that you might have.

7 MEMBER ROSEN: You did note, did you not,  
8 that the security was mentioned in the presentation.

9 MR. RICCIO: I'm glad it finally crept in.  
10 It wasn't mentioned in the July workshop. I'm glad  
11 that finally someone around here is starting to wake  
12 up three years later.

13 MEMBER ROSEN: We're talking about  
14 advanced reactors here.

15 MR. RICCIO: Yes, I understand that.

16 MEMBER ROSEN: So, what we saw this  
17 morning was that they are considering just the issue  
18 you've raised so cogently. And we will -- at least  
19 that's

20 MR. RICCIO: I'm a little concerned --

21 MEMBER ROSEN: I can't speak for the ACRS,  
22 but I can speak for myself. At least one member will  
23 keep an eye on that.

24 MR. RICCIO: I'm a little concerned at  
25 this point. It seems that the public will again be

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1 excluded from this discussion as well. Mary just  
2 threatened to close the meeting if we got into the  
3 issue.

4 You can sit there with any eye, but you're  
5 going to miss the perspective that I think is going to  
6 be necessary if you ever think you're going to build  
7 a new reactor in this country.

8 MEMBER APOSTOLAKIS: What would you  
9 propose? Would you propose open meetings?

10 MR. RICCIO: I understand the difficulty.  
11 You don't want to out safeguards information.  
12 Meanwhile, any eye is spewing forth to the Brits  
13 about, you know, what is in and is not in the DBT.

14 So, honestly, you know, you are trying to  
15 close the barn door so far after the horse is out that  
16 I don't think your security measures are really doing  
17 anything in terms of the information that's out there.

18 There is a problem. At the same time,  
19 this Agency has been basically -- you know, I know of  
20 three people that have gone for security clearances.

21 Once they get the security clearance, the  
22 NRC jerks them around then about need-to-know. These  
23 are people you've known for 20 or 30 years. These are  
24 people that have brought cases before this agency for  
25 decades.

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1           And yet, we are basically jerking them  
2 around and not giving them the information they need  
3 to legally challenge you in court. Even your formal  
4 engineer, a former Westinghouse engineer of the year  
5 was refused a security clearance because he was going  
6 to represent us, rather than the industry.

7           So, I think you are playing games with  
8 your security clearances, I think you are playing  
9 games with security in general. You're closing the  
10 barn door long after the horse is out.

11           And, honestly, it's not serving the Agency  
12 any good. You know, we're concerned. There's a lot  
13 of things that we have on our hard drives, and, in the  
14 documents that we have, that we don't make public.

15           You know, I didn't mention what we know  
16 the vulnerabilities to be on the BWR Mark-1s and Mark-  
17 2s. And I don't even believe it's in the petition  
18 that's publicly available.

19           But, they are in your documents. And I'd  
20 like just one other aside. You've already acknowledge  
21 in your letters to this Commission -- you know, back  
22 in the 80's, granted, these reactors constituted a  
23 major safety tradeoff.

24           I read the transcripts from the previous  
25 meetings where Dr. Powers spoke about the confinements

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1 at SRP. And, actually, I came across a document by  
2 Mr. Kress that recommended building reactors  
3 underground.

4 You're at a point now where you can't just  
5 sit back and hope your PRAs are working. You have  
6 people that are intent on taking these reactors down  
7 and using them to harm this country.

8 And your thinking hasn't caught up with  
9 that reality.

10 MEMBER POWERS: You mentioned briefly the  
11 underground setting. In your presentation you focused  
12 heavily on containment domes. Have you thought about  
13 the trade-off between underground setting and  
14 containment?

15 MR. RICCIO: I haven't really gotten into  
16 it yet. Quite honestly, I think the construction of  
17 a new reactor in this country is so far down the pike.

18 I'm actually very concerned with you  
19 putting up this framework. Because I think, at this  
20 point, this Commission, if given the opportunity, and  
21 NEI wanted it, they'd probably license the Chicago  
22 Pile.

23 The one bit of solace that I do have is  
24 that, by the time any new reactor comes forward, the  
25 gentlemen that serve in this Commission will no longer

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1 be here.

2 So that's where I'm looking in terms of,  
3 you know, safety and security, is that you'll get  
4 people with a little bit more responsibility on the  
5 Commission.

6 I really think you need to dramatically  
7 alter your thinking. You can't just shove security  
8 aside anymore. And, unfortunately, we're looking at  
9 reactor designs that really haven't changed in almost  
10 -- you know, since the 80's.

11 You had mentioned in one of the  
12 transcripts that perhaps the industry should wake up  
13 and realize that, you know, the only reactors actually  
14 being constructed right now is one that has a double  
15 containment.

16 Meanwhile, this industry is coming in and  
17 asking for reactors that have none. And, actually,  
18 the Dutch Government looked at a reactor that this  
19 body and the NRC already certified, and found that its  
20 lack of a secondary containment was insufficient.

21 And, basically that would make it  
22 unlicenseable in their country. So you can continue  
23 to certify designs that will never be built. I think  
24 it's a waste of FTE and -- you know, both the  
25 industry's and in tax payer money.

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1           But, you can continue to do that. But,  
2 unless you have -- the problem is too that you've  
3 built up a mythology around containment after Three  
4 Mile Island, that now you're being expected to live up  
5 to.

6           And I realize that places the Agency and  
7 the industry at a difficult place. But, if you come  
8 in and say you want to build a reactor, actually,  
9 these are quotes from the industry.

10           Anyone who comes in and orders a new  
11 reactor -- this Dominion, one of the guys that's  
12 actually going to site reactors. If you go in and say  
13 you're going to build a reactor, your stocks turn to  
14 junk.

15           So, let's see, we have -- Dominion has  
16 already said, while they are going through the  
17 process, they have no intention of building or  
18 ordering.

19           The same thing from Entergy. Entergy made  
20 a similar statement. And then Exxon dropped out of  
21 the PBMR. What are we doing here. Now, I haven't  
22 gotten into the underground containments.

23           I'll look at them. I just came across the  
24 paper two days ago, actually. And I was trying to get  
25 my hands on the actual Sandia report that you cited.

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1 MEMBER ROSEN: Yes, there was a Sandia  
2 report and an Oakridge report.

3 CHAIRPERSON GEOFFREY: Thank you for your  
4 comments.

5 MR. RICCIO: Thank you. I hope you guys  
6 will reject this framework and not allow the  
7 Commission to basically make these plants any more  
8 dangerous. Thank you for your time and consideration.

9 CHAIRPERSON GEOFFREY: Thank you again.

10 MEMBER KRESS: Okay. I'll turn it back  
11 over to you, Mr. Chairman.

12 CHAIRPERSON GEOFFREY: Okay. Now we're  
13 late. But let's take a break until quarter of eleven.

14 (Whereupon, at 10:27 a.m. the above-  
15 entitled matter was concluded.)  
16  
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This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on

Reactor Safeguards

516<sup>th</sup> Meeting

Docket Number: n/a

Location: 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.



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Eric Hendrixson  
Official Reporter  
Neal R. Gross & Co., Inc.

# REGULATORY STRUCTURE FOR NEW PLANT LICENSING, PART 1: TECHNOLOGY-NEUTRAL FRAMEWORK



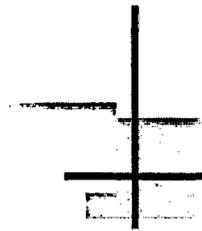
## "POLICY ISSUES"

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PRESENTED TO  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

Presented by  
Mary Drouin, Amarjit Singh, Tom King  
US Nuclear Regulatory Commission  
John Lehner, Trevor Pratt, Vinod Mubayi  
Brookhaven National Laboratory  
Dennis Bley  
Buttonwood Consulting, Inc.

October 8, 2004



# Purpose

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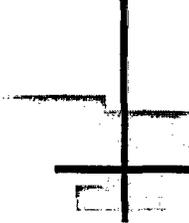
- Information briefing on policy issues
- Secy Paper due to Commission in December, 2004
- Paper will discuss
  - Status of framework
  - Implementation of previously approved issues
  - Recommendations on integrated risk and containment
  - New policy issues
- Brief the full Committee , December 2, 2004 on paper, Requesting a letter



# Background/History

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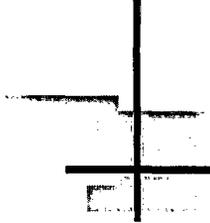
- SECY-03-0047
- SRM on SECY-03-0047
- SECY-04-0103
- SECY-04-0157



# Policy Issues

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- Commission approved staff approach
  - Definition of defense-in-depth
  - Probabilistic approach for licensing basis
  - Licensing source term
  - Offsite emergency preparedness
- Commission requesting additional information
  - Integrated risk
  - Containment performance
- Potential New Issues
  - Level of Safety
  - Security
  - Selective Implementation



# Defense-in-Depth

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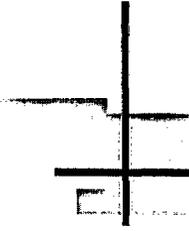
- Commission approved development of a description of Defense-in-Depth (DID) and to be incorporated in PRA policy statement
- Staff approach
  - Develop principles
  - Develop model
  - Implementation



# Probabilistic Approach for Licensing Basis

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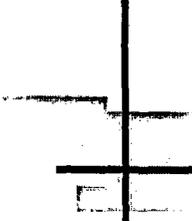
- Commission approved use of probabilistic criteria for identification of elements to be considered in design and safety classification
- Staff Approach
  - Identify/define event sequence categories
  - Two category SSC classification scheme
  - Replace SFC with event sequences from design-specific PRA
- Consistent with Safety Goal Policy
- Need "living" PRA



# Licensing Source Term

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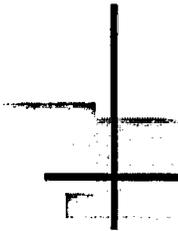
- Commission approved use of scenario-specific source terms
- Staff proposes a flexible, performance-based approach
- Burden on applicant to develop the technical basis



# Offsite Emergency Preparedness

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- Commission approved that no change to emergency preparedness requirements are needed in the near term
- Staff approach requires a baseline emergency preparedness capability



# Integrated Risk

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- Commission asked the staff to provide further details on the options for, and associated impacts of, requiring modular reactor designs account for the integrated risk posed by multiple reactors
- Staff approach, metrics associated with both accident prevention and mitigation need to be considered
- ACRS
  - Recommend QHOs apply to site as a whole
  - Differing views presented on how to treat CDF
  - ACRS view expands scope



## Integrated Risk (Cont'd)

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- Staff evaluation limited to modular reactors
- Non modular reactor not an issue in near term requiring Commission direction
- Staff recommendation
  - Not address risk for non-modular reactors
  - For modular reactors, integrated risk should be considered:
    - Accident prevention independent of reactor barrier level and
    - Accident mitigation that allows for consideration of the affected power level

# Background (Non-LWR Containment Functional Performance Requirements and Criteria)

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The Commission SRM direction on SECY-03-0047:

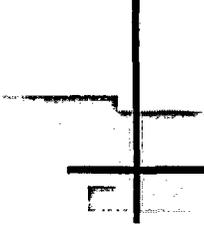
- Develop options for non-LWR containment functional performance *requirements and criteria*,
- Account for such features as core, fuel and cooling system designs
- Interact with industry experts and other stakeholders to develop the options
- Submit options and recommendations for Commission decision



# Policy Development Activities

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- NRC Workshop on Regulatory Structure for New Plant Licensing Framework for a Risk-Informed Regulatory Structure for Advanced Reactors, November 2003
- NRC Workshop on Non-LWR Containment Functional Performance, January 2004
- SECY-04-0103, Status of Response to the June 26, 2003, Staff Requirements Memorandum on Policy Issues Related to Licensing Non-LWR Designs, June 23, 2004
- NRC Workshop on Framework and Non-LWR Containment Functional Performance, July 2004



# “Containment” Functional Roles

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- Protect SSCs important to safety from internal/external events
- Ensure physical support of SSCs important to safety
- Protect onsite workers from radiation
- Provide physical protection for SSCs important to safety
- Remove heat to prevent SSCs important to safety from exceeding design or safety limits
- Reduce radionuclide releases to the environs (including limiting core damage)

# Technology-Neutral "Containment"

- Third Level Radionuclide Barrier (Main Focus)
- Prevention Functions
- Mitigation Functions
- Building (Structural) Elements
- System Elements

Adopt technology-neutral term: TLPMBBS

- Third Level Prevention Mitigation Building System



## TLPMBS Performance *Requirement*

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- *Must reduce radionuclide releases adequately to ensure that the dose criteria are met for the selected events in the event categories.*

# Development of TLPMBBS Performance *Criterion*

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Conform to framework by using:

- Frequency-consequence curve to limit risk
- Probabilistic approach to identify design-basis events; deterministic engineering judgment to bound uncertainties
- Scenario-specific mechanistic source term; deterministic engineering judgment to bound uncertainties
- Best-estimate deterministic analysis for design-basis events and uncertainty analysis, with 95% confidence level for meeting criteria
- Defense-in-depth to address "random" (stochastic) uncertainties and "state-of-knowledge" (e.g., completeness) uncertainties

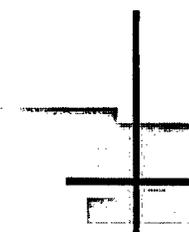
## Development of TLPMBBS Performance *Criterion* (cont.)

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### Use Defense-in-Depth Principles:

- Balance accident prevention with accident mitigation
- Key safety functions (e.g., control fission product release, chemical attack) not dependant on a single element of design, construction or operation
- Account for uncertainties in SSC (e.g., fuel and heat removal systems, pressure boundary) and human performance
- Use two elements of defense-in-depth:
  - Rationalist – for model and parameter uncertainties
  - Structuralist – for completeness uncertainties

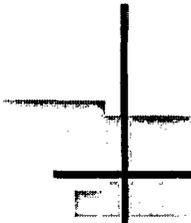
Options demonstrate/provide progressive mitigation capability to reduce radionuclide release to the environment (Defense-in-Depth)



## Alternative Functional Performance *Criterion* (Options)

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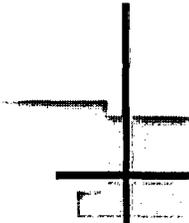
1. Must be adequate to meet the dose criteria.
2. Must be adequate to meet the dose criteria, include in the design-basis category bounding events with potential high consequence source terms.
3. Must be adequate to meet the dose criteria and have the capability for low leakage and controlled release of delayed accident source term.
4. Must be adequate to meet the dose criteria by being essentially leak-tight for both prompt and delayed accident source terms.



# Level of Safety

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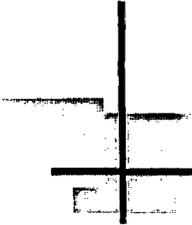
- Commission approved the staff's recommendation on implementation of the Commission's expectation for enhanced safety in future reactors
- What is the criteria for achieving enhanced safety?
- Staff approach: develop requirements to achieve level of safety defined as Safety Goal QHOs
- Consistent with Advanced Reactor Policy Statement
- Plan to solicit stakeholders input



# Security

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- Raised as a potential new policy issue
- Issue being evaluated with recommendation to be proposed for Commission consideration
- Staff intends to implement Commission direction on this issue



# Plan and Schedule

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- Preliminary framework drafted
  - Work to date indicates the feasibility of developing a technology-neutral approach
- Issue working draft to public to engage stakeholder's input early in the process
  - Consistent with Commission direction in Advanced Reactors Policy Statement
    - "the Commission encourages the earliest possible interaction of applicants, vendors, and other government agencies,..."



## Plan and Schedule (Cont'd)

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- SECY paper on framework and policy issues due to Commission in December 2004
- Brief the ACRS, December 2, 2004, staff will request a letter