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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
(ACRS)

494TH MEETING

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WEDNESDAY

JULY 10, 2002

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ROCKVILLE, MARYLAND

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

COMMITTEE MEMBERS PRESENT:

- DR. GEORGE E. APOSTOLAKIS, Chairman
- DR. MARIO V. BONACA, Vice Chairman
- DR. THOMAS S. KRESS, Member-at-Large
- DR. F. PETER FORD, Member
- DR. GRAHAM M. LEITCH, Member
- DR. DANA A. POWERS, Member
- DR. VICTOR H. RANSON, Member
- DR. STEPHEN L. ROSEN, Member

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COMMITTEE MEMBERS PRESENT: (CONT.)

DR. JOHN D. SIEBER, Member

DR. WILLIAM J. SHACK, Member

DR. GRAHAM B. WALLIS, Member

ACRS STAFF PRESENT:

DR. JOHN T. LARKINS, Executive Director

SHER BAHADUR, Associate Director

HOWARD J. LARSON, Special Assistant

SAM DURAISWAMY, Technical Assistant

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AGENDA

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

(8:30 a.m.)

CHAIRMAN APOSTOLAKIS: The meeting will now come to order. This is the first day of the 494th meeting OF THE Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will consider the following:

Pressurized Thermal Shock Reevaluation Project: Risk Acceptance Criteria.

Draft Final Revision 1 to Regulatory Guide 1.174, "An Approach to Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and the Associated Standard Review Plan, Chapter 19.

Discussion of topics for meeting with the NRC Commissioners.

Risk-informed Regulation Implementation Plan; and Proposed ACRS Reports.

The ACRS will meet with the NRC Commissioners from 2:00 until 4:00 p.m. today in the Commissioners' Conference Room, One White Flint, North, to discuss topics of mutual interest.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act; and Dr. John T. Larkins is the

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1 Designated Federal Official for the initial portion of  
2 the meeting.

3 We have received no written comments or  
4 requests for time to make oral statements from members  
5 of the public regarding today's sessions. A  
6 transcript of portions of the meeting is being kept,  
7 and it is requested that the speakers use one of the  
8 microphones, identify themselves and speak with  
9 sufficient clarity and volume so that they can be  
10 readily heard.

11 At the request of Westinghouse, video  
12 teleconferencing arrangements have been made for  
13 Westinghouse to observe the meeting session on the  
14 Pressurized Thermal Shock Reevaluation Project: Risk  
15 Acceptance Criteria.

16 I would also draw the attention of the  
17 members to the items of interest that was handed out  
18 to you earlier. There are four speeches by the  
19 Commissioners, and one interesting item is that on  
20 page 39, the preliminary agenda for the nuclear safety  
21 research conference this coming October is given.

22 And on the second page, you will find the  
23 session on formal decision methods, and nuclear safety  
24 research, that makes the Chair very happy.

25 MEMBER POWERS: And the rest of us know

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1 which session to avoid.

2 CHAIRMAN APOSTOLAKIS: And the rest of you  
3 don't know. The first session this morning, unless  
4 someone has any comments, is the Pressurized Thermal  
5 Shock Re-Evaluation Project, Risk Acceptance Criteria,  
6 and I understand that Mr. Mayfield will open it, and  
7 Dr. Kress will lead the committee through this.

8 MEMBER KRESS: Thank you, Mr. Chairman.  
9 Of course, the reason that I am leading this session  
10 is because of my extensive background in structural  
11 mechanics and fracture toughness.

12 You guys are all aware that the PTS  
13 reevaluation project is going to lead to a  
14 distribution of frequencies through all cracks, which  
15 may or may not be a LERF, but it will lead to a LERF.

16 So the question is what value of that is  
17 acceptable, and that is the subject of today's  
18 meeting, and with that as an introduction, I will just  
19 turn it over to Mike.

20 MR. MAYFIELD: Thank you, Dr. Kress. We  
21 appreciate the opportunity to come back with the  
22 Committee. This is one of several meetings we have  
23 had, where we have had the opportunity to come and  
24 describe to you what we are doing, and the progress we  
25 are making.

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1           This morning, we are wanted to do two  
2 things. To start off with Mark Kirk to give you a  
3 brief overview of the project and where we are on the  
4 status; and then Nathan Siu to get into the heart of  
5 the discussion on the PTS acceptance criteria.

6           We note that there is time reserved for  
7 the discussion of a letter. We had not particularly  
8 anticipated a letter, but if that is where the  
9 committee chooses to go, we would welcome your  
10 feedback as always. With that, Marc.

11           CHAIRMAN APOSTOLAKIS: Have these two  
12 gentleman ever told us who they are? Does the  
13 Committee know who they are?

14           MEMBER KRESS: No, we have never  
15 encountered the people at all.

16           CHAIRMAN APOSTOLAKIS: Nathan and Mark, do  
17 we know? Okay.

18           MEMBER ROSEN: We know when Mark is giving  
19 a presentation by the viewgraph.

20           CHAIRMAN APOSTOLAKIS: But this is  
21 Nathan's presentation.

22           MR. SIU: Well, I copied your format.  
23 Well, I get the lead-in, in terms of the structure of  
24 this presentation. I will be giving the overview and  
25 status, which is the pretty easy part, and then I pass

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1 it over to Nathan, who is going to talk about the PTS  
2 acceptance criteria, and in particular, the  
3 information that went into the SECY later, and then we  
4 will be talking about the next steps for the project,  
5 and the acceptance criteria in particular.

6 The current rule, meaning 10 CFR 50.61, is  
7 focused on defining the allowed degree of reactor  
8 pressure vessel embrittlement to permit safe continued  
9 operation of the vessel.

10 As is pointed out here on the slide, there  
11 is a multi-tiered structure to 10 CFR 50.61. The  
12 licensee starts off by comparing a deterministically  
13 computed RPV embrittlement metric, namely RT PTS,  
14 again a screening criteria which is currently 270  
15 degrees fahrenheit for axial welds or plates, or 300  
16 degrees fahrenheit for circ. welds.

17 So you take the most embrittled material  
18 and compare it to those screening limits. If you are  
19 below that, everything is fine and dandy. If you are  
20 not below that, the first step that is generally taken  
21 is -- and these are words that are stolen from 10 CFR  
22 50.61, is to employ reasonably practical flux  
23 reduction measures which many licensees have in place.

24 Again, to get their embrittlement metric  
25 below the screening criteria. If that doesn't work,

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1 safety analyses are performed according to Reg Guide  
2 1.154 to justify continued operation.

3 In practice, 1.154 submittals have been  
4 few and generally regarded as being unsatisfying,  
5 which is why both the NRC and the nuclear power  
6 industry has had an interest in using our improved  
7 state of knowledge as developed in the 20 or 25 years  
8 since this rule was put in place to update the rule.

9 In terms of our use of risk information,  
10 we are exploring the risk implications of the  
11 screening criteria that was developed as part of the  
12 original technical basis.

13 And just for reference, something that  
14 everybody knows, the current acceptance criteria is a  
15 through wall cracking frequency of 5E minus 6 per  
16 year.

17 The objective of the overall PTS  
18 reevaluation project is to reevaluate the technical  
19 basis for 10 CFR 50.61 in light of what we know now  
20 relative to what we knew in the early 1980s. We are  
21 looking at the lessons that have been learned, and an  
22 application of the rule in Reg Guide 1.154, and as I  
23 have said a number of times, the research results that  
24 have been developed since 1983.

25 MEMBER WALLIS: Remind me what a through

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1 wall crack means.

2 MR. KIRK: A through wall -- and I'm  
3 sorry, this is going to sound really circular, but a  
4 crack to penetrate all the way through the thickness  
5 of the reactor pressure wall.

6 MEMBER WALLIS: And so it is just a crack.  
7 So this means that it drips? What happens when you  
8 get a through wall crack?

9 MR. KIRK: We don't address that.

10 MEMBER WALLIS: You don't address that?

11 MEMBER KRESS: It is a hypothetical crack.  
12 It is calculated to go through.

13 MR. KIRK: That's just --

14 MEMBER WALLIS: Well, I envision this as  
15 a real crack, and it is a little thing which reaches  
16 the outside, but it doesn't grow around the vessel or  
17 anything. It is just a little thing that goes out to  
18 a point?

19 MR. KIRK: Yes.

20 MEMBER WALLIS: And what happens after  
21 that?

22 MR. MAYFIELD: This is Mike Mayfield from  
23 the staff. Dr. Wallis, previous analyses, which go  
24 back to the late '80s, suggested that for an axial  
25 crack, once it penetrates the wall, there will be

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1 sufficient driving force, and the pressure will be  
2 sufficiently high, to cause the crack to extend  
3 axially basically from the nozzle shell course to the  
4 lower head.

5 So you will have a large axial split in  
6 the vessel wall. So that was what those analyses  
7 indicated. For circumventional cracks, it gets to be  
8 significantly more complicated, and the confidence in  
9 the calculations goes down remarkably.

10 But it is not likely that you are going to  
11 get something that just drips a bit of water.

12 MEMBER WALLIS: It is hard to evaluate  
13 something without knowing its consequences.

14 MR. KIRK: I think the sub -- well, two  
15 things. Some of that discussion is going to occur  
16 later, in terms of selecting, and that gets into  
17 Nathan's part of the discussion, selecting an  
18 appropriate risk goal consistent with what we think  
19 happens later, and that gets into picking the number.

20 MEMBER WALLIS: Thank you.

21 MR. KIRK: In terms of what we are doing  
22 here in the project, right now we are evaluating the  
23 frequency of PTS induced RPV failure at four pilot  
24 plants; namely, Oconee -- and I will say these in the  
25 order that we are completing them.

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1           But Oconee, Beaver Valley, Palisades, and  
2 Calvert Cliffs. We are developing quantitative  
3 estimates of the annual reactor vessel failure  
4 frequency, including due consideration of  
5 uncertainties.

6           And in the course of this project, we will  
7 be identifying the key contributors to the failure  
8 frequencies and the uncertainties. Also, one of the  
9 key steps in the program, which is again currently  
10 ongoing, is understanding and developing a rationale  
11 for extending these results on the four plants where  
12 we are doing plant specific analyses to all other  
13 pressurized water reactors.

14           And then we finish up by identifying and  
15 evaluating the potential PTS risk acceptance metrics  
16 and criteria, which is what the topic of today's  
17 discussion is.

18           The first two major bullets are what you  
19 have been briefed on many times before by the  
20 fractured mechanics folks. In terms of project  
21 status, you have seen this slide before, and we have  
22 changed around a few things, and I can go into more  
23 detail on dates if that is of interest to the  
24 committee.

25           Oconee. As you know, we presented results

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1 on Oconee to you back in December, and since that  
2 time, all three of the major technical disciplines  
3 went back, as is fairly common in engineering  
4 calculations, and found both some errors, and found  
5 some things that in the light of day we decided could  
6 be done better.

7 Those analyses have been largely rerun at  
8 this time, and we are assembling the results.

9 Palisades. The licensee is currently  
10 revising the PRA. We have had first cut runs through  
11 thermal hydraulics and PSM. According to our current  
12 schedule, the final PRA and thermal hydraulics should  
13 be available for probabilistic fracture mechanics runs  
14 later in this -- I'm sorry, but I am talking about  
15 Beaver Valley now.

16 The final cut on PRA and thermal  
17 hydraulics should be available later in this month.  
18 Palisades follows those analyses by about another  
19 month, and then Calvert will be completing in the fall  
20 or winter time frame.

21 MEMBER POWERS: My recollection the last  
22 time that you presented here is that you were doing a  
23 variety of sampling type calculations to develop  
24 distributions.

25 MR. KIRK: Yes.

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1           MEMBER POWERS: And a question emerged, is  
2           that when you set various levels in the distribution,  
3           like your 95 percentile, or even your main, or your 5  
4           percentile, a question emerged of what was the level  
5           of uncertainty associated with those limits on the  
6           percentiles. Have you sorted that out?

7           MR. KIRK: That is currently underway, and  
8           I think I might defer this one to Nathan, because we  
9           talked about your question yesterday.

10          MR. SIU: Well, my understanding right now  
11          is that -- I mean, I guess I would phrase it a little  
12          differently, Dr. Powers. We are developing  
13          distributions for many of the parameters in the  
14          models, the key parameters, and through the use of  
15          parameters, we are also addressing some of the model  
16          uncertainties.

17          Those distributions are being developed in  
18          the case of some of the parameters through expert  
19          judgment. So you have subjective distributions, which  
20          are what they are. There is no uncertainty in that,  
21          and you propagate those distributions through the  
22          entire model.

23          Now, in terms of the sampling scheme that  
24          we are using, I believe we were using a latin  
25          hypercube, and there were some questions about whether

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1 there was variance reduction associated with that. So  
2 I believe we were also going to look at more direct  
3 Monte Carlo sampling methods.

4 But frankly, I am not quite sure how far  
5 we are on that.

6 MEMBER POWERS: Well, I mean, for  
7 instance, I see a variety of plots here, and on the  
8 forthcoming viewgraphs that have 95th in mean listed  
9 on them, which I am going to guess are speaking of the  
10 95th percentiles, the mean, and the 5th percentile,  
11 and some result in distribution that you get.

12 MR. SIU: Yes, that's correct.

13 MEMBER POWERS: And these things are  
14 plotted as though they were known with high precision,  
15 when in fact in any kind of finite sampling scheme,  
16 you only know those to within an uncertainty interval.

17 And what I am asking you is do you know  
18 what that is uncertainty interval is?

19 MR. SIU: No, I don't know that. Given --  
20 and as you will see from those plots, which we will  
21 get to some time later in the presentation, the spread  
22 is considerable. And I guess off the top of my head  
23 that the uncertainty associated with the sampling  
24 scheme would be significantly smaller than that  
25 spread.

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1 MEMBER POWERS: Well, I doubt it. I  
2 suspect that it is inherent in your distribution that  
3 your finite sampling scheme gives you 95th percentiles  
4 that have a pretty wide uncertainty band on them.

5 MR. SIU: Well, again, it is in the  
6 mechanics of how you are sampling these things. Roy,  
7 are you here? Roy Woods. Do you know how many  
8 samples we are running in the Monte Carlo trials, in  
9 the Latin hypercube trials?

10 MR. WOODS: Okay. Roy Woods, and I work  
11 with Nathan. The question was?

12 MR. SIU: The uncertainty sampling. Do  
13 you know how many trials we are using in the Latin  
14 hypercube sampling?

15 MR. WOODS: I'm sorry, I don't.

16 MR. SIU: Okay. So the question still is  
17 there then.

18 MEMBER KRESS: Dana, you are looking for  
19 the 95-5 are you?

20 MEMBER POWERS: Well, that could be. I  
21 mean, that would be one possibility. But typically as  
22 you are aware when we did a lot of this work for the  
23 source term, we got distributions, and when we went  
24 with -- well, we had to go to fairly sizeable sample  
25 sizes in the Monte Carlo method to get meaningful

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1       uncertainties.

2                   MEMBER KRESS:   Well, it was like 10,000  
3       samples or so.

4                   MEMBER POWERS:   Well, I typically like to  
5       get over 300 if I can, and sometimes we went to  
6       thousands when it was feasible to do so.  I mean, you  
7       have got a problem.  They have got multiple  
8       calculations they have to hook together here.

9                   And each one of them is not that easy to  
10       do.  And the last time they were here, they were  
11       talking to us about sample sizes on the orders of 80.  
12       And then you do that, it just blows the uncertainty in  
13       your -- and especially your 95th percentile, and it  
14       becomes kind of a -- yeah, you get a number, but it is  
15       not very useful.

16                   MR. SIU:   We will check on that.  My  
17       recollection -- and the whole uncertainty integration  
18       is being done through favor, and we are not talking --  
19       I am surprised that we mentioned sample sizes of 80.  
20       I was under the impression that we were doing many  
21       thousands.

22                   CHAIRMAN APOSTOLAKIS:   But there is a  
23       difference, you know.  I mean, 80 is reasonable when  
24       you are doing Latin hypercubes, and Dana is talking  
25       about thousands when you are doing straight Monte

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1 Carlo, and they are two different things.

2 MR. KIRK: I think we might be dancing  
3 around the question. I am not sure what I can say,  
4 which is true, and I don't know if this helps, is that  
5 I just went ahead in the slides to show you the  
6 examples of the current calculations that we have run  
7 for Oconee.

8 Our convergence criteria is that in favor  
9 -- we track the mean values, and we terminate the  
10 calculation when the mean values stop changing by less  
11 than one percent.

12 So, for example, we don't check for at  
13 that same time currently how much the 95th percentile  
14 is changing or the 99th.

15 MEMBER POWERS: Well, I think I asked you  
16 --

17 MR. KIRK: We don't force convergence into  
18 detail.

19 MEMBER POWERS: I think I asked you to go  
20 through and just do a simple exercise on a square  
21 distribution, zero to one flat distribution, and see  
22 if your one percent criteria on your mean -- and then  
23 compare that to how much your variance was changing on  
24 that simple exercise.

25 And I think you will find that your

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1 variance, which is in some measure your 95th  
2 percentile, and you can use the 95th percentile, is  
3 going to be changing pretty radically there.

4 MR. KIRK: So that we clarify the  
5 question, because --

6 CHAIRMAN APOSTOLAKIS: I don't understand  
7 what you just said. You said that favor looks at the  
8 estimate of the mean value, and stops when you are  
9 within one percent.

10 MR. KIRK: Yes.

11 CHAIRMAN APOSTOLAKIS: So you are not  
12 calculating a 95th and a 5th percentile?

13 MR. KIRK: Well, we are calculating -- and  
14 what underlies --

15 CHAIRMAN APOSTOLAKIS: Well, that is the  
16 criteria for stopping, but you are still calculating  
17 the --

18 MR. SIU: What underlines it, that's  
19 right.

20 CHAIRMAN APOSTOLAKIS: I think that is a  
21 good idea. Would you please give him microphone.

22 MEMBER POWERS: The other thing, George,  
23 is that I would disagree that 80 samples is reasonable  
24 for a hypercube sampling, simply because Latin  
25 hypercube inherently reduces the variance, and then

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1 thus will inherently reduce the 95th percentile.

2 CHAIRMAN APOSTOLAKIS: No, but the whole  
3 point of Latin hypercubes is to have a small sample,  
4 right? And I think they used the 18 in the big  
5 studies, the 1150 and so on.

6 MEMBER POWERS: That's fine if you are  
7 looking for a mean. If you are looking for this 95th  
8 and 5th percentile, then I think you are just asking  
9 for trouble going to a latin hypercube, and I  
10 personally don't believe it saves you anything.

11 MEMBER KRESS: That is an interesting  
12 point, Dana, because I have not seen anywhere where  
13 they plan on using the 95th and the 5th. I think they  
14 plan on using the mean.

15 MR. KIRK: That is -- I think that is a  
16 question that I think Nathan will be addressing later,  
17 is what are these various -- that favors a great  
18 computer code, and like all great computer codes, it  
19 spits out way more numbers than you can use.

20 That is something that we could -- you  
21 know, in terms of the folks who run FAVA, certainly  
22 use feedback on what are these numbers that we are  
23 using, and then of course force convergence to that.

24 But to answer Dr. Apostolakis' question,  
25 we track convergence of the mean value, but we are

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1 carrying along -- the whole distribution comes along  
2 with that.

3 And certainly if -- and, I mean, in any  
4 calculation, you want to track convergence of the  
5 value that you use in the end. So if the message  
6 comes back from this type of discussion that we want  
7 to be looking at the 95th percentile, we can track  
8 convergence on that certainly.

9 CHAIRMAN APOSTOLAKIS: But as far as  
10 myself now, I agree -- I think that the prevailing  
11 view among the risk analysts is what Nathan said; that  
12 the epistemic uncertainties here overwhelm the  
13 numerical uncertainties.

14 Now, if Dana thinks otherwise, I would be  
15 curious to look at a simple example to understand this  
16 better.

17 MEMBER POWERS: Well, the epistemic  
18 uncertainties are built into this. I mean, what  
19 Nathan says is that they build these subjective  
20 distributions, and that's fine. I mean, that is the  
21 only thing you can do, and so what else is there  
22 possible.

23 And then they propagate them through in a  
24 sampling process. Now, what happens is -- and the joy  
25 of a Monte Carlo sampling technique is that indeed you

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1 get the convergence of the mean in a relatively small  
2 number of samples.

3 And the last time they were here, there  
4 was talk on something of the order of 80, and I can't  
5 remember exactly what the number was, that was the  
6 appropriate number to get a pretty decent mean, and  
7 that is not unusual.

8 I think that the criteria that they maybe  
9 advanced, they were 95 percent confident that 95 --  
10 that they had found the 95th percentile, or something  
11 like that, and there was a lot of fun and games seeing  
12 if that was the right number, because it was a little  
13 different than what we had used in the source term  
14 definitions.

15 And what they were doing was fine, but the  
16 problem is that as you add in epistemic uncertainties  
17 in various parameters, that the width of the  
18 uncertainty associated with any quintal of the  
19 distribution -- and not the mean, but any of the  
20 quantities of the distribution, gets wider, and you  
21 have to use a larger number of samples in order to  
22 know those within any precision.

23 And these are indicative of the epistemic  
24 uncertainties.

25 CHAIRMAN APOSTOLAKIS: Right, but if I

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1 already have -- well, if you look at the right figure  
2 there, a difference of at least two orders of  
3 magnitude between the 5th and 95th, how much of a  
4 numerical uncertainty affect that? Would that make it  
5 three orders?

6 MEMBER POWERS: No, no, what it will do is  
7 that 95th percentile that they are looking at up there  
8 could be anywhere between 10 to the minus 8th and 10th  
9 to the minus 4th.

10 CHAIRMAN APOSTOLAKIS: Well, if that is  
11 the case, then obviously they have to address it, but  
12 I would be surprised if that happened.

13 MEMBER POWERS: Oh, I think it is very  
14 easy to happen.

15 CHAIRMAN APOSTOLAKIS: Okay.

16 MEMBER POWERS: As you add in hypothermic  
17 uncertainties -- and especially the 95th percentile.

18 CHAIRMAN APOSTOLAKIS: Four orders of  
19 magnitude?

20 MEMBER POWERS: It is very common to have  
21 very wide uncertainty bands, and especially on the  
22 95th percentiles. I mean, it is just not very unusual  
23 to get very big numbers there when you use small  
24 samples.

25 Now, when you get up into the thousands,

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1 of course that converges right now, and it is no  
2 longer a sampling problem.

3 MR. SIU: We will definitely go back and  
4 look at this. I am under the distinct impression that  
5 we have on the order of thousands of samples from  
6 through FAVA, where we have numbers on the order of 80  
7 or so, is when we talk about thermal hydraulic bins,  
8 and how many RELAP runs we have done.

9 And we have used those to represent the  
10 many thousands of PRA event sequences, and there is  
11 certainty uncertainty in that binning process as we go  
12 along.

13 And the treatment of thermal hydraulic  
14 uncertainties has been done in a discreet probability  
15 distribution manner, which would certainly reduce  
16 variance. But that was done in, if you will, a  
17 deterministic and probablistic probability  
18 calculation, and that you just run that through, and  
19 that is just part of your equation.

20 MEMBER POWERS: I know, but it will become  
21 the limiting equation on things.

22 CHAIRMAN APOSTOLAKIS: The practical  
23 question is that instead of 80, if you used a hundred,  
24 would you see a difference in the results that are  
25 significant, or if you went too high.

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1 MR. SIU: But again, just to be clear, the  
2 numbers that we are talking about, I think we are  
3 talking about the TH bins, and we have been increasing  
4 those to improve the detail of the calculation.

5 CHAIRMAN APOSTOLAKIS: Anyway, I think we  
6 will address that in the future obviously.

7 MEMBER KRESS: I still didn't get an  
8 answer to my question. I think you intend to use the  
9 means, and not the 95 percentile.

10 MR. SIU: So far, yes. But just to go  
11 back to the -- maybe, Mark, if -- well, just to tell  
12 you where we are coming from in this presentation.  
13 This is a status report on where we are in the  
14 acceptance criteria, and we have not decided on  
15 whether it is the mean or the 95th, or the 5th.

16 We have not decided on the particular  
17 criteria, or the particular matrix. So we would like  
18 to present to you where we are in this task. So this  
19 is ongoing.

20 CHAIRMAN APOSTOLAKIS: Do you think all of  
21 this discussion over the last 7-1/2 minutes would  
22 argue for you using the mean? I mean, if a 95th  
23 percentile is so sensitive to numerical calculations,  
24 that is an argument for using the means. That is not  
25 the only one, but it is a good argument. It is a more

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1 robust measurement.

2 MEMBER POWERS: Well, I think the  
3 inception of this program was cast in doing  
4 uncertainties with a certain amount of rigor. So that  
5 now I don't think that the mean captures everything.  
6 That even if you elected to use something like a mean,  
7 you would still have to cast it in terms of what does  
8 the rest of the distribution look like, much like the  
9 plots that they are putting up here.

10 I mean, this is the kind of plot that one  
11 would like to see. The only difference is that one  
12 would like to see something on these percentiles that  
13 reflects how certain you are about what the values  
14 are.

15 And even if you ended up selecting the  
16 mean, you would want to see something that said I know  
17 this value to within an order of magnitude or  
18 something like that.

19 MR. SIU: I understand that, right.

20 CHAIRMAN APOSTOLAKIS: I can't resist. I  
21 have to make a comment. The reason why we have to do  
22 all of this alchemy is because we are not using  
23 decision theory. Let's go on. No comments. Keeping  
24 going.

25 MEMBER POWERS: You can't do that. Yes,

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1 you are the Chairman, but --

2 CHAIRMAN APOSTOLAKIS: Because you are not  
3 using utilities, and now you are stuck. And you say  
4 that it is not a good measure.

5 MEMBER POWERS: You can cloud it in all  
6 the decision theory mumbo-jumble that you want to. If  
7 you don't know the numbers accurately, you still are  
8 uncertain.

9 MR. SIU: Okay. So what we are trying to  
10 --

11 CHAIRMAN APOSTOLAKIS: Do you remember  
12 where you were?

13 MR. SIU: I'm trying. It is getting  
14 harder every day. We would like to present to you  
15 again where we are in terms of this particular task.  
16 So, again, just as a reminder, we are providing a  
17 technical basis for a risk-informed selection of a PTS  
18 screening criteria.

19 This is something, of course, that we are  
20 not actually going to pick criteria in this process.  
21 If there is a rule making process following this, then  
22 the criteria would be selected as part of that, and of  
23 course there is a number of activities that would go  
24 along with that; for public comment, for example.

25 We provided a status report in the SECY-

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1 02-0092, which we provided to the committee, I  
2 believe, a couple of weeks ago. And hopefully you  
3 have had a chance to look at it.

4 Okay. Our assumptions here -- and again  
5 as Mark indicated, this is 50.61, which is focused on  
6 reactor pressure and the degree of embrittlement. And  
7 so what we are really talking about is how to identify  
8 the allowed degree of embrittlement. There already is  
9 on the books, there is a process for complying with  
10 that rule.

11 And what we are trying is to see if there  
12 is a technical basis for changing that rule, and part  
13 of that would include what would be the risk  
14 implications if we do change the degree of  
15 embrittlement.

16 It is important to note, however, that as  
17 we are talking about the allowed degree of  
18 embrittlement that we are not affecting the  
19 conditional probability of core damage given a through  
20 wall crack, and we are not talking about or we are not  
21 affecting the conditional probability of a large  
22 release given a PTS induced core damage event.

23 And again this is all focused on the  
24 embrittlement of the reactor pressure vessel. Those  
25 things, they are what they are, following the crack

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1 and possible subsequent effects. So this is one  
2 reason why the focus is on largely the through wall  
3 crack frequency.

4 MEMBER KRESS: You at one time talked  
5 about the possibility of quantifying those conditional  
6 probabilities. Is that still in the --

7 MR. SIU: Yes, we are still looking at the  
8 issues underlying what happens following the crack,  
9 because that will tell us hopefully where we should be  
10 setting our limits, or inform how we should be setting  
11 our limits. That is another important point; that as  
12 indicated in the second bullet, this is supposed to be  
13 a risk-informed application, and it is not risk-based.

14 So there will be other considerations that  
15 may come into play. And, in fact, if we end up being  
16 confident that the PTS risk is very low, then there  
17 might be other considerations that would come into  
18 play regarding the allowed degree of embrittlement you  
19 would have for a reactor pressure vessel, just from  
20 general engineering considerations.

21 So again that is something that we need to  
22 consider. We are focusing on the reactor vessel  
23 failure frequency as a metric. We are not using the  
24 through wall crack frequency terminology here if only  
25 because there is some question as to how you define

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1 failure of the reactor pressure vessel.

2 And that is one of the things that we  
3 address, and that I will get to a little bit later.  
4 We do want to establish --

5 CHAIRMAN APOSTOLAKIS: The picture that  
6 you showed earlier, you know, that we have seen  
7 several times, ends up with an annual frequency of  
8 through wall crack cracking, right, like before? It  
9 is standard.

10 MR. SIU: That's right.

11 CHAIRMAN APOSTOLAKIS: That's not what you  
12 call reactor vessel failure frequency?

13 MR. SIU: That could be one definition.  
14 Another definition would be the crack initiation,  
15 which would occur before the through wall -- before  
16 the crack propagates through the wall.

17 CHAIRMAN APOSTOLAKIS: But are you  
18 identifying the through wall crack with core damage;  
19 is that what you are saying, or with the vessel  
20 failure?

21 MR. SIU: No, there are two -- what we are  
22 trying to say is that there are two possible  
23 definitions that we are exploring for reactor vessel  
24 failure.

25 CHAIRMAN APOSTOLAKIS: Right, I understand

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1 that.

2 MR. SIU: One is through wall crack.

3 CHAIRMAN APOSTOLAKIS: This.

4 MR. SIU: This. And another one is crack  
5 initiation, which is also computed by FAVA. So we  
6 have those results already, and the question is --

7 CHAIRMAN APOSTOLAKIS: But that would be  
8 very conservative though to say that the initiation of  
9 a crack is equal to the vessel.

10 MR. SIU: Well, that is one of the  
11 questions, of course. The counter-argument is are the  
12 uncertainties in the prediction of crack arrest so  
13 large that you would want to go back to something  
14 simpler.

15 Now, of course, how you pick your allowed  
16 level of reactor vessel failure frequency would also  
17 reflect the fact that crack initiation isn't exactly  
18 the same thing as a through wall crack development.

19 MEMBER WALLIS: While we are on this  
20 figure, it is strange in the light of what we have  
21 been seeing. It looks as if you calculated the  
22 possibility of vessel failure first, and then you  
23 deduce through wall cracking.

24 I thought through wall cracking didn't  
25 always lead to vessel failure. It doesn't seem to

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1 make any sense.

2 MR. SIU: I think we are using or I think  
3 we are mixing terminology in that figure.

4 MEMBER WALLIS: I think you must be.

5 MR. SIU: It is a conditional probability  
6 of the through wall crack.

7 CHAIRMAN APOSTOLAKIS: Yes, and you should  
8 correct that.

9 MR. SIU: Thank you.

10 CHAIRMAN APOSTOLAKIS: Now, you said --  
11 and I guess it is just a question of clarification,  
12 but that you are not dealing with a conditional  
13 probability of core damage.

14 MR. SIU: We are saying that changing the  
15 embrittlement, the allowed degree of embrittlement,  
16 shouldn't have a major effect, if any, on the  
17 conditional probability of core damage given vessel  
18 failure.

19 The margin is there. We don't know what  
20 it is necessarily, but it is still there. It is the  
21 same. And again we are trying to set the vessel  
22 failure frequency, and the allowed level, consistent  
23 with what we have been doing in more recent years.  
24 Mark, the next slide, please.

25 MEMBER WALLIS: Are you going to explain

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1 why the mean is outside the 95 percentile?

2 MR. SIU: Yes. Absolutely.

3 CHAIRMAN APOSTOLAKIS: There is no reason  
4 he can't. It is a pathological --

5 MEMBER WALLIS: Well, it must be a  
6 pathological distribution.

7 MEMBER POWERS: Actually, it is more  
8 common distribution than -- it is more common than the  
9 alternative.

10 MR. SIU: Just for the cases that we care  
11 about, right? Okay. What I want to show here is  
12 first of all on the left-hand side of the graph is a  
13 notional figure of how one might go about setting the  
14 allowed degree of embrittlement.

15 So on the left-hand side, we have plotted  
16 this yearly frequency of reactor vessel failure, or  
17 this is what we have termed RVFF, Reactor Vessel  
18 Failure Frequency, and on the bottom we have indicated  
19 this RT PTS, the reference temperature at the end of  
20 life.

21 We are not using that RT PTS in the strict  
22 way that it is defined in the regulation. This is  
23 just again a notion of embrittlement. And one could  
24 use the mean curve in its relationship between RT PTS  
25 ad RVFF to derive what an appropriate level of

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1 embrittlement would be.

2 And the trick would be therefore to set  
3 what is the allowed RVFF, the allowed reactor vessel  
4 failure frequency; how much of your risk do you want  
5 to allocate if you will to pressurized thermal shock.

6 MEMBER WALLIS: If you used the log mean,  
7 I suppose it would have to lie in the middle, or  
8 somewhere near the middle.

9 MR. SIU: This is the arithmetic mean.  
10 This is computed, and it is weighted, and it is your  
11 --

12 MEMBER WALLIS: It is shown on a large  
13 scale.

14 MR. SIU: It is shown on a large scale,  
15 that's correct. And that is different from what you  
16 saw in the SECY paper, but again it is jut a notional  
17 picture, just to see what you might do.

18 CHAIRMAN APOSTOLAKIS: In the real  
19 calculation though the mean curve will overlap with  
20 the 95th percentile.

21 MR. SIU: Well, in fact it does as you see  
22 on the right-hand side, but we will get there in just  
23 a second. Okay. Well, let's get there right now.  
24 The right-hand curve indicates where we are right now  
25 with the Oconee calculation. Now I will caution you

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1 that that curve doesn't include external events, and  
2 it doesn't include any revisions to LOCA frequencies.

3 So we have recently been going through  
4 this effort to develop interim LOCA frequencies, which  
5 will be followed up by a more sustained effort later  
6 on. We do plan to use the interim LOCA frequencies in  
7 an update of these curves.

8 We also are still looking at external  
9 events in a fairly simply manner. Now, a number of  
10 things to note on the right-hand graph. As was  
11 pointed out the mean curve does exceed the 95th  
12 percentile curve on the left-hand side.

13 That is just a reflection that there is  
14 tremendous uncertainties in these calculations. It is  
15 also a reflection of the fact that the mean curve is  
16 just a mathematical construct. It is indeed a  
17 weighted value of the reactor vessel failure  
18 frequency.

19 MEMBER WALLIS: What d you mean that it is  
20 a mathematical construct?

21 MR. SIU: Well, there is actually a  
22 meaning in my mind to something like a 95th  
23 percentile, where you are saying or you are stating  
24 with 95 percent confidence that the RVFF is lower than  
25 that value.

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1           The mean value is just an integral, and it  
2           has some measure of the -- it incorporates uncertainty  
3           in a way, but there is no way that it should be in the  
4           middle of the distribution, for example. There is no  
5           physical reason.

6           CHAIRMAN APOSTOLAKIS: This actually is  
7           not just an indication of a lack of uncertainty. As  
8           I said earlier, it is an indication of very long tail.

9           MR. SIU: That's right.

10          CHAIRMAN APOSTOLAKIS: And it means now  
11          that the issue of numerical uncertainty becomes much  
12          more important now because changing the tail a little  
13          bit makes the mean jump up and down, you know, and  
14          that is very disturbing actually, because the  
15          distribution is pathological.

16          If you can imagine a log normal, it will  
17          go a long way, and then it drives the mean way up  
18          there, and you change it just a little bit, and it is  
19          just crazy, but that is the way that it is. I mean,  
20          if that is the way it is, then that is the way that it  
21          is. You have to deal with it.

22          MEMBER KRESS: It is the selection of your  
23          distribution parameters that drives it.

24          CHAIRMAN APOSTOLAKIS: Or your state of  
25          knowledge I would say. It is not a matter of

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1 selection.

2 MEMBER KRESS: If you use a log normal,  
3 that almost automatically does that to you.

4 CHAIRMAN APOSTOLAKIS: It depends on the  
5 log normal, but some log normals are better than  
6 others. But if you really have a long tail, you have  
7 this problem, which means now that the whole thing is  
8 up in the air really.

9 MR. SIU: Well, again, one of the messages  
10 also to take away, the first three points on the  
11 right-hand curve represent 32 effective full-power  
12 years, and 60 effective full power years, and a  
13 hundred effective full-power years.

14 So the extrapolation out beyond that is  
15 well beyond, of course, what you would expect with any  
16 operating system. Why are we showing extrapolation?  
17 Just to show the relationship to some of the figures  
18 of merit that we are going to be talking about later  
19 at 10 to the minus 6th and 10 to the minus 5th.

20 So one of the takeaways could be that  
21 despite the very large uncertainties, you are still  
22 quite confident that you are below these levels. Now,  
23 again, Dr. Powers' point about the sampling will make  
24 absolutely sure that we don't have these tremendous  
25 uncertainties, numerical uncertainties, associated

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1 with the 95th percentile.

2 CHAIRMAN APOSTOLAKIS: And it is not when  
3 the mean becomes greater than the 95th that you have  
4 a problem. If it is so close, the problem is there,  
5 even if it is slightly below, and you still have that  
6 instability so to speak.

7 MEMBER POWERS: Well, I guess I just get  
8 very concerned that when you input your thermal  
9 hydraulic results to this, that you have these  
10 uncertainties, and you are bending in the means on  
11 those distributions and not the uncertainties in those  
12 distributions.

13 And then you could run 10,000 FAVA  
14 calculations and say I know this incredibly well, when  
15 in fact you don't, and it is driven by the thermal  
16 hydraulic uncertainties.

17 MR. SIU: Yeah, right, and so part of the  
18 strategy that we are trying to use to deal with these  
19 are certain sensitivity calculations as well, and  
20 looking some of the specific modeling assumptions  
21 built into the TH analyses.

22 But again that seems to be a subject of  
23 another discussion here.

24 MR. KIRK: There is a briefing of ACRS  
25 scheduled in December on thermal hydraulic

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1       uncertainty.

2                   CHAIRMAN APOSTOLAKIS:  Is that an hour or  
3       two?

4                   MEMBER WALLIS:  Only in connection with  
5       PTS?

6                   MR. KIRK:  David?

7                   MEMBER POWERS:  Well, one would hope that  
8       it just in connection with PTS.

9                   MR. KIRK:  I believe so, that it does  
10      focus on the PTS.

11                  MEMBER RANSOM:  When you talk about the  
12      thermal hydraulic uncertainties, is this just pressure  
13      temperature for the vessel?

14                  MEMBER POWERS:  Heat flux.

15                  MR. BISSETT:  The answer is yes.

16                  CHAIRMAN APOSTOLAKIS:  And would you  
17      identify yourself?

18                  MR. BISSETT:  David Bissett, from the  
19      Office of Research.

20                  MEMBER RANSOM:  I also had a question. How  
21      many parameters are there in this analysis that have  
22      epistemic uncertainties?

23                  CHAIRMAN APOSTOLAKIS:  Nathan wrote a nice  
24      white paper some time ago.

25                  MEMBER RANSOM:  Well, what are some

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1 examples?

2 MR. SIU: Yeah, we have looked at  
3 epistemic uncertainties in all three major aspects of  
4 this analysis, and so that is on the PRA. For  
5 example, you are looking at typical equipment failure  
6 rates. You are also looking at human error  
7 probabilities, initiating event frequencies, and  
8 things of that sort.

9 And some of the hydraulics now, there is  
10 a -- in the -- well, I guess in the February briefing,  
11 we had a table showing some of the key parameters. So  
12 you would look at such things as the flow rate through  
13 the break.

14 You looked at the heat transfer  
15 coefficients. You looked at what we would consider  
16 auditory issues, such as the temperature of the  
17 cooling water that you are injecting, which is of  
18 course affected. If it is an outside tank, it is  
19 affected by the season.

20 So off the top of my head, I can't give  
21 you the full set, but it wasn't -- I don't believe it  
22 was hundreds or thousands. It was more like tens of  
23 parameters that were addressed. Dave, do you want to  
24 comment on that?

25 MR. BISSETT: How about the vessel itself.

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1 MR. SIU: Well, yes, on the reactor  
2 pressure vessel, of course. We looked at quite a  
3 number of the parameters, and such things as copper  
4 intent, the flaw distribution. We looked at --

5 MEMBER RANSOM: You have correlations that  
6 give you the cracking properties, I guess, with all of  
7 those variables?

8 MR. KIRK: I think within -- and as Nathan  
9 said, there is parameters, and there are relationships  
10 which are uncertain within each of the major areas.  
11 I mean, since fracture mechanics is my area, the  
12 number there is -- I mean, I never sat down to count  
13 it.

14 But I am sure that it exceeds 10, and I am  
15 also pretty sure that it is below 50. The other areas  
16 are probably similar.

17 CHAIRMAN APOSTOLAKIS: Does it take the  
18 95th percentile?

19 MR. KIRK: No.

20 MEMBER KRESS: Let me get us back, because  
21 all of these are very valid comments on the PTS  
22 overall project, but it has very little to do with  
23 acceptance criteria. And I would like to get us back  
24 to the acceptance criteria.

25 MR. SIU: Thank you.

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1                   MEMBER WALLIS: But I think how uncertain  
2 you are must have some influence on your thinking  
3 about it.

4                   MEMBER KRESS: Well, it will have some  
5 effect on your thinking, but you can produce  
6 acceptance criteria completely in the absence of that.  
7 So --

8                   MEMBER WALLIS: When you get a weird  
9 distribution, or a distribution of this type, not  
10 necessarily weird, but whether a mean can be way  
11 outside the 95th percentile, then you get this problem  
12 that George is alluding to, and therefore you are more  
13 conservative.

14                   You know that the tail can wag the dog,  
15 and you have got to be more careful maybe. So it is  
16 relevant to the acceptance criteria.

17                   MEMBER KRESS: It has some relevance, but  
18 you can get this point over here on the left without  
19 thinking about uncertainty, but --

20                   MEMBER WALLIS: But the left is not  
21 realistic.

22                   MR. KIRK: And another thing to perhaps  
23 just bring up again, because it is something that I  
24 frequently forget, is once again we have mis-labeled  
25 this slide. This is not a PTS acceptance criteria.

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1 It is a screening criteria.

2 So if any reactor crosses the line so to  
3 speak, wherever the line in the sand is drawn, that is  
4 not the end of the day. There are things that are  
5 then done after that which are the warning light.

6 MEMBER SHACK: You know, you are going to  
7 have to have an acceptance criteria for 11.54, and  
8 then a screening limit from that.

9 MR. KIRK: Yes.

10 MEMBER SHACK: But first we set an  
11 acceptance criteria.

12 MEMBER KRESS: That's right.

13 CHAIRMAN APOSTOLAKIS: So now I am  
14 confused. Is it acceptance or screening?

15 MEMBER KRESS: Well, they are tied  
16 together.

17 MEMBER POWERS: It is acceptance, I think.

18 CHAIRMAN APOSTOLAKIS: Acceptance in the  
19 sense that it is good enough, and if you exceed it,  
20 then it is not good.

21 MR. KIRK: I agree with Dr. Shack. That's  
22 right. We were not entirely clear on this. There are  
23 two parts to the use of this risk metric. One is in  
24 establishing the screening criteria for the level of  
25 embrittlement.

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1           And the second one has to do with if as  
2           Mark indicated there is their tiered approach in  
3           50.61, and at some point you do a calculation and  
4           compare your results against --

5           CHAIRMAN APOSTOLAKIS: So the RPTS star  
6           there on the left is a screening, or --

7           MR. KIRK: Yes, that would be a screening.  
8           That's right.

9           CHAIRMAN APOSTOLAKIS: Maybe we can move  
10          on to the next slide.

11          MR. SIU: Again, just the principles in  
12          developing options for the acceptance criteria.  
13          Clearly as you read in SECY 82.465, there was an  
14          intent in the original rule to keep the level of PTS  
15          events small, and they were comparing against the then  
16          draft safety goals, and there was also a desire to  
17          keep the relative contribution of PTS events small,  
18          say 10 percent I think was the number that they put  
19          out in that SECY paper.

20          So we would still have the intent to  
21          maintaining those principles.

22          MEMBER KRESS: Those are fairly arbitrary  
23          choices.

24          MR. SIU: Yes, but also within the --

25          MEMBER KRESS: And that is within the

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1 nature of the acceptance criteria as a result.

2 MR. SIU: That's right. And that is where  
3 the discussion of uncertainties comes in.

4 MEMBER KRESS: Because they represent  
5 values.

6 MR. SIU: Yes.

7 MEMBER KRESS: These are your values.

8 MR. SIU: That's right. That's right.  
9 And of course the other principle is to be consistent  
10 with the more recent risk-informed initiatives, and  
11 that is one of the spurs for this particular task.

12 I mean, we could have just stuck with the  
13 original value, but the question had been raised that  
14 given the activities, including the development of  
15 1174, should we reconsider that particular value of 5  
16 times 10 to the minus 6 per reactor year.

17 MEMBER KRESS: What that does is give you  
18 a shift in values. There is a different set of values  
19 that establish that.

20 MR. SIU: That's correct.

21 MEMBER KRESS: And how you are just saying  
22 that maybe we will see how that set of values works  
23 out, in terms of acceptance criteria.

24 MR. SIU: That's right. So in this slide  
25 here, in fact that is all that we are doing. We are

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1 saying that there are two issues that identify and  
2 lead to possible options.

3 One is how do we define reactor vessel  
4 failure frequency, and that comes -- the two options  
5 have to do with whether we are talking about a through  
6 wall crack, and that at the top bullet the sub-bullet  
7 is circular. But that is the PTS induced crack  
8 through the reactor pressure vessel.

9 So that is the through wall crack  
10 frequency that we are using now. The second option  
11 would be to look at crack initiation.

12 MEMBER WALLIS: One of these is vessel  
13 failure then?

14 MR. SIU: Well --

15 MEMBER WALLIS: One is through wall, and  
16 one is initiation of a crack.

17 MR. SIU: That's right.

18 MEMBER WALLIS: And it doesn't say  
19 anything about failure.

20 MR. SIU: Well, this is how the failure  
21 would be defined.

22 MEMBER WALLIS: I think I would like to  
23 know the connection between this and failure. If  
24 failure is extraordinarily unlikely as a result of  
25 crack initiation, then that is very important to me.

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1 MR. SIU: One thing to point out here is  
2 that right now we are the only country that I am aware  
3 of  
4 -- and Mike can correct me -- that uses through wall  
5 crack generation as the definition of failure. Other  
6 countries use initiation, crack initiation.

7 CHAIRMAN APOSTOLAKIS: And, Graham, if it  
8 were extraordinarily unlikely, I don't think those  
9 guys would even consider identifying failure with  
10 crack initiation.

11 MEMBER WALLIS: But we need to know how  
12 likely it is though. We don't want to waffle about  
13 it.

14 CHAIRMAN APOSTOLAKIS: So it must be less  
15 than the --

16 MEMBER WALLIS: We need to know the  
17 connection, right in some numerical way?

18 MR. SIU: And indeed we have the  
19 predictions that show difference between crack  
20 initiation and through wall crack development.

21 MEMBER KRESS: And that is what FAVA gives  
22 you. It gives you both of those numbers, and you can  
23 sit there and look at them.

24 MEMBER WALLIS: I can think of through  
25 wall crack as essentially vessel failure. I think of

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1       them as synonymous.

2                   MR. SIU:    Yes, and as Mike indicated  
3       earlier, it was based on earlier analyses and  
4       experiments at the heavy steel section technology  
5       research program in Oak Ridge, where they were looking  
6       at a number of -- I guess you would call them  
7       prototypical vessels, and they observed how those  
8       vessels reacted under both high thermal shock  
9       conditions, and pressurized thermal shock conditions.

10                   And there were some cases where they  
11       indeed had catastrophic failure of the vessel. Now,  
12       there are some questions about the representiveness of  
13       those tests with respect to reactor pressure vessels,  
14       and that is something that we have got some work  
15       ongoing to deal with.

16                   MEMBER ROSEN: Catastrophic failure of the  
17       vessel means at least complete depressurization?

18                   MR. SIU:    Yes. These were very big --

19                   MR. MAYFIELD: This is Mike Mayfield from  
20       the staff. Some of those tests literally fragmented  
21       the vessel. You had chunks left.

22                   MEMBER WALLIS: And are you going to  
23       explain to us what crack initiation means? There are  
24       always flaws, and when is a flaw a crack? Is that  
25       something that is understood or is it arbitrary?

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1 MR. KIRK: In this analysis, we start with  
2 the preexisting fabrication flaws that have been  
3 identified by our work at P&L, and we got the flaw  
4 distributions from them. So those are things like  
5 lack of penetration.

6 Well, not so much lack of penetration, but  
7 predominantly lack of fusion, either in the sidewall  
8 fusion or the brief fusion, is what really drives  
9 these distributions. So you have those flaws that are  
10 on the order of millimeter or submillimeter, all the  
11 way up to perhaps half-an-inch to mixed units.

12 And crack initiation is when that crack  
13 extends due to the applied loads.

14 MEMBER WALLIS: When it is crack growth  
15 initiation you mean really isn't it?

16 MR. KIRK: I'm sorry?

17 MEMBER WALLIS: Initiation of crack  
18 growth. It is not the crack itself. There are always  
19 little cracks you could say, but it is the growth of  
20 the crack that you worry about.

21 MR. KIRK: Yes. The crack grows from that  
22 size, yes.

23 MR. MAYFIELD: Let's try and be precise.

24 MEMBER WALLIS: Yes, please.

25 MR. MAYFIELD: This is the initiation, the

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1 onset of unstable crack extension.

2 MEMBER WALLIS: That's right.

3 MR. MAYFIELD: It is not subcritical crack  
4 growth like we talk about for environmentally assisted  
5 cracks.

6 MEMBER WALLIS: You want to be clear,  
7 because you need to tell the public that there are  
8 flaws and so on, and this is very different from the  
9 growth of cracks, and you have got to make that clear  
10 to them.

11 MR. SIU: Okay. So again I think we need  
12 to investigate -- and in fact that is the issue that  
13 Dr. Wallace has raised. What is the difference  
14 between this crack initiation and through wall crack  
15 development.

16 What is the numerical difference, and what  
17 are the uncertainties in the prediction of that  
18 difference, and that would help us determine what is  
19 an appropriate level, or what is the definition of  
20 reactor vessel failure that we would recommend as part  
21 of our technical basis document.

22 The three options that we have in terms of  
23 acceptance limits, and here is where I will retract a  
24 little bit from what my response earlier to Dr. Kress  
25 was about whether we are using mean values.

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1           Clearly, if we benchmark to 10 to the  
2 minus 5th, and 10 to the minus 6th, which are the  
3 numbers that you would see in REG Guide 1174 and in  
4 some of the Option 3 framework now, those are mean  
5 values.

6           Again, I don't think that we would have to  
7 be locked into mean values, but it would be consistent  
8 with what we are doing in other areas.

9           MEMBER WALLIS: Could you help me again?  
10 Is reactor vessel failure really synonymous with LERF,  
11 or is it synonymous with PDF, or is it somewhere in  
12 between?

13           MR. SIU: The problem is or the belief is  
14 that it is somewhere in between, and we don't know how  
15 much. So really the question is given our state of  
16 knowledge about what happens after through wall crack  
17 development, are we sufficiently uncertain that we  
18 should equate it to a large early release?

19           MEMBER WALLIS: I tend to equate it to  
20 LERF, just sitting here, but not knowing very much.

21           MR. SIU: And that could very well be  
22 where we end up. Without -- I will get to some of the  
23 next steps, and we will try to dig into it just a  
24 little bit. But we are trying to maintain the  
25 December 2002 completion schedule that has been

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1 mentioned, I'm sure, to the Committee, before.

2 So that will necessarily put a limit on  
3 what we are able to do.

4 MEMBER POWERS: Well, help me a little  
5 bit, Nathan. Suppose we pick one of these numbers,  
6 like 1-times-10 to the minus 5th, and we assumed that  
7 every reactor in the country was the same as Oconee.

8 What would be the probability that over  
9 the course of a 60 year lifetime that we would have in  
10 the country a reactor vessel failure?

11 MR. SIU: My problem with that is that I  
12 have trouble doing numerical immigration in my head,  
13 and what you have got is a time dependent failure  
14 probability as you would see from the graph there.

15 MEMBER POWERS: I don't really want an  
16 answer from you, but isn't that the kind of thinking  
17 that you would have to go through to decide among  
18 these things?

19 MR. SIU: Yes.

20 MEMBER POWERS: And have you gone through  
21 that exercise at all?

22 MR. SIU: Not yet, because one of the  
23 steps that we have to do is address the question does  
24 every vessel look like Oconee, and they clearly don't.

25 MEMBER POWERS: Yes, and you probably

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1 wouldn't do that. You would probably say, okay, every  
2 vessel looks like as the vessels are, and do the  
3 integration in your head. And that is when you need  
4 that distribution that we discussed one slide and a  
5 half-an-hour ago.

6 MEMBER KRESS: Well, actually the safety  
7 goal, the practicality safety goal, to some extent was  
8 derived with that kind of thinking. And it doesn't  
9 tell you what the status is with respect to that goal.  
10 It just tells you what the goal is.

11 MEMBER POWERS: And that is all that we  
12 are looking for right here.

13 MEMBER KRESS: Yes. Well, you can set the  
14 goal and say this is what is acceptable to us, and it  
15 may very well turn out that all of the plants are way  
16 below the goal, and that's all right. I don't think  
17 that should influence the setting of the goal.

18 MEMBER POWERS: I think you can't take  
19 such a detached view here, because you are going to  
20 come in and you are going to say, well, I have got to  
21 pick one of these numbers.

22 MEMBER KRESS: Oh, yes, you have to pick  
23 some number.

24 MEMBER POWERS: Or some other number. But  
25 I pick a number and I would like to relate it somehow

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1 to the frequency of things happening. I have already  
2 judged that I would really, really, really not like to  
3 have my vessels fail.

4 MEMBER KRESS: Yes, and my relationship  
5 there would be that I would pick the safety goals. I  
6 mean, that is how I would end that.

7 MEMBER POWERS: The trouble is how do you  
8 do that. Then you have got to factor in containment  
9 performance here

10 MEMBER KRESS: Well, you would either do  
11 that, or you would make the big jump that Graham makes  
12 and say, well, it is a LERF. And then I have got a  
13 LERF surrogate for the safety goal, but I wouldn't  
14 want just one set of sequences to equal my whole LERF.  
15 So I would have to back off on that to some extent.  
16 But that would be the way that I would approach it.

17 MEMBER POWERS: I think you are asking  
18 them to compound the problem too much. Why don't we  
19 just say that I really, really don't want vessels to  
20 fail.

21 MEMBER KRESS: Well, that is what the  
22 safety goal is. We really, really don't want to have  
23 a LERF, and that is what I am saying, is that it is  
24 already built into that.

25 MEMBER POWERS: So how you have to look

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1 and say if I pick this number -- let's say I pick 1-  
2 times-10 to the minus 5th.

3 MEMBER KRESS: Then I would say -- well,  
4 that is for the whole LERF. And I really don't want  
5 a pressurized thermal shock to be very much a  
6 contribution to that. And here you are getting into  
7 values.

8 MEMBER WALLIS: But that is a 10 percent  
9 of the load.

10 MEMBER KRESS: Well, they said 10 percent,  
11 but I don't know if that is the right number or not.

12 MEMBER POWERS: Well, I suppose you have  
13 to go back and let's suppose I took 1 times 10 to the  
14 minus 5th. What is the probability that I am going to  
15 have in the course of a lifetime an event somewhere in  
16 the country?

17 MEMBER KRESS: I think that would be a  
18 nice number to come up with. But you have to multiply  
19 by the number of plants, and you have to have a value  
20 for each of the plants.

21 MEMBER POWERS: Somewhere in this you come  
22 back to those distributions that they were talking  
23 about earlier, and you know that you are going to be  
24 around one of the tails of the distribution, and that  
25 is where we get into the problem of how well do you

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1 know the tail.

2 MR. MAYFIELD: This is Mike Mayfield. I  
3 think that there is something that Nathan had  
4 mentioned earlier. At some point, and if you actually  
5 started seeing vessel failure probabilities computered  
6 this way and starting to climb up to these kinds of  
7 numbers, the level of embrittlement has climbed so  
8 high that basically you would be operating a reactor  
9 pressure vessel well below its nil-ductility  
10 transition temperature, and that's just a bad  
11 engineering idea. We go to some lengths as we design  
12 and build things and not have that situation.

13 So there could easily become other  
14 criteria that would begin to govern the level of  
15 embrittlements that we would think is a good idea.

16 MEMBER POWERS: If you ran production  
17 reactors for 10 years --

18 MR. MAYFIELD: Sir?

19 MEMBER POWERS: We've run production  
20 reactors for 10 years when they were embrittled.

21 MR. MAYFIELD: Well, embrittled, operating  
22 below the nil-ductivity temperature.

23 MEMBER POWERS: Yes. They were cool. It  
24 was a bad idea.

25 MR. MAYFIELD: It is a fundamentally bad

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1 idea, and that was the point that Nathan had made  
2 earlier. That there could easily become other  
3 criteria that we would start looking at in a risk-  
4 informed approach to that.

5 MR. SIU: Okay.

6 MEMBER KRESS: Those three values that you  
7 have up there, could we go back to them?

8 MR. SIU: Yes.

9 MEMBER KRESS: The first ones are the ones  
10 that you already have.

11 MR. SIU: That's right.

12 MEMBER KRESS: The 1.154, and the second  
13 one is just the overall acceptable LERF value in REG  
14 Guide 1.154.

15 MR. SHACK: That is a tenth of a CDF.

16 MEMBER KRESS: That is a tenth of a CDF?

17 MEMBER SHACK: If you say take a tenth of  
18 that, yes.

19 MR. SIU: If you could convince yourself -

20 -

21 MEMBER KRESS: That one really bugs me.

22 MR. SIU: If you could convince yourself  
23 that there was -- that you basically had the same  
24 margin between a PTS induced core damage event and  
25 your, quote, average core damage event, then you could

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1 peg it to the core damage frequency.

2 MEMBER KRESS: I understand. And the  
3 other one is a tenth of the LERF.

4 MR. SIU: Right.

5 MEMBER KRESS: So you could have both of  
6 those as criteria actually because one of them is a  
7 CDF and one of them is a LERF.

8 CHAIRMAN APOSTOLAKIS: What do you mean  
9 both?

10 MEMBER POWERS: Well, they just lead you  
11 to a different conclusion.

12 MEMBER POWERS: Yes, but I think you are  
13 still compounding it in. You had better be able to  
14 tell me what happened after the vessel failure.

15 MEMBER KRESS: Well, if it tells me that  
16 if I am using this one-tenth rule of thumb that it is  
17 a LERF that is driving it, and not CDF, and then you  
18 just forget about the one in the middle and say I am  
19 really worried about LERF, and use the 1-times-10 to  
20 the minus 6th.

21 CHAIRMAN APOSTOLAKIS: But that is a  
22 matter of  
23 -- I am missing something. I mean, this is a matter  
24 of choice.

25 MEMBER KRESS: Oh, yes.

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1 CHAIRMAN APOSTOLAKIS: So nothing is  
2 driving it. I mean, except for your values.

3 MEMBER KRESS: Those criterias are always  
4 a matter of choice.

5 MEMBER WALLIS: I think it is very clear.  
6 You started assuming it is a LERF and then you say  
7 show me it is not a LERF, or otherwise it is a LERF.

8 MEMBER KRESS: You may have to get out and  
9 have a conditional LERF.

10 MEMBER POWERS: Before I jumped in and  
11 started pursuing that action, somebody would have to  
12 tell me what happens after a failure.

13 MEMBER WALLIS: Well, that's what I mean,  
14 because I don't know.

15 MEMBER POWERS: Because I have a feeling  
16 that the source term consequences of a prompt  
17 containment and failure associated would be radically  
18 different than anything that we have ever looked at  
19 before.

20 MEMBER KRESS: That's right, and that's  
21 why you worry about making one-tenth of the REG Guide  
22 1.154 or 1.174 value, because that was based on a  
23 particular source term, and I agree with you on that.

24 MEMBER WALLIS: You mean it is worse than  
25 a LERF?

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1 MEMBER POWERS: Yes, it would be a very  
2 different kind of source term. I would think there  
3 would be nothing in the calculational base that led to  
4 LERFs and CDFs that was comparable at all.

5 MEMBER KRESS: I agree with you on that.

6 MEMBER POWERS: I mean, this would be more  
7 like the LERF 1400 -- I mean, it could be. You would  
8 have to tell me more about what happens following the  
9 rupture, but it could be very much like the LERF 1400  
10 steam explosion, first term, because you get a prompt  
11 failure error, and --

12 CHAIRMAN APOSTOLAKIS: Let me understand  
13 that Dana, though. If he tells you that he is very  
14 conservative, and that he is taking one-tenth of a  
15 LERF goal, even though it was not under the same  
16 oxidation conditions, and 10 to the minus 6, and he  
17 says that is or he identifies that as a crack  
18 initiation as the second thing, and so he is really  
19 conservative, do you expect that because you would  
20 have a different source term that the ultimate goal  
21 will be very different? Really? Even though he has  
22 been so conservative?

23 MEMBER POWERS: Well, with an S-1 source  
24 term, you would probably multiple consequences by a  
25 factor of a hundred pretty easily.

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1           MEMBER KRESS: And once again, we don't  
2 like the idea of building your uncertainties in like  
3 this. Why don't you go to the front end and then find  
4 out exactly how your condition compares with some  
5 acceptance value, and then build your conservatism in  
6 there.

7           CHAIRMAN APOSTOLAKIS: So what you are  
8 saying is that the choice should not be among these  
9 three values that Nathan is showing you.

10          MEMBER KRESS: That's right.

11          CHAIRMAN APOSTOLAKIS: Because there is an  
12 important element missing to take you all the way to  
13 the quantitative help objective.

14          MEMBER KRESS: That's exactly right. And  
15 the idea is probably that -- well, the only right  
16 acceptance criteria you really have is the safety  
17 goals, and they are not really risk acceptance  
18 criteria. They are just safety goals.

19                 But since we don't have any, I would say,  
20 well, let's start with the practicality. Well, you  
21 have to do a level three calculation to get it. The  
22 value in 1.174 was appropriate for what it is used in  
23 1.174 for, but probably not appropriate for this.

24          MEMBER WALLIS: I think you have to worry  
25 about land contamination, too, if you are talking

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1 about the kind of release that you are taking about.

2 CHAIRMAN APOSTOLAKIS: Well, I think you  
3 have to talk to these guys to revise it. I can agree  
4 with what Tom is saying, but to go beyond that --

5 MEMBER POWERS: I wouldn't overreact until  
6 there is a part of the calculation that is missing,  
7 the calculation sequence that is missing, and that I  
8 really don't have too much intuition on.

9 And that is, okay, the vessel failed and  
10 now what? I can find in the literature things like  
11 Rich Denning's calculation that says, well, the vessel  
12 jumps a little bit. I can find in the literature  
13 things like the German's calculation that says, well,  
14 the vessel goes through the roof and it is a lower  
15 orbit.

16 Okay. Well, then I have a very wide range  
17 of uncertainty about what happens following vessel  
18 failure here. And until I have a better understanding  
19 of that, I don't have know how to do what Tom is  
20 asking for.

21 MEMBER KRESS: You are exactly right.

22 MEMBER POWERS: All I know is that he is  
23 absolutely right. I cannot take the LERF value as it  
24 was derived from the safety goals, and I think in that  
25 case it actually was derived from the safety goals.

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1 CDF wasn't.

2 MEMBER KRESS: It definitely wasn't.

3 MEMBER POWERS: And to start using that as  
4 some criteria.

5 MEMBER WALLIS: Well, if you know nothing,  
6 what are you supposed to do? Are you supposed to  
7 assume the worst or is the worst reasonable, or what?

8 MEMBER KRESS: Well, I will tell you what  
9 you can do. The 1.174 value is the specific white  
10 water reactor source term that is used in every site  
11 that we have, and it calculated the practicality of  
12 the safety goal, and plotted it versus LERF, and used  
13 the mean value, okay?

14 Now, that is probably a pretty good  
15 approach for what 1.174 is being used for. Now, when  
16 you are crafting a regulation like this, I would have  
17 used a different source term, and repeat the process,  
18 and instead of using a mean value, you use some  
19 bounding value.

20 And that gives me a new LERF that  
21 represents the practicality safety goal in a  
22 conservative way, and at a high level of confidence.  
23 And then use that value, some fraction of it, and  
24 maybe the one-tenth is a pretty good rule of thumb,  
25 and back down. I think it is going to give you a

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1 number that is a low lower than any of those three.

2 MEMBER WALLIS: That sounds very  
3 reasonable, and then you would have to know the source  
4 term.

5 MEMBER KRESS: Yes. You have to know  
6 something about the source term.

7 MEMBER POWERS: There is nothing that  
8 would like me more than to work out that source term  
9 for them and what not. But I think there is another  
10 way to go about it, Tom. And that is to say again I  
11 really, really don't want vessels to fail, and say  
12 what is the frequency of failure within the fleet  
13 given my acceptance criteria.

14 MEMBER KRESS: Well, I'm afraid that gives  
15 you a value that may be too high, Dana, because I  
16 think that these probabilities are going to be pretty  
17 low.

18 MEMBER POWERS: Well, I mean, fracture  
19 mechanics gives you this 10 to the minus 45th. I  
20 mean, it is a number that is built into FAVA, I'm  
21 pretty sure. But the uncertainties help you here a  
22 lot.

23 CHAIRMAN APOSTOLAKIS: Can't you tie it to  
24 the core damage frequency though?

25 MEMBER KRESS: Well, my point that if you

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1 use 10 to the minus 4, those last two bullets, sub-  
2 bullets, tells you that the LERF is the driving  
3 factor, because it is more restrictive than the  
4 CDF.

5 CHAIRMAN APOSTOLAKIS: That is always the  
6 case.

7 MEMBER KRESS: So let's be more  
8 constrictive.

9 CHAIRMAN APOSTOLAKIS: Well, wait a  
10 minute. I think the same study that we had the fellow  
11 work backwards from the goal under your deduction to  
12 LERF and CDF. And one of the conclusions that he  
13 reached was that the CDF value of 10 to the minus 4 is  
14 more restrictive than would be justified working  
15 backwards from the quantitative temperature.

16 MEMBER KRESS: But because there was a  
17 conditional containment failure, the probability now  
18 would be very different. It is one. According to  
19 Dana, it may be one, and you can't use that judgment.

20 CHAIRMAN APOSTOLAKIS: Well, if it is one,  
21 then maybe the 10 to the minus 4 goal for core damage  
22 frequency then is realistic, because it was already  
23 restrictive.

24 MEMBER KRESS: But that gives you 1-times-  
25 10 to the minus 5.

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1 CHAIRMAN APOSTOLAKIS: What I am trying to  
2 avoid here is that they are doing a good job up until  
3 this point, and we are asking them to really go all  
4 the way to the QHOs, and I am trying to find a way  
5 that maybe would be reasonable, and stop earlier than  
6 that.

7 MEMBER KRESS: Well, in my view, CDF does  
8 not do it for you.

9 CHAIRMAN APOSTOLAKIS: Does not do it?

10 MEMBER KRESS: No. And yo have no choice  
11 but to go I think to full --

12 CHAIRMAN APOSTOLAKIS: Mr. Cunningham  
13 wants to say something.

14 MR. CUNNINGHAM: This is Mark Cunningham  
15 from the staff. The discussion that you are having is  
16 similar to the discussions that we have had internally  
17 about this issue; that at some probability of  
18 containment failure the LERF becomes dominant.

19 It becomes the controlling metric, and  
20 that is where we are, and that is where we are, is  
21 trying to have assessment of our own of what the  
22 probability or the conditional probability of a large  
23 early release is given this type of vessel failure.

24 In the Commission paper that Nathan  
25 authored a month or two ago, we laid out qualitatively

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1 some factors that we thought would influence your  
2 conclusion of whether or not it would be a large early  
3 release.

4 Clearly, it is very different than your  
5 vanilla core melt if you will.

6 CHAIRMAN APOSTOLAKIS: So you are still  
7 thinking bout it?

8 MR. CUNNINGHAM: We are still thinking  
9 about it, and there is issues that go in both  
10 directions.

11 MEMBER POWERS: I refuse to look up on a  
12 core melt accident as vanilla.

13 MR. CUNNINGHAM: At any rate, there are  
14 factors that would go both ways.

15 MEMBER KRESS: Well, what we are trying to  
16 do is to give you the benefit of what we think it is.

17 MR. CUNNINGHAM: And we appreciate that.

18 CHAIRMAN APOSTOLAKIS: I have a question  
19 by the way which I forgot regarding the definition of  
20 reactor vessel failure frequency.

21 MR. CUNNINGHAM: Yes.

22 CHAIRMAN APOSTOLAKIS: On page 5 of the  
23 SECY, you are saying at the bottom of the page the  
24 first option uses the current definition of RPD  
25 failure. You saw that?

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1 MR. CUNNINGHAM: Yes.

2 CHAIRMAN APOSTOLAKIS: In addition to  
3 being a more direct measure of the likelihood of  
4 events with potentially significant public health  
5 consequences, it has the advantage of regulatory  
6 stability.

7 MR. SIU: This is the current definition.

8 MEMBER KRESS: That is what they used  
9 before.

10 CHAIRMAN APOSTOLAKIS: Is that an  
11 advantage though?

12 MEMBER KRESS: It won't confuse the --

13 MR. SIU: It's one of our principles of  
14 good regulation, right?

15 CHAIRMAN APOSTOLAKIS: Yes, but is this  
16 what people mean by stability, regulatory stability?  
17 I mean, if you guys reevaluate the whole thing, and  
18 you show that there is a more rational approach --

19 MR. SIU: No, but it is --

20 CHAIRMAN APOSTOLAKIS: It just struck me  
21 as something that was odd, and Dr. Shack is laughing,  
22 and it is odd.

23 MEMBER SHACK: Well, regulatory stability  
24 means exactly what you think it means. You don't keep  
25 changing the regulation, and the regulation that hits

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1 you now is that number.

2 CHAIRMAN APOSTOLAKIS: You have to speak  
3 through your microphone, Dr. Shack. How long have you  
4 been on this committee?

5 MEMBER SHACK: Too long, but it is coming  
6 back to Mark's. I mean, the two critical issues here  
7 are the conditional failure of the containment when  
8 you have the RPD, and what you are going to use for  
9 the source term.

10 I mean, you kept focusing on the  
11 conditional failure, and I don't see how you can leave  
12 the other one out. I mean, you have to convince  
13 yourself that your source term is in some way bounded  
14 by some number, and your conditional containment --  
15 well, we can always bound the conditional containment  
16 probability.

17 That is the wonderful thing about it. It  
18 is not going to get any higher than one. The source  
19 term argument I think you also need to address.

20 MEMBER KRESS: I would be tempted on the  
21 source term to go to the spent fuel pool assessment.

22 MEMBER POWERS: I don't think that is  
23 adequate.

24 MEMBER KRESS: You think the fuel finds  
25 are --

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1 MEMBER POWERS: I think in particular that  
2 gets to you.

3 MEMBER KRESS: Well, I would look at high  
4 value opinion and rethink the fuel finding and put a  
5 bigger value there. But that is really going to drive  
6 these numbers down.

7 MEMBER SHACK: But then you come back to  
8 Dana's argument that if you can't do it on a risk  
9 basis, and you really don't know what really, really  
10 happened, but then I don't know what really, really  
11 don't want means.

12 MEMBER POWERS: Well, to a big extent, we  
13 went through that exercise when we set up the QHOs.  
14 We decided what we really, really didn't want.

15 MEMBER KRESS: And that's why I would have  
16 started from the QHOs, because it already has it built  
17 into it.

18 MEMBER SHACK: But then you have to go  
19 back to the source term.

20 MEMBER KRESS: That's right.

21 CHAIRMAN APOSTOLAKIS: That's what they  
22 want.

23 MEMBER POWERS: Hey, chemists are  
24 important.

25 MEMBER SHACK: The blacksmiths can solve

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1 the problem all by themselves.

2 MEMBER POWERS: I know that. They came up  
3 with 10 to the minus 45th. I know that answer.

4 MEMBER KRESS: We better move on, Nathan.  
5 We are running out of time.

6 CHAIRMAN APOSTOLAKIS: You have been given  
7 enough advice, Nathan. Would you like some more?

8 MR. MAYFIELD: Nathan got a lot of advice  
9 before we started this presentation. He has been  
10 getting a lot of help, yes. sir.

11 CHAIRMAN APOSTOLAKIS: Okay.

12 MR. SIU: We actually only have a few more  
13 slides anyway, and they are pretty much in the way of  
14 wrap-up.

15 MEMBER WALLIS: Well, I think the fact  
16 that you have up these numbers if a public meeting as  
17 far as what you are thinking of that as being  
18 realistic.

19 MR. SIU: Yes.

20 MEMBER WALLIS: And so I think it is very  
21 good that we had some discussion about what they might  
22 mean, and where they have might come from.

23 MR. SIU: Absolutely. Yes. And in fact,  
24 we put them in the SECY paper. So, yes, they are  
25 being seriously considered. Okay. Some of the issues

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1 that we have got, these issues are associated again  
2 with the uncertainties in the pilot plant studies.

3 Part of what is driving the identification  
4 of these issues is the notion that if it turns out  
5 that the reactor vessel failure frequency is low by  
6 any measure for the degrees of embrittlement that we  
7 really would project for our operating fleet, then we  
8 would not spend a whole lot of time looking at what  
9 happens after the vessel failure.

10 And so we want to make sure that we  
11 understand what these sources of uncertainty are here.  
12 We have been told in a number of places that we need  
13 to be using more formal methods for looking at the  
14 sources of uncertainty, and experimental design, and  
15 how we do our calculations, and that is something that  
16 we will certainly pick up as we start closing this  
17 project out.

18 I would also point out that currently we  
19 are not planning on doing a formal peer review of the  
20 PTSPRA, and we may want to reconsider that. Certainly  
21 the PRA and thermal hydraulics, as well as fracture  
22 mechanics, are contributing to the numbers that you  
23 are seeing on the graphs, and we have to make sure  
24 that we understand that.

25 I think the committee also mentioned that

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1 for places where we are using expert illustration, and  
2 the HRA, human reliability analysis, was one place  
3 where we wanted to take a closer look at that.

4 So we do need to understand where the  
5 numbers are coming from. We are planning on looking  
6 at the post-vessel failure in a very scoping manner at  
7 this point.

8 We have to determine whether it is  
9 feasible given the time scale that we have got and the  
10 resources that we have got, to do much digging into  
11 that.

12 And to identify what are the gaps in  
13 knowledge where the uncertainties are, and we have  
14 different reports saying different things, and  
15 determine if there is something that can and should be  
16 done between now and the end of the project.

17 There is money from my understanding  
18 budgeted to look in Fiscal Year 2003 --

19 MEMBER WALLIS: Well, I think there is  
20 some hydraulic uncertainty, and I think we are going  
21 with a well mixed downcomer; isn't that true, Mike?  
22 That seems to be the way that we are headed.

23 MR. CUNNINGHAM: That's correct.

24 MEMBER WALLIS: And that is a  
25 deterministic decision then. Wasn't there some

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1       uncertainty about how well mixed it is? Is that  
2       something that you are able to calculate?

3               MEMBER KRESS: Wasn't that based on the  
4       apex results?

5               MEMBER WALLIS: Yes, but there is some  
6       uncertainty in that. So how do you figure uncertainty  
7       into how well mixed the downcomer is. Are you ready  
8       to do that or not, or are you just assuming it is well  
9       mixed, and then going with that as a deterministic  
10       conclusion?

11              MR. CUNNINGHAM: Well, it's not really an  
12       assumption. We have got the experiments in this CFD  
13       calculation.

14              MEMBER WALLIS: But there is always  
15       uncertainty about everything isn't there? Are you  
16       absolutely certain that it is well mixed?

17              MR. CUNNINGHAM: Well, the question is the  
18       degree of non-uniformity, and is that a significant  
19       parameter or significant variable --

20              MEMBER WALLIS: And can you quantify it.

21              MR. CUNNINGHAM: Yes, I think the answer  
22       is that we can say it is less than -- well, let's say  
23       less than 10 degrees --

24              MEMBER WALLIS: And so the next time you  
25       see us, you will give us a certainty on that mixing?

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1 MR. CUNNINGHAM: We will address it, yes.

2 MEMBER WALLIS: I'm sorry to interrupt,  
3 but since thermal hydraulic uncertainty has been  
4 mentioned there, that's why I had asked to see an  
5 explicit number describing it next time.

6 MR. CUNNINGHAM: We have run some  
7 calculations through FAVA, all the way through FAVA,  
8 a couple of years ago, where we looked at the effect  
9 of non-uniformity, and any kind of non-uniformity you  
10 assume tends to get further dampened once you get the  
11 FAVA results calculated.

12 MEMBER WALLIS: And that seems to be not  
13 very important.

14 MR. CUNNINGHAM: Well, the worst flaw has  
15 to be in the coldest spot in order to make a  
16 difference.

17 MR. SIU: Without speaking to the specific  
18 issue, my expectation is that when we develop the  
19 final results, we will have a quantified significant  
20 portion of the uncertainty, and obviously we are  
21 making efforts to identify what are the driving  
22 sources and deal with those.

23 I am sure that we will have some  
24 qualitative descriptions of issues that we were either  
25 unable to quantify, or think that they are not as

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1 important as the ones that we are dealing with. And  
2 that will be a part of the technical basis document.

3 I think we are making a very good whack at  
4 dealing with some of these uncertainties. But it  
5 certainly would not be the last word in doing  
6 uncertainty analysis.

7 I mentioned that we have to extend our  
8 pilot studies, and we have to include external events  
9 in some fashion, and we are still talking about how  
10 exactly we are going to do that.

11 And we have to also talk about how we are  
12 going to extend our results to the non-pilot plants,  
13 the plants that we didn't do the detailed PRAs for,  
14 because we do have to be mindful as to what is the  
15 implication for the population.

16 MEMBER KRESS: I don't understand the  
17 external events bullet. That is an initiating event  
18 that is related to the PRA.

19 MR. SIU: Yes.

20 MEMBER KRESS: And then you have PTS as an  
21 initiating event through your PRA. How do they relate  
22 to each other?

23 MR. SIU: Well, you could have a fire  
24 induced overcooling event, for example, which actually  
25 what happened at one of the plants.

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1 MEMBER KRESS: Oh, I was thinking seismic.

2 MR. SIU: Well, we would have to address  
3 all possible ways that you could get to overcooling  
4 situations, pressurized thermal shock situations.

5 MEMBER KRESS: I'm sorry. I'm sorry, but  
6 now I understand.

7 MR. SIU: And the last bullet on this  
8 slide refers to a point that Mike made earlier, that  
9 let's say it turns out that the reactor vessel failure  
10 frequency associated with PTS events as calculated by  
11 our models is very, very, very small, and we are quite  
12 confident of that.

13 There would still be other engineering  
14 considerations that you would want to bring into play  
15 to establish the screening criteria. And how you do  
16 that now in a formal mathematical way, or even just a  
17 formal process, would be something that we would have  
18 to address.

19 Just to give you a head's up now, we  
20 showed some very low results for Oconee, and we are  
21 not absolutely sure that the results are going to be  
22 as low for some of the other plants that we are  
23 looking at.

24 And so we don't want to bias any folks  
25 right now in saying that the results are definitely

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1 going to be low. We don't know that.

2 MEMBER WALLIS: I would be very interested  
3 to see what you mean by defense in depth when you have  
4 got a failed vessel.

5 MEMBER KRESS: Yes. I was thinking that  
6 your choice of a one-tenth contribution from the PTS  
7 events to a LERF was in itself a defense in depth  
8 concept.

9 MR. SIU: I'm sorry, but I didn't catch  
10 you.

11 MEMBER KRESS: I was just commenting that  
12 just the selection of a one-tenth contribution to LERF  
13 from PTS events as an acceptance criteria is a defense  
14 in depth concept I think.

15 MR. SIU: Well, you are still --

16 MEMBER KRESS: The lower that you make  
17 that value, the more defense in depth you have.

18 MEMBER SHACK: But I think he is making  
19 another argument that even if he can demonstrate that  
20 it is acceptable, he just doesn't like operating with  
21 an embrittled vessel.

22 MEMBER KRESS: No, he wants a structural -  
23 -

24 MEMBER SHACK: Yes.

25 MEMBER ROSEN: This is a really, really

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1 ought to have this kind of event.

2 MEMBER KRESS: That may go back to what my  
3 comment on that.

4 MEMBER SHACK: Well, just -- have you  
5 looked at where the numbers would have to fall before  
6 other considerations would take over?

7 MR. SIU: Not yet.

8 MEMBER SHACK: I am sure with all of our  
9 helpful suggestions that we can drive that frequency  
10 down so low that PTS will be a limiting event.

11 MR. SIU: We have not done that yet. Mark  
12 did point out in the overview that the team is running  
13 real hard just to develop the base case results. And  
14 so the implications of those results and where they  
15 are coming from also. We just have not had time to  
16 explore that.

17 MEMBER ROSEN: But I think your  
18 clarification that we should not expect to see results  
19 for the whole fleet, for example, like the ones that  
20 you showed us for Oconee, is important, because I  
21 certainly was headed in the direction of thinking  
22 along those lines on the Oconee line.

23 MR. SIU: Yes, and we just don't know at  
24 this point.

25 MR. KIRK: If you just want to hold a

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1 metric in your head for the next time that we show up,  
2 hopefully with results for both Beaver and Palisades,  
3 the most embrittled weld in all of Calvert Cliffs,  
4 Oconee, and Beaver will be embrittled plate, is  
5 between 30 and 40 degrees fahrenheit.

6 And more embrittled, meaning a higher  
7 transition temperature at any given or equivalent  
8 fluence than in Oconee. And that is a substantial  
9 shift in the transition temperature.

10 So we would expect, if I have got to  
11 guess, numbers higher by probably an order of  
12 magnitude, all other things be equal, an of course all  
13 other things aren't equal.

14 MR. MAYFIELD: Well, this is Mike  
15 Mayfield, and one other point that I think is  
16 important to keep in mind is that when we went into  
17 this, it was more or less with the expectation that  
18 the conversatisms embedded in the original rule were  
19 such that with a better state of knowledge we could  
20 relax the screening criteria and still have the same  
21 perceived level of safety.

22 We recognized going in that it could go  
23 the other direction, and that is something that I  
24 think the discussion this morning on the metric gives  
25 us some food for thought.

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1           But we are waiting to see what the  
2           calculations are really going to look like. But we  
3           have not predetermined which direction this would go,  
4           if any. It could be that we decide that we are close  
5           enough and the existing regulation satisfies interest,  
6           and you just leave well enough alone.

7           Or it could go either direction, but we  
8           have not pre-judged where this thing should do, in  
9           terms of the outcome.

10           MR. SIU: Mark, next slide, please. So  
11           our next steps, obviously as I said, we are pushing  
12           real hard to complete the pilot studies, and we have  
13           to find a way to address external events, and  
14           extension to the broader population.

15           We will assess the need for and the  
16           feasibility of a scoping study on what happens after  
17           a crack propagates through the wall for these  
18           postulated scenarios.

19           And again to see what we can do between  
20           now and December. And we are going to continue  
21           interactions with the international community, and  
22           understandings that we are participating in a PTS  
23           benchmark calculation with CSNI.

24           And some deterministic calculations are  
25           being done this year, and then in 2003, there will be

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1 some probablistic calculations.

2 MEMBER ROSEN: I think that your third  
3 point is important, but in listening to the discussion  
4 from the members about some of the scenarios that are  
5 being discussed -- low earth orbit reactor vessels,  
6 for example -- I think that needs to be addressed.

7 MR. SIU: Yes.

8 MEMBER ROSEN: We need to understand that,  
9 the conditional probability of containment failure  
10 with a low earth orbit reactor vessel is very hard,  
11 approaching one.

12 MEMBER WALLIS: Well, maybe we can give it  
13 a escape velocity and we don't need to worry about it.

14 MEMBER ROSEN: That's right, if we could  
15 be sure that it would reach escape velocity.

16 MR. SIU: And I think what we can do in  
17 the time that we have got is to assess what the  
18 current state of knowledge is. We won't probably be  
19 able to make much of a dent in --

20 MEMBER ROSEN: I think you need to do your  
21 third bullet in a way that says that some of these  
22 scenarios are just outrageous and are not physically  
23 real.

24 MR. SIU: Yes. Thank you. Mark. Oh, we  
25 have one more.

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1 MR. KIRK: We have one more. Okay.

2 MR. SIU: Okay. I have mentioned this  
3 already. We are scheduled to be complete in 2002, and  
4 we are looking at the risk associated with selected  
5 plants, and we are looking at the uncertainties and  
6 the drivers of those uncertainties.

7 We will have extension to non-pilot  
8 plants, and we will have recommendations regarding  
9 risk acceptance criteria for PTS. We have identified  
10 options, and we plan to do the evaluation of those  
11 options by December, and again this is not a risk-  
12 based approach.

13 So setting the limit on the reactor vessel  
14 failure frequency might not be the limiting factor in  
15 setting the allowed degree of embrittlement.

16 MEMBER KRESS: I guess that ends it,  
17 George, unless there are comments. Well, thank you  
18 very much. Once again, it was a very nice  
19 presentation, and we appreciate the information.

20 Well, I will probably jot down some of our  
21 comments and have a letter just for feedback.

22 MR. MAYFIELD: Good. We appreciate it.

23 MEMBER KRESS: Okay.

24 CHAIRMAN APOSTOLAKIS: Okay. Thank you,  
25 gentlemen. We will recess until 20 minutes after

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1 10:00.

2 (Whereupon, at 10:00 a.m., the meeting was  
3 recessed and resumed at 10:20 a.m.)

4 CHAIRMAN APOSTOLAKIS: We are back in  
5 session. The next item on the agenda is the Draft  
6 Final Revision 1 to Regulatory Guide 1.174, an  
7 approach to using probabilistic risk assessment in  
8 risk-informed decisions on plant-specific changes to  
9 the licensing basis and the associated standard review  
10 plan Chapter 19.

11 And I see Ms. Druin in front of us. Are  
12 you leading the presentation, Mary?

13 MS. DRUIN: Both John and I will be  
14 presenting today.

15 CHAIRMAN APOSTOLAKIS: Okay. Please.

16 MS. DRUIN: Okay. My name is Mary Druin  
17 with the Office of Research, and with me is John Lane,  
18 also from the Office of Research. The purpose of  
19 today's presentation is to provide you a status of our  
20 Revision-1 to REG Guide 1.174.

21 And we would like to go out for  
22 publication on this revision, and we went out for  
23 public review and comment, and we are going to go  
24 through that. And so we are here today to request a  
25 letter from the ACRS for approval to publish Revision-

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1 to Reg Guide 1.174.

2 MEMBER KRESS: Do you plan on subsequent  
3 revisions?

4 MS. DRUIN: I love someone who leads me  
5 perfectly into my next slide.

6 MEMBER KRESS: Sorry. Oh, what does  
7 periodically mean? Is that 5 years, or what?

8 MS. DRUIN: The intention is to do it  
9 every year as necessary, but the point --

10 CHAIRMAN APOSTOLAKIS: Every year? My  
11 goodness.

12 MS. DRUIN: -- is that it could be every  
13 six months. That is really going to depend on what  
14 the proposed change would be, and what we want to do,  
15 and what information comes in.

16 MEMBER ROSEN: This is a model of  
17 regulatory stability. Every six months?

18 CHAIRMAN APOSTOLAKIS: Well, presumably  
19 improving it, Steve.

20 MS. DRUIN: It doesn't necessarily have to  
21 be every six months, but I think we are committed in  
22 our SRM to a yearly update if my recollection is  
23 correct.

24 MR. CUNNINGHAM: This is Mark Cunningham.  
25 We owe to the Commission annually an update of

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1 possible changes to this Reg Guide, and all the  
2 aforementioned risk-informed --

3 CHAIRMAN APOSTOLAKIS: So you have an SRM  
4 that says that?

5 MR. CUNNINGHAM: Yes. Now, that is a  
6 report to the commission, and that doesn't necessarily  
7 mean that we will make an update.

8 CHAIRMAN APOSTOLAKIS: Exactly.

9 MR. CUNNINGHAM: But again the frequency  
10 of changing or revising the guide depends on the  
11 extent of comment that we get on issues that come up.  
12 Six months maybe is a little quick.

13 MS. DRUIN: There is nothing that says  
14 that it can't be longer, although it could be quicker,  
15 depending on as Mark says on issues that we want to  
16 deal with.

17 And the point that we want to make is that  
18 it is a living document, and it is our intent to  
19 update it as it needs to be updated over time. We did  
20 issue Revision-1 in June, and we went out for a 90-day  
21 comment period.

22 We came back and we did receive comments,  
23 and we made revisions based on it based on the  
24 comments that we received. We came to the ACRS in  
25 February and no issues were raised, and our

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1 recommendations, in terms of the revisions to Rev-1,  
2 have not changed from what we presented back in  
3 February.

4 And on that, we are going to go through  
5 what we had done for the public review comment  
6 version, and what we have changed based on the public  
7 review comments, and where we are on what we would  
8 like to publish.

9 MEMBER ROSEN: Now, wait a minute. Mary,  
10 your first bullet refers to lessons learned from  
11 ongoing issues, such as those at Davis-Besse. Is that  
12 or is there an implication that there were lessons  
13 learned about PRA from Davis-Besse?

14 MS. DRUIN: There is an implication that  
15 we are looking at the Davis-Besse incident to see what  
16 impact it could potentially have on Reg Guide 1.174,  
17 and do we need to make an update based on that. Right  
18 now we have no decision in that regard. We have it  
19 under evaluation.

20 CHAIRMAN APOSTOLAKIS: Well, since you  
21 raised the issue, I had a comment on that, and maybe  
22 we could address that now. Do you have the standard  
23 integrated decision making picture that we have? You  
24 know, do you have a slide or that?

25 MS. DRUIN: No, I don't, but I have it

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1 right here.

2 CHAIRMAN APOSTOLAKIS: We can go to the  
3 regulatory guide. It must be somewhere in there. I  
4 mean, I'm sure that everybody -- yes, it is on page 7.

5 MS. DRUIN: Yes, it is on page 7.

6 CHAIRMAN APOSTOLAKIS: Integrated  
7 decision-making. The five inputs, defense in depth  
8 and so on. In light of Davis-Besse, and in light of  
9 the comment recently from a senior French regulator  
10 that they will never go the risk-informed way as the  
11 Americans are doing, because the PRAs will never  
12 include safety calculations and organizational issues,  
13 shouldn't there be a sixth box that says safety  
14 conscious work environment?

15 I mean, if it is so important as Davis-  
16 Besse showed? I mean, it is not part of the PRA, and  
17 why don't we have a six box there that says quality of  
18 the safety conscious work environment? And that would  
19 show that we are concerned about it.

20 MEMBER KRESS: Well, that is normally how  
21 we deal with things that aren't in the RPA anyway. We  
22 separately integrate them in their thinking.

23 CHAIRMAN APOSTOLAKIS: Yes, and that's why  
24 it is risk-informed, right?

25 MEMBER KRESS: Yes.

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1 VICE CHAIRMAN BONACA: But it is not being  
2 measured.

3 CHAIRMAN APOSTOLAKIS: It doesn't matter.  
4 Other things are not measured.

5 VICE CHAIRMAN BONACA: Well, you put them  
6 in.

7 CHAIRMAN APOSTOLAKIS: Do you measure  
8 safety measures?

9 MS. DRUIN: No.

10 MEMBER WALLIS: George, this sounds like  
11 something they should consider in their next revision.

12 CHAIRMAN APOSTOLAKIS: I don't know. I  
13 mean, that's what matters, is future revisions, and  
14 maybe so.

15 MEMBER WALLIS: But they can insert it in  
16 this revision.

17 CHAIRMAN APOSTOLAKIS: And I would  
18 probably agree with you that it is pretty much they  
19 ought to do it in this revision, but I am planting a  
20 seed here, and Mr. Cunningham seems to be anxious to  
21 say something.

22 MR. CUNNINGHAM: I guess two things.  
23 First, the staff's review of Davis-Bessie is still  
24 under way, and I am not sure --

25 CHAIRMAN APOSTOLAKIS: And that's why it

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1 is probably premature.

2 MR. CUNNINGHAM: Yes, and whether or not  
3 safety culture was a key factor in what happened or  
4 not, the staff doesn't have an opinion I don't believe  
5 on that. The second point is, and I guess more for  
6 discussion, is one, do you consider safety culture as  
7 part of defense in depth.

8 CHAIRMAN APOSTOLAKIS: I don't know.

9 MR. CUNNINGHAM: I guess you had in the  
10 past, but maybe it merits bringing it out explicitly.

11 CHAIRMAN APOSTOLAKIS: All I am saying is  
12 here is something that happened that was fairly  
13 serious. Here is some criticism of what we are doing  
14 from a foreign senior guy. I mean, it is not an  
15 average engineer, and it is related to that.

16 And we have the third point that Tom  
17 mentioned, that it is risk-informed, and it is  
18 integrated decision making, and if something is not in  
19 the PRA, we account for it in some other way. Why  
20 then don't we have a six box that says worry about  
21 this and do something about it.

22 Now, the moment that you decide to put the  
23 box there, you have to resolve all sorts of issues and  
24 understand all sorts of issues. But it seems to me  
25 that it is something that has to be addressed.

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1           And whether it is a sixth box and you want  
2           to make it part of defense in depth, I don't know. It  
3           is way too soon to tell, but I don't think it is way  
4           too soon to actually say that we need to do something  
5           about it.

6           And I agree with Graham. I mean, for this  
7           revision, it is way too premature, but --

8           MEMBER ROSEN: I think you can consider  
9           that the seed has been planted.

10          CHAIRMAN APOSTOLAKIS: The seed has been  
11          planted. Very good.

12          MEMBER ROSEN: Well, the reason that I  
13          opened this discussion was that Mary wrote this slide  
14          that said that David-Besse underneath 1.174, and I  
15          don't know that there is a connection between what  
16          happened to David-Besse and the Regulatory Guide  
17          1.174, the subjects of the regulatory guide.

18          MEMBER POWERS: Nor does the sentence  
19          claim that there is.

20          MEMBER ROSEN: And that's what I wanted to  
21          be sure that we all understood; that that is not a  
22          claim that bullet and the underlying words underneath  
23          it doesn't claim that there is.

24          MEMBER POWERS: Let me ask you something  
25          about --

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1 MS. DRUIN: And that is correct. We are  
2 evaluating it and no decision has been made.

3 MEMBER POWERS: Let me ask you a better  
4 question, and they may fall in the same category. But  
5 we recently have seen some probablistic analyses about  
6 recriticality following a successful termination of a  
7 small break LOCA.

8 And I have a feeling that that particular  
9 sequence is not usually included in probablistic risk  
10 assessments. Is that being examined?

11 MS. DRUIN: In the past, or typically  
12 right now, recriticality is not a sequence looked at.  
13 I know that if you go back -- I remember back in the -  
14 - and I will say the term early days, recriticality  
15 was a sequence that was looked at.

16 MEMBER POWERS: But right now we have this  
17 issued raised by the owners groups themselves, and I  
18 think that they were the ones that identified it most  
19 explicitly, that in successfully terminating a small  
20 break LOCA, which is one of our relatively common  
21 sequences in most PWR accidents, that the spectrum of  
22 accidents -- that you get a recriticality. Yet, in  
23 1150, termination is a success path.

24 MS. DRUIN: Yes.

25 MEMBER POWERS: And here there is the

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1 possibility of a non-success path, and I suspect that  
2 it is a deficiency of not only PRAs that the agency  
3 has access to, but maybe the PRAs that are being  
4 submitted by the licensee.

5 And since it is under consideration by the  
6 agency, is that something that is going to be  
7 considered in either this or future revisions?

8 MS. DRUIN: I think that many of the  
9 assumptions that you have in your PRAs need to be in  
10 some sense reexamined. There are things that we don't  
11 include in the scope because of knowledge that we  
12 have, or the knowledge that we thought we had that we  
13 thought we could exclude it from probablistic grounds.

14 And I think that some of those things do  
15 need to be revisited in light of new experiences.

16 MEMBER POWERS: I would be interested to  
17 see this, because it is like you say, that when we  
18 first started PRAs, we spent a lot of time worrying  
19 about recriticalities.

20 MS. DRUIN: Yes, we did.

21 MEMBER POWERS: And always -- I mean,  
22 nothing ever came out of it. Everything looked fine,  
23 and so that kind of disappeared into the past legacy  
24 of the field, and we have come forward with PRAs, and  
25 where people who have little neutronic experience --

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1 and now we are running into these things again, and it  
2 is just one of those things that we have got to remind  
3 ourselves that these are nuclear machines.

4 MS. DRUIN: Yes. Okay.

5 MR. LANE: The initial set of proposed  
6 changes to the draft guide 1.110, which was Rev-1 as  
7 we put it out last summer, were three primary changes,  
8 labeled 1, 2, and 3 on this slide, plus number 4,  
9 which was simply an example to provide some examples  
10 of risk-insights that were used in the decision-making  
11 process.

12 Going back to the top of the slide, the  
13 first change that we proposed was to acknowledge the  
14 staff's ability to request risk-related information if  
15 new unforeseen hazards emerged, or a substantially  
16 greater prospect for a known hazard emerges.

17 CHAIRMAN APOSTOLAKIS: Is this the issue  
18 that if the staff decides that the issue is related to  
19 adequate protection?

20 MR. LANE: Yes.

21 CHAIRMAN APOSTOLAKIS: And if the industry  
22 does not provide the risk information, you will  
23 develop it?

24 MR. LANE: If they hadn't provided the  
25 risk information as part of their submittal. In other

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1 words, if they had made a non-risk informed submittal,  
2 the staff would have the option to go out and ask for  
3 the information.

4 MEMBER KRESS: Is Reg Guide 1.174 the  
5 right place to put that, because Reg Guide 1.174  
6 almost presupposes it is a risk-informed submittal.

7 MEMBER POWERS: Well, I mean, that raises  
8 the question that came promptly to my mind, is suppose  
9 someone admits something that is not risk-informed,  
10 and in it he says, gee, my auxiliary feed water is  
11 going to be susceptible to flow assisted corrosion at  
12 some prodigious rate per year, like maybe seven-tenths  
13 of an inch, to pick a number out of the hat.

14 And shouldn't the staff be asking for risk  
15 information in that case?

16 CHAIRMAN APOSTOLAKIS: Yes, but 1.174  
17 comes into the picture after the risk information is  
18 submitted. This is a different decision.

19 MR. RUBIN: This is Mark Rubin from the  
20 staff, and if I could clarify. This is a conforming  
21 change to guidance that has already been put out on  
22 the street, and I think which we have discussed with  
23 the committee in the past.

24 A regulatory information letter was  
25 issued, and which has already been discussed, and

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1 there have been workshops with industry. This change  
2 -- and you are right. And a little is in a sense non-  
3 seculatory because it is for a non-risk informed  
4 action, but was put here for a sense of completeness  
5 to close the loop on the other documentation and  
6 notification that is already out on the street.

7 MEMBER KRESS: I don't see anything with  
8 putting it in there.

9 MEMBER ROSEN: Bug Reg Guides are not  
10 regulations, and so it doesn't have any force, but  
11 there is nothing wrong with putting it in there.

12 CHAIRMAN APOSTOLAKIS: But I think there  
13 is a regulation that says that the staff can do it.

14 MEMBER ROSEN: Sure, but putting it in  
15 there doesn't have any force of law.

16 CHAIRMAN APOSTOLAKIS: Well, that is how  
17 we understand it.

18 MEMBER POWERS: This is not what gives the  
19 staff the ability to do it. This just says that,  
20 yeah, they do, and be forewarned.

21 MEMBER KRESS: I guess if somebody is  
22 reading Reg Guide 1.174 and trying to make a decision  
23 whether to go risk-informed or traditionally, this  
24 comment in there would say, whoa, even if I go  
25 traditionally, they may ask me for risk information.

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1                   So you could put it in there for a reason,  
2                   you know, and it gives them information. So I think  
3                   it is okay.

4                   MR. LANE:       The next change that we  
5                   proposed involved the issue of increases that are  
6                   currently under evaluation for power level, changes in  
7                   fuel burn-up rates, and the use of mixed oxide fuel.

8                   We had put a note in the revision  
9                   suggesting that risk parameters, such as LERF, may be  
10                  impacted by the changes in power level that are being  
11                  looked at, and possible fuel burn-up rate changes, and  
12                  the use of mixed oxide fuel --

13                  MEMBER WALLIS:   Why do you use the word  
14                  rate? I thought it was burn-up. Now, rate to me  
15                  means a rate in time, and it is not a rate in time.  
16                  It is the total burn-up that you are worried about  
17                  isn't it? I don't think the word rate should be  
18                  there.

19                  MR. LANE:       I will have to defer to the  
20                  fuels people on that. That is the language that we  
21                  had in there.

22                  MEMBER POWERS:   I think that Graham is  
23                  quite right, that it is really the burn-up, though I  
24                  will comment that NRR informs us that fuel burn-up is  
25                  essentially irrelevant to licensing decisions.

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1 MEMBER WALLIS: That's not a rate of  
2 anything is it.

3 CHAIRMAN APOSTOLAKIS: Just delete it.

4 MEMBER SHACK: And spell affect more  
5 correctly.

6 MEMBER KRESS: I presume, you know, that  
7 we know those things affect LERF.

8 MEMBER POWERS: I don't know that we do  
9 know that fuel burn-up affects LERF.

10 MEMBER KRESS: Well, I am assuming that  
11 you have a higher decay heat level if you have a  
12 higher burn-up, and so the decayed heat level gets  
13 translated into how much or when you melt to the  
14 vessel, and whether or not you have got enough energy  
15 to fail the containment.

16 So I think it affects LERF, but my issue  
17 here is should it affect your 1.1, or 1 times 2 to the  
18 minus 5 value.

19 CHAIRMAN APOSTOLAKIS: That's right.

20 MEMBER KRESS: That is what I am getting  
21 at.

22 CHAIRMAN APOSTOLAKIS: The calculation is  
23 not part of --

24 MEMBER KRESS: The calculation is  
25 something else.

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1                   MEMBER POWERS: But I don't think that  
2 this -- well, it doesn't seem to -- well, I will let  
3 the speakers answer the question, but it doesn't seem  
4 to me that this raises the issue over whether the 1.10  
5 to the minus 5th level has changed.

6                   MEMBER KRESS: Well, I don't understand it  
7 otherwise.

8                   CHAIRMAN APOSTOLAKIS: What is the purpose  
9 of bullet number 2? What does that say, that the  
10 calculation of LERF may be affected by certain things,  
11 but the regulatory guide doesn't get into that does  
12 it?

13                   MEMBER KRESS: No.

14                   CHAIRMAN APOSTOLAKIS: It tells you what  
15 to do given the numbers.

16                   MR. CUNNINGHAM: This gets to really the  
17 definition of LERF that is in there. About an hour  
18 ago, we had a discussion about whether or not certain  
19 characteristics of pressured thermal shock accidents  
20 are qualitatively different enough that you may have  
21 to rethink them in the context of a definition of  
22 large and early.

23                   CHAIRMAN APOSTOLAKIS: Right.

24                   MR. CUNNINGHAM: But the point here is the  
25 same. That under some circumstances, using mixed

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1 oxide fuel, or something like that, may bring into  
2 question how we define large and early as it relates  
3 to -- and the relationship between large and early to  
4 the early fatality safety goal.

5 MEMBER WALLIS: Well, my colleague, Dr.  
6 Kress, has always been pointing out with power uprates  
7 that you use the same LERF value, but you have got  
8 more stuff there, and you have actually got more risk.

9 MEMBER POWERS: Well, I can see why one  
10 might want to be careful and say, gee, the mixed oxide  
11 fuel could have sufficiently different characteristics  
12 under accident conditions that the LERF value that we  
13 have selected may no longer be applicable. I think  
14 that is what you are saying.

15 MEMBER KRESS: That's what I am asking.

16 MEMBER POWERS: And I think that is what  
17 is Mark is saying, is to be cautious. We don't know  
18 right now, but it could be, and that it is more  
19 difficult for me to see how power level and fuel burn  
20 up would do that. But I would concede that you could  
21 be careful and say it might.

22 MR. CUNNINGHAM: That's correct.

23 MEMBER KRESS: In this particular bullet,  
24 in my opinion the LERF is a site characteristic and  
25 not a plant characteristic, and I think for multi-unit

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1 sites, you have to think of LERF as the summation of  
2 the LERFs on the site.

3 Now, I see no consideration of this in Reg  
4 Guide 1.174 at all. So, LERF is supposed to be a  
5 surrogate for the practicality safety goal, and not  
6 for a site characteristic.

7 MEMBER SIEBER: That's where the source  
8 term has a role to play, and it is after you go  
9 through that exercise of surrogate.

10 MEMBER KRESS: Yes, it is not really a  
11 source term issue in my mind. It is a frequency issue  
12 for the -- for the practicality, you have to multiple  
13 the frequency times the consequence. If you have two  
14 plants, you have got the double the frequency. You  
15 know, you have to add up the frequency.

16 MEMBER SIEBER: And it is 10 times the  
17 frequency.

18 MEMBER KRESS: So, somehow I think that  
19 Reg Guide 1.174 needs to address the question of  
20 multi-plant sites, and it is silent on it altogether,  
21 and it doesn't discuss it at all. And it seems to me  
22 that that falls under that bullet, or that Item Number  
23 2.

24 MEMBER SIEBER: Well, I would make it a  
25 separate item.

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1 MEMBER KRESS: I would, too.

2 CHAIRMAN APOSTOLAKIS: A separate item  
3 meaning what?

4 MEMBER POWERS: Are you bringing up these  
5 ideas that if I have five plants on a site, then I  
6 need to change my limiting criteria if I look at any  
7 one of them?

8 MEMBER KRESS: Yes.

9 MEMBER POWERS: I think that is a good  
10 point.

11 MEMBER KRESS: I think it is an excellent  
12 point.

13 MEMBER POWERS: I think that it is time  
14 that that appear explicitly in 1.174.

15 MEMBER KRESS: Yes, and that is where I  
16 think it needs to be.

17 CHAIRMAN APOSTOLAKIS: And you should also  
18 make sure that that your calculation of CDF includes  
19 the possible influence from the other units.

20 MEMBER POWERS: Well, I think they do a  
21 pretty good job on that.

22 CHAIRMAN APOSTOLAKIS: They do.

23 MEMBER POWERS: I mean, not a bad job on  
24 that.

25 CHAIRMAN APOSTOLAKIS: And that is a

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1 calculation issue, and it is not a 1.174 issue.

2 MEMBER POWERS: Well, what Tom is stating  
3 is that it is the acceptance criteria.

4 CHAIRMAN APOSTOLAKIS: It is an acceptance  
5 issue, exactly. Okay. Let's move on.

6 MR. LANE: The third change that we made  
7 was to incorporate as the Commission requested us to  
8 do, to define acceptable PRA quality as discussed in  
9 a previous SECY paper 0162, Attachment 1.

10 We added this to Reg Guide 1.174 as an  
11 appendix, and so it was a very detailed discussion of  
12 the scope and technical attributes that the staff felt  
13 would be required for a minimally acceptable PRA.

14 And as we will see in the subsequent  
15 slides, this is one of the things that was revised  
16 with the proposed final changes.

17 CHAIRMAN APOSTOLAKIS: Is this a good  
18 place to raise the issue of scope? I looked at the  
19 standard review plan -- and it will take me a while to  
20 get to my comments, okay?

21 And on page 19-14, the scope of analysis,  
22 I see again our usual attitude of trying to  
23 accommodate any kind of risk information that can be  
24 submitted by the licensees.

25 So we have statements here like for plant

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1 modes and initiators not analyzed in the PRA, such as  
2 shutdowns, seismic events, fire, floods, and severe  
3 weather, the licensee should do this.

4 Then further up it says it is not  
5 necessary in a risk-informed regulation that licensees  
6 submit PRAs that treat all plant operating modes, and  
7 all initiating events, in all initiating events.

8 So then I read Commissioner Diez's speech  
9 to the 2002 Regulatory Information Conference, where  
10 he says that it is my perception that the pace of  
11 risk-informed regulation has slowed down. I am  
12 puzzled as to why. And I think that I have an answer  
13 that answers his puzzlement.

14 I don't believe that people trust PRAs,  
15 and the reason why they don't trust them is precisely  
16 this attitude that you can do anything that you want  
17 with them. And if you don't want to include shutdown,  
18 that's fine. You don't want to include fires, then  
19 that's fine, too. We will accommodate you.

20 Now it says even initiating events can be  
21 excluded from the internal list. So then people  
22 wonder why there isn't three categories, for example,  
23 in the option, too, being that the staff doesn't  
24 impose any requirements.

25 And then Commissioner Diez says something

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1 that is very interesting. He says this is the year,  
2 2002, almost 30 years after WASH 1400, and it is time  
3 that all licensees have a quality level of 2 PRA so  
4 they can effectively utilize our regulatory processes.

5 So what I am saying now after all of this  
6 is why don't we say here in the standard review plan,  
7 and in the regulatory guide, that if you want to come  
8 to us and take advantage of this, you must have a  
9 quality level 2 PRA.

10 And where quality is defined by the  
11 industry's peer review process, and by the ASMEA  
12 standards, and by the ANS standards, and so on. Why  
13 try again to accommodate people who don't do fires,  
14 and who don't do seismic, and who don't do initiating  
15 events.

16 If they don't do that, they shouldn't come  
17 before us, or they should have a very good story why  
18 this is irrelevant. I realize that this goes much  
19 higher than you in front of us, that is probably a  
20 policy issue that has to be resolved at some level,  
21 and maybe the division, director, or office director  
22 level, or even the Commission.

23 But this is not the year 1996 and 1997  
24 when we started doing this, and naturally we didn't  
25 want to scare people that you have to have a good PRA

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1 before you even dare come before us.

2 This is 2002, and when are we going to  
3 draw the line and say you have to have a quality level  
4 2 PRA like the Commissioner says. And then it will be  
5 up to the reviewer to decide how that PRA is used and  
6 to integrate the decision making process.

7 Another point that has been made to me is  
8 that perhaps calling this a risk informed regulation  
9 was a mistake, because the word informed is used as an  
10 excuse not to do a good job on the PRA side.

11 It is risk informed and not risk based,  
12 and what do you want. We are going to take care of it  
13 in a different way. So people do sloppy PRAs. The  
14 penalty that we pay is that our own people don't  
15 believe in the results of PRAs, and then you have  
16 these debates with what do you do with risk three, and  
17 what do you do with this, and with that, because our  
18 own engineers don't have to.

19 Now, after all of that, I don't know what  
20 you guys want to say. I really don't want to sound  
21 like I am blaming you.

22 MEMBER WALLIS: Is this another seed that  
23 you are planing, George?

24 CHAIRMAN APOSTOLAKIS: Sorry? No, this is  
25 not a seed anymore.

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1 MEMBER WALLIS: No, this is a true.

2 CHAIRMAN APOSTOLAKIS: What I am proposing  
3 is to turn this back and say that this is now the time  
4 when you have to have a good level 2 PRA before you  
5 dare do a risk informed regulatory action.

6 VICE CHAIRMAN BONACA: I agree a hundred  
7 percent.

8 MEMBER POWERS: And so do I.

9 MEMBER ROSEN: And so do I.

10 MEMBER KRESS: Are we voting on this  
11 issue?

12 CHAIRMAN APOSTOLAKIS: No, no. I think it  
13 is a serious issue because it is not just the detail  
14 in the document, and again I repeat I don't want to  
15 sound like I am casting blame on Mary, or John, or  
16 others who worked on this.

17 This would take a major change, I think,  
18 in the way that the agency is doing its business, and  
19 naturally it will have to involve some higher level  
20 policy makers, because it is time that we said this.  
21 If you want the benefits of risk-informed regulation,  
22 forget about not having done fires and this. No, you  
23 have to do a good job.

24 And now that they have already done their  
25 Ips, and IPEEEs, and they have already been improved

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1 as we are told, it shouldn't be that expensive to  
2 actually come up to speed and have a good level 2 PRA.

3 MEMBER ROSEN: Let me say something.

4 CHAIRMAN APOSTOLAKIS: Sure.

5 MEMBER ROSEN: Only 10 percent of -- well,  
6 I think if we have a risk-informed regulation, we must  
7 cover the sources of risk. And the sources of risk  
8 are internal events, external events, including fire,  
9 and shutdowns.

10 And then we must over the mitigating  
11 systems, which includes the engineer safety features,  
12 which are of course covered in the internal events, as  
13 well as the containment. So you need a Level-2 PRA to  
14 study the containments effect and its effect on LERF.

15 So without that, we are just playing  
16 around the edges.

17 CHAIRMAN APOSTOLAKIS: Exactly. Exactly.

18 MR. LANE: Well, the Level-2 discussions  
19 will be part of a NUREG Guide that is currently under  
20 development. There is discussions of a Level-2  
21 acceptability at that point.

22 We had discussions of Level-2  
23 acceptability in our Appendix A, which went out for  
24 draft comments, and of all of the comments that we got  
25 back, I got the most comments critical of the new

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1 Level-2 requirements that we were discussing.

2 It was predominantly that they were overly  
3 prescriptive, and there were additional requirements  
4 that shouldn't be put in Reg Guide 1.174. Now, they  
5 are being revisited again, in the NUREG Guide 16 --

6 CHAIRMAN APOSTOLAKIS: I understand that,  
7 and in reading SECY-02-0070, you have a nice  
8 discussion of this. Several stakeholders felt that  
9 new requirements regarding Level-2, rate containment  
10 failure, were being added.

11 MR. LANE: Right.

12 CHAIRMAN APOSTOLAKIS: And then you have  
13 a nice footnote on the next page where you say in a  
14 subsequent public meeting the staff clarified that in  
15 NUREG 11.50 that late containment failure was a  
16 significant contributor, on the order approximately 30  
17 percent, to all sources of risk.

18 Now, coming back to what Mr. Rosen just  
19 said, if 30 percent is due to this contribution, then  
20 I have to consider all sources of risk. It is  
21 natural. In other words, a short statement that all  
22 sources of risk should be considered when you come  
23 before us for a risk-informed decision, it seems to me  
24 that is a very rational thing to say.

25 MEMBER KRESS: Let's clarify some things.

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1 1.174 had a very distinct specific purpose when it was  
2 first initiated, and that was to give a probability of  
3 allowing small changes to the licensing basis that  
4 didn't have much risk impact, and the process was set  
5 up to keep that small.

6 And small delta LERFs, and small delta  
7 CDFs, and in my mind at that time, for that purpose,  
8 using an LWR base source term, and a mean value, and  
9 just focusing only on CDF and LERF were perfectly  
10 acceptable, because you were limiting to small  
11 changes, and it was to give an optional way for  
12 somebody to come in and change their licensing basis.

13 And I didn't care much even then in having  
14 a complete PRA. I felt that you could deal with some  
15 things qualitatively because of the nature of the  
16 thing.

17 But now all of a sudden, 1.174 has become  
18 the paradigm for risk informing the regulations. This  
19 is the risk-informed approach, and for that purpose,  
20 I don't think that Reg Guide 1.174 is completely  
21 acceptable.

22 You have to have these complete PRAs, and  
23 you have to deal with things about LERF being  
24 something other than the mean. You have to talk about  
25 source terms to do the different types of sequences.

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1 You have a whole host of issues when you say that we  
2 are going to call this thing the risk-informed  
3 approach, and use it to craft our regulations,  
4 particularly in crafting our regulations.

5 If we want to restrict 1.174 to its  
6 original use, I don't have all these problems with it,  
7 except that I have a little problem with the LERF for  
8 multiple plant sites. But if we are going to use it  
9 as a paradigm for crafting risk-informed regulations  
10 in general, I think it is a mistake.

11 MS. DRUIN: The only thing that I would  
12 add to that is that we have not used 1.174 as the  
13 paradigm. We have used a lot of stuff from 1.174 in  
14 risk-informing the regulation so that we aren't --

15 MEMBER KRESS: Well, what particularly  
16 bothered me was the use of the 1 times 10 to the minus  
17 5. That tends to show up in the framework and in  
18 other things, and that particularly bothers me.

19 And the fact that it is based on an  
20 incomplete PRA. But I think it is all right in Reg  
21 Guide 1.174 for the intended use of small changes to  
22 the licensing basis.

23 CHAIRMAN APOSTOLAKIS: Another comment  
24 that I would like to make in addition to this issue of  
25 Level-2 PRAs is that we should change our attitude.

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1 I think that our attitude as an agency the last 6 or  
2 7 years has been let's try to accommodate people, and  
3 they have done certain analyses.

4 And let's not use perfection, which may be  
5 the enemy of the good enough. But I think it is time  
6 that we stop that, and I will give you another  
7 example. There is a beautiful discussion on  
8 uncertainty in the regulatory guide, Sections 2.2.5,  
9 1, 2, 3, 4, model uncertainty.

10 I mean, you would read this and say, boy,  
11 those are really ahead of everybody else and they are  
12 doing great things, and then you go to the SRP. The  
13 first thing you read is, "However" --

14 MEMBER SHACK: Where are you?

15 CHAIRMAN APOSTOLAKIS: On 19-21. I mean,  
16 I am not going to lie to you. So, 19-21, parameter  
17 uncertainty. So all of these nice discussions in the  
18 regulatory guide, what we read here in the second  
19 sentence is, "However, this does not imply that the  
20 detailed propagation of uncertainty is always  
21 necessary."

22 Now, why do we have to do that up front?  
23 I appreciate that this may be true, but always we have  
24 to say there is a good theoretical discussion of what  
25 needs to be done. However. Well, don't need to do

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1 that.

2 MEMBER WALLIS: Because you are over-  
3 responsive to public comment is one reason.

4 CHAIRMAN APOSTOLAKIS: Public comment in  
5 this case means industry comment really. So I think  
6 the attitude has to change, and that is broader than  
7 just 1.174. There are certain things that need to be  
8 done.

9 Now, uncertainty analysis is not always  
10 something that really needs to be done, but let that  
11 come as something that people know that in certain  
12 case, but not to put it up front here and undermine  
13 all this discussion in the regulatory guide.

14 And the same thing goes with other things.  
15 Surely you don't need to have an excellent job on HRA  
16 for every issue that comes before us, right? But that  
17 is not something that we want to put up front. And I  
18 think it is the attitude that, boy, we really have to  
19 accommodate anybody.

20 That they have to come before us and take  
21 advantage of this. People who want risk-informed  
22 regulation should have good risk information. So,  
23 please go ahead.

24 MS. DRUIN: Do you want us to continue, or

25 --

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1 CHAIRMAN APOSTOLAKIS: I think you should.

2 MS. DRUIN: -- do you want us to jump  
3 ahead?

4 CHAIRMAN APOSTOLAKIS: Use your judgment,  
5 Mary.

6 MS. DRUIN: Well, we only have two slides  
7 left. Maybe we will get through them.

8 MEMBER WALLIS: These proposed changes are  
9 relatively small.

10 CHAIRMAN APOSTOLAKIS: What?

11 MEMBER WALLIS: These proposed changes are  
12 relatively small.

13 CHAIRMAN APOSTOLAKIS: That's right.  
14 That's really what comes out of this.

15 MEMBER WALLIS: And you are proposing a  
16 much bigger change.

17 CHAIRMAN APOSTOLAKIS: And that's why I am  
18 saying that it is probably that they would probably  
19 have to involve some higher ups.

20 MR. LANE: Because what we have right now  
21 are the two dash lines, which consist of the changes  
22 that we are proposing for REV-1, both of which we just  
23 discussed; the risk-informed information request, and  
24 the staff's authority to do that.

25 And just a cautionary note, and less-

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1 strongly worded than we had in the draft version, that  
2 potential changes in power level fuel burn-ups and  
3 mixed oxide fuel might affect the evaluations of lerb.

4 We have some ongoing work that is being  
5 done in the fuels area to look at the risk of these  
6 changes. There are some preliminary results, I guess,  
7 but nothing really adequate for us to really put  
8 anything in the Reg Guide at this point.

9 MEMBER POWERS: I guess it is a question  
10 just a little bit of wording here. And that is the  
11 impact on the LERF evaluation, and that is what you  
12 said, the wording on the slide doesn't say that.

13 MS. DRUIN: If you go to your viewgraph,  
14 we have two attachments there; an Attachment-1 and an  
15 Attachment-2. On Attachment-2, you will see at the  
16 top of the page that is the actual change that has  
17 been made to the Reg Guide, and those are the actual  
18 words right there.

19 MEMBER POWERS: Yes, and it says,  
20 "Increases in use parameters on LERF." And I guess  
21 the question is or still remains I read these words to  
22 say that it is the evaluation of LERF that you do.

23 MEMBER KRESS: And I read them just the  
24 opposite. I read it to mean the evaluation of the 1  
25 times 10 to the minus 5.

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1 MEMBER POWERS: You read it as affecting  
2 the acceptance criterion, and I think you ought to  
3 just make it explicit there. It could conceivably  
4 affect the acceptance criterion. It is very likely to  
5 affect the parameter evaluation. I just wanted to  
6 make that clear.

7 MS. DRUIN: Understood.

8 MR. LANE: The third thing that we planned  
9 to put in the Reg Guide was the SECY 01-62 Attachment-  
10 1 input regarding scope and technical acceptability of  
11 PRAs. We decided to incorporate that in a separate  
12 Reg Guide, which is under development right now. And  
13 that has a schedule for later this year to be released  
14 in draft form.

15 CHAIRMAN APOSTOLAKIS: So that will take  
16 into account the ASME standard?

17 MR. LANE: Yes.

18 MS. DRUIN: It will be going out on public  
19 review and comment on that Reg Guide, and our  
20 endorsement at the end of August.

21 MEMBER POWERS: You know, when people tell  
22 me that studies of high burn up fuel have no impact on  
23 ongoing regulatory activities like the development of  
24 Reg Guides and what not, that seems not to be true  
25 here. I mean, you are saying that -- you are very

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1 anxious to get information on fuel burn up because it  
2 could affect what you write in 1.174.

3 MR. LANE: Right. And like I indicated  
4 the studies are ongoing. In fact, I think you have  
5 seen  
6 -- at least the fuel subcommittee has seen some  
7 presentations, and they are scheduled for another one  
8 this October.

9 MEMBER POWERS: I hang on every  
10 development in the field.

11 MR. LANE: Okay.

12 MEMBER KRESS: Did you read the advance  
13 reactors research plan?

14 MEMBER POWERS: I looked at it, yes.

15 MEMBER KRESS: There was a comment in  
16 there that for the advanced LWRs that we don't have to  
17 do any more fuels research because we already know  
18 enough, and that includes the IRIS, which has core  
19 lifetimes of 8 years, and has a different mix of  
20 enrichment, and it has burnable poisons in it, and it  
21 goes to burn-ups of a hundred-thousand, and they said  
22 that we expect the core degradation process and source  
23 term to be similar to current plans.

24 MEMBER POWERS: And the 17 gigawatt day  
25 fuel that we have looked at up until now, and I can

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1 only believe that the -- and I have it on great  
2 authority, that it is totally irrelevant to any  
3 licensing consideration.

4 MEMBER KRESS: I made -- in my letter that  
5 I am going to write on the research plan, that issue  
6 will be discussed.

7 MEMBER POWERS: Do you think it might get  
8 a little in there?

9 MEMBER KRESS: It might get in there in  
10 some way.

11 MEMBER POWERS: It might make it into the  
12 letter.

13 MS. DRUIN: Okay. Our final slide is back  
14 to our purpose of why we were here, and that we were  
15 asking for a letter to go ahead and approve  
16 publication of Revision-1 of Reg Guide 1.174 that has  
17 those two revisions in them.

18 And recognizing as I have shown there that  
19 there will be future updates of the reg guide.

20 MEMBER WALLIS: Well, this letter is  
21 confined to these very small changes, and it could be  
22 very short.

23 MS. DRUIN: Yes.

24 MEMBER WALLIS: And if it gets expanded,  
25 and you get all the thoughts of the committee on risk

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1 informed regulation, it may be very long.

2 CHAIRMAN APOSTOLAKIS: Well, what would be  
3 the consequences or inadvertent consequences of asking  
4 you to go back and change it? I mean, if you don't  
5 publish a revision, what happens? Nothing really.

6 MS. DRUIN: Well, the revision that is out  
7 there is what is out there.

8 CHAIRMAN APOSTOLAKIS: Yes, but I mean it  
9 is not something major will be impacted.

10 MEMBER POWERS: George, I think we have --  
11 well, I mean, if I was strategizing on their part, I  
12 think they would be anxious to get a letter that is  
13 Graham's short version.

14 I think there may be a -- it might be wise  
15 to consider expanded comments in something separate.

16 MEMBER KRESS: I would be tempted to  
17 combine -- to have a combined letter that says that  
18 for this revision, fine, but for the next revision, we  
19 think that these --

20 MEMBER POWERS: If you make it very  
21 explicit.

22 MEMBER KRESS: Yes.

23 CHAIRMAN APOSTOLAKIS: Or if you really  
24 want to have some results.

25 MEMBER POWERS: And make it clear to the

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1 staff that we really don't expect a response to those  
2 ancillary things until the next draft comes out.

3 MR. LANE: Another reason we would like to  
4 go ahead and publish this, we did tech edit this  
5 version a little bit better. There was some minor  
6 corrections and things that we omitted by accident  
7 that we would like to correct and get this out on the  
8 street.

9 MEMBER POWERS: Did you put it in defense  
10 in depth philosophy?

11 MEMBER ROSEN: The thing that we need to  
12 do in the letter I think is to do something about the  
13 perception that people will have when they get all  
14 done reading this revision with what did I just read,  
15 and what changed.

16 CHAIRMAN APOSTOLAKIS: That's right.  
17 Nothing changed.

18 MEMBER ROSEN: All that furor and nothing;  
19 it's a tempest in a teapot. We need to say something  
20 that there are changes coming that are important.  
21 This particular revision doesn't have them in them.

22 CHAIRMAN APOSTOLAKIS: I want to make a  
23 point. You have to stop the publication of this to  
24 show that it is really important that we have to  
25 demand good PRAs from now on.

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1           If you just say, well, next revision, I  
2           don't know when the next revision is coming up. The  
3           Commission wants a statement from the staff as to what  
4           could be done, and it could be done in 5 years. If  
5           you say no, don't publish this, then you are  
6           attracting attention. Unfortunately, that is the way  
7           that it is. One other thing just for the record.

8           MEMBER WALLIS: But, George, we have seen  
9           this before and said it was pretty good haven't we?

10          CHAIRMAN APOSTOLAKIS: No, we didn't say  
11          it was pretty good. We said Larkins' down.

12          MEMBER WALLIS: But essentially we said  
13          this is such a small matter that it is going to be a  
14          breeze.

15          CHAIRMAN APOSTOLAKIS: No, we said we will  
16          review it after the public comment period.

17          MEMBER WALLIS: Oh, is that all we said?

18          CHAIRMAN APOSTOLAKIS: Now, we may not  
19          have been model reviewers in this case, but at least  
20          we are not contradicting ourselves.

21          MEMBER ROSEN: But the point is that I am  
22          as one member of the ACRS underwhelmed by this, this  
23          particular revision.

24          CHAIRMAN APOSTOLAKIS: Now, would you make  
25          sure that your colleagues in reviewing power uprates

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1 read your sentence on page 15 that says a qualitative  
2 assessment of the impact of the licensing basis change  
3 on the plant's risk may be sufficient in some cases.  
4 Make sure that they read that, and I will comment on  
5 this later on.

6 MEMBER WALLIS: Qualitative?

7 CHAIRMAN APOSTOLAKIS: Yes. They are  
8 pulling quantitative numbers out of nowhere. They  
9 don't have to do that all the time, and --

10 MEMBER WALLIS: Qualitative isn't the  
11 word.

12 CHAIRMAN APOSTOLAKIS: -- I think the  
13 guide gives them a way out.

14 MEMBER SIEBER: If you are referring to  
15 PRAs for power uprates like Brunswick, that one was  
16 done wrong in the first place because it didn't model  
17 the change in LERF due to the higher pressures that  
18 were created, and it did not take into account the  
19 higher level of DKE, and it did not take into account  
20 changes in the source term.

21 What it did take into account was what 3  
22 minutes shorter, which is irrelevant.

23 CHAIRMAN APOSTOLAKIS: Irrelevant, right.

24 MEMBER SIEBER: And yet it went through  
25 all of this kind of review, and was included in the

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1 application. And we wrote a letter on it, and I have  
2 to pick the right words, and the ones that I want to  
3 use. Everything I can think of is four letters. That  
4 it was not a good PRA.

5 And I think that there is too many ways to  
6 wiggle out of doing that extra work, you know. Those  
7 are phenomenological things that occur that aren't  
8 modeled right.

9 CHAIRMAN APOSTOLAKIS: But the point that  
10 I really want to make is that not that I want them to  
11 do more. I think that -- and like in this case with  
12 the late containment side, you have got comments from  
13 the industry that this is an extra requirement, and we  
14 don't want this with it.

15 What they don't realize is that they will  
16 pay the price somewhere else if they don't do it here.  
17 That there will be some additional requirements  
18 somewhere else that they will have to fight, because  
19 the reviewers know that you have not done this.

20 The other point that Dr. Bonaca raised in  
21 another context is the categorization scheme actually  
22 for Option 2. And you have to also worry in addition  
23 to CDF and LERF about other things. You know, the  
24 barriers, to fission product releases, and so on, and  
25 if you don't do things like that, people know that

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1 these are not in the PRA, and they impose additional  
2 requirements.

3 So it is not by eliminating some of this  
4 stuff from the PRA that you are doing less. You pay  
5 the price somewhere else. If the PRA becomes very  
6 good, then eventually we will believe the  
7 categorization schemes and we will say if it is in  
8 Risk 3, then it doesn't deserve any treatment.

9 But now we don't, because the PRAs have  
10 holes in them, and I think that is a price that we all  
11 pay. So I think drawing the line now and saying as  
12 Diez said, a good level 2 PRA 30 years after WASH 1400  
13 is not an unreasonable thing to demand.

14 MEMBER WALLIS: But, George, wouldn't it  
15 be appropriate first to give a very short letter  
16 approving this change, and then forget it, and it's  
17 finished, and then have a meeting with the staff about  
18 future changes which ought to be made? We should  
19 really seriously look at these changes that we have  
20 discussed.

21 CHAIRMAN APOSTOLAKIS: My problem with  
22 that is that you are postponing it for at least a year  
23 that way, because we will not meet with the staff  
24 before December.

25 MEMBER ROSEN: Well, maybe a partial

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1 answer to Graham's question is the idea of a white  
2 paper brought up by Jack. A PRA white paper by ACRS  
3 could put these ideas together that we have expressed  
4 here and at other meetings.

5 CHAIRMAN APOSTOLAKIS: I don't think we  
6 need a detailed discussion with the staff as to what  
7 we should do. I could quote Diez, that a good level  
8 2 PRA, and what good means, and if you ask me, it  
9 means industry peer review, and so on.

10 MEMBER SIEBER: Right.

11 MEMBER ROSEN: I think that Commissioner  
12 Diez was absolutely right on the Level-2 part, but I  
13 don't think it goes far enough. I think we are  
14 talking about covering the sources of risk.

15 CHAIRMAN APOSTOLAKIS: yes.

16 MEMBER ROSEN: And that is a broader  
17 concept than just Level-2. So if we are going to make  
18 regulatory decisions based on risk analysis, we need  
19 a risk analysis that covers all the sources of risk.

20 CHAIRMAN APOSTOLAKIS: Well, he didn't say  
21 exclude any. He said just the good. The question is  
22 what is good.

23 MEMBER ROSEN: All right. But I think he  
24 and I wouldn't disagree if we had time to talk about  
25 these things. But I think that statement is a more

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1 limited one.

2 CHAIRMAN APOSTOLAKIS: Well, we can  
3 elaborate in our letter, but I really think we ought  
4 to take some drastic action with it, because as you  
5 said, publishing this doesn't help anybody. So  
6 delaying it doesn't hurt anybody either.

7 MEMBER SIEBER: You're right.

8 MEMBER ROSEN: And I don't think anyone is  
9 waiting for this in the industry.

10 MEMBER WALLIS: I think you may need to  
11 give your ideas some more thought before firing them  
12 off as part of a response to it.

13 CHAIRMAN APOSTOLAKIS: You see, I am not  
14 becoming very technical, and so I don't need to give  
15 it too much thought. All I am saying is that there  
16 exists a PRA out there that we have not taken  
17 advantage of.

18 MEMBER WALLIS: I think what he is saying  
19 is very important and very significant. But I am jus  
20 nervous about our over-response to what really is a  
21 very minor matter at this point, which is whether or  
22 not these changes are reasonable.

23 CHAIRMAN APOSTOLAKIS: No, they are. They  
24 are and I don't object to the changes. I am just  
25 saying that they don't go far enough.

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1 VICE CHAIRMAN BONACA: I think like Graham  
2 here, that it seems as if we are ambushing Revision-1  
3 and we are making a major change here to Reg Guide  
4 1.174. I mean, this is a major change, and I am all  
5 for it.

6 But I am saying that that may be a better  
7 approach to let Revision-1 to go with whatever is  
8 being proposed, and find a different forum for  
9 bringing this position, and that may be a white paper.

10 CHAIRMAN APOSTOLAKIS: Let me give you the  
11 counter argument to that. First, you are not helping  
12 anybody with Revision-1. Nobody is waiting out there  
13 to use Revision-1. It is just something that we are  
14 doing.

15 So delaying it, you are not hurting  
16 anybody. Second, if you say let's find another forum,  
17 I would bet you that it would be at least two years  
18 before Mary sits in there with a new revision. Not  
19 because of her, but because that is the way that the  
20 Agency works.

21 For us to develop a white paper, it is not  
22 -- you know our time scale, and we are not going to do  
23 it in a month.

24 MEMBER KRESS: No.

25 CHAIRMAN APOSTOLAKIS: We will have to

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1 discuss it in the January '2003, and then somebody  
2 will have to draft something for April. And I don't  
3 think we should postpone this thing. I mean, all we  
4 are saying is that it has been 30 years since the  
5 first good PRA.

6 MEMBER POWERS: That has to be the most  
7 ingenuous complaint that I can think of, because I  
8 know what the PRAs were like 30 years ago, and I don't  
9 think they were ready for prime time or any kind of  
10 time.

11 And it took us 20 years to get PRAs that  
12 had a reasonable amount of confidence, and now we are  
13 raising ancillary issues that really have not been  
14 wrestled with. And to argue that we have PRAs now for  
15 fire that are comparable to those that we have in  
16 internal events, is difficult to do.

17 To argue that we have shut down risk  
18 analyses that are acceptable to Dr. Kress is  
19 impossible to do. So I don't think it is fair to say  
20 to say, look, it has been 30 years, and this is like  
21 wine. It has aged enough.

22 CHAIRMAN APOSTOLAKIS: No, but on the  
23 other hand, it is a technology that came out five  
24 years ago. I mean, I can appreciate the argument of  
25 the 30 years, but I think there is some point there.

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1 And look at the last thing.

2 We have been doing this risk-informed  
3 regulatory thing for 5 or 6 years now. I mean, there  
4 has to be some knowledge that has been gained, and  
5 what is important, and what is not important.

6 MEMBER POWERS: And I think your  
7 discussion is appropriate for later this afternoon.

8 CHAIRMAN APOSTOLAKIS: Yes, when we get  
9 into that.

10 MEMBER POWERS: I think this lady and  
11 gentleman are doing just a workmanlike job on making  
12 a correction, and we ought to let them get on with it  
13 so that they can then devote their time to carrying  
14 out the implementation plan.

15 CHAIRMAN APOSTOLAKIS: Let me repeat the  
16 argument. I would be happy to let them go ahead and  
17 publish this, but they are publishing a document that  
18 nobody really cares about, and I am undermining my  
19 point.

20 I think that people are paying attention  
21 when you say no to something, okay? Otherwise, it is  
22 another advice from the ACRS and we will think about  
23 it. Anyway, anything else? This afternoon we will  
24 have to discuss this as to what the letter will be.  
25 But is there anything else that anybody else wants to

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1 ask? Mary and John? Okay. Thank you very much.

2 And we will recess for eight minutes.

3 (Whereupon, at 11:15 a.m., the meeting was  
4 recessed.)

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

(4:12 a.m.)

1  
2  
3 CHAIRMAN APOSTOLAKIS: We are back in  
4 session. The next item is Risk-Informed Regulation  
5 Implementation Plan, and the cognizant member is me,  
6 and so let's go ahead. Who will start? Okay. Mr.  
7 Cunningham, would you care to introduce your  
8 colleagues there for the record.

9 MR. CUNNINGHAM: I would be happy to. At  
10 the table with me today are Chris Grimes, Chief of the  
11 something branch in NRR.

12 MR. GRIMES: I am the program director for  
13 Policy and Rule Making in NRR.

14 CHAIRMAN APOSTOLAKIS: Okay.

15 MR. CUNNINGHAM: Next to him is William  
16 Beckner, Chief of the Technical Specification Branch.

17 MR. BECKNER: Again, Mark is not with me,  
18 and we have had programs put in place, and I am now  
19 the Chief of the Operating and Reactor Improvements  
20 Program, which includes the technical specifications  
21 section now.

22 MR. CUNNINGHAM: And then Mark Cunningham  
23 and Mike Johnson.

24 MR. JOHNSON: Mark Johnson, Chief of the  
25 Probablistic Safety Assessment Branch since April.

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1 MEMBER WALLIS: Mark, do you know what  
2 your job is?

3 MR. CUNNINGHAM: I am the Chief of the PRA  
4 Branch nominally in the Office of Research. Okay.  
5 This is an information briefing for the Committee, and  
6 we would like to tell you something about what is in  
7 the current version of the risk-informed regulation  
8 implementation plan, and give you some ideas on what  
9 we think are some of the more interesting topics  
10 there.

11 And to use this as an opportunity to  
12 define what might be of interest to the committee in  
13 hearing about over the next six months or so. Each of  
14 us will do some of it as we go on here.

15 We provided a draft copy of the  
16 implementation plan to you, and a somewhat modified  
17 version is with EDO now. It has not been signed out  
18 to the Commission as of this morning anyway.

19 I have a couple of slides that provide you  
20 a summary of what is in the implementation plan, the  
21 June 2002 version. There is 3 or 4 major elements in  
22 the mission paper itself.

23 One is a summary of upcoming activities,  
24 and one is a description of new activities in the  
25 implementation plan, there is a description of

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1 accomplishments over the last six months; and then  
2 there is an attachment, which is the implementation  
3 plan itself, which is a more detailed description, a  
4 kind of a two-page description of all of the  
5 activities that we have underway and that fall under  
6 the purview of risk-informed regulation.

7 The plan itself covers both reactor safety  
8 issues and nuclear materials, and safety and nuclear  
9 waste issues. And most of what we are going to talk  
10 about today is reactor oriented, and we will hit on  
11 some of the issues that are coming up in the waste  
12 area as well or in the materials area.

13 CHAIRMAN APOSTOLAKIS: Now, I read the  
14 draft document to the Commission, I guess, and it  
15 lists the areas that you have there. How come there  
16 is nothing on PRA methodology improvements and on  
17 safety cautious work environment.

18 MR. CUNNINGHAM: I will do the second one  
19 first, safety functions work environment is not  
20 something that is the subject of research in the  
21 agency. A few years ago there was a discussion up  
22 through and including the commission of whether or not  
23 that was an appropriate thing for us to study, and the  
24 commission said it was not an appropriate thing for us  
25 to study.

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1 CHAIRMAN APOSTOLAKIS: But in light of  
2 what happened recently, should we -- I mean, we keep  
3 talking about learning from experience.

4 MR. CUNNINGHAM: And some of our recent  
5 experience may cause us to rethink that, but at least  
6 the --

7 CHAIRMAN APOSTOLAKIS: But you would wait  
8 until you received high level guidance on this. You  
9 are still under the old Commission decision?

10 MR. CUNNINGHAM: Correct. Correct.

11 CHAIRMAN APOSTOLAKIS: Okay. How about  
12 general improvements of PRA methodology?

13 MR. CUNNINGHAM: General improvements are  
14 in the implementation plan. There is a description of  
15 work we are doing in human reliability analysis, fire  
16 risk analysis, and that sort of thing.

17 It probably didn't show up in the upcoming  
18 activities, because there were not major milestones to  
19 be accomplished over the next six months. The plan is  
20 updated every six months. So this list of upcoming  
21 activities tends to focus on that six month time  
22 frame.

23 There are a number of I think interesting  
24 issues going on in fire and human reliability, and  
25 aging, and that sort of thing if the committee wanted

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1 to hear about, and we could --

2 CHAIRMAN APOSTOLAKIS: And you would talk  
3 about each one of these items there?

4 MR. CUNNINGHAM: Today, we will talk about  
5 a few of these items.

6 CHAIRMAN APOSTOLAKIS: Does that include  
7 the coherence among risk-informed activities?

8 MR. CUNNINGHAM: Yes, sir.

9 CHAIRMAN APOSTOLAKIS: Good.

10 MR. CUNNINGHAM: And as we talked about,  
11 the paper talks about a number of upcoming activities  
12 in the reactor arena. We will talk today about some  
13 changes in 50-69. We will talk a little bit about  
14 risk-informing 50-46.

15 But in other things that are going on,  
16 there is a rule of vision for the fire protection  
17 rule, and we will talk about coherence here in more  
18 detail, and talk some more about risk management tech  
19 specs.

20 And you have heard a little bit already  
21 about the new regulatory guide or our P Chapter that  
22 we are writing on to address the issue of the needed  
23 PRA quality or adequacy to support decision making,  
24 and that you heard this morning in one of a series of  
25 discussions on pressurized thermal shock.

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1 CHAIRMAN APOSTOLAKIS: Right.

2 MR. CUNNINGHAM: Next slide. In the waste  
3 and materials safety areas, there is some other  
4 upcoming activities. They are looking at you know in  
5 that arena the number of licensees, and the type of  
6 licensees is much more diverse than in the reactor  
7 arena.

8 So they are looking at amending  
9 regulations related to medical uses, and they are  
10 looking at issues related to Yucca Mountain, and they  
11 are looking at how to risk-inform the materials  
12 inspection manual, and looking at ways to improve the  
13 decommissioning policy and make it more risk-informed.

14 CHAIRMAN APOSTOLAKIS: Now, the document  
15 says that NMSS anticipates the issuance of a final  
16 rule to amend the regulations governing the disposal  
17 of high level radioactive waste at Yucca Mountain, and  
18 to define the term unlikely in quantitative terms.

19 Now, that is kind of interesting. They  
20 are using the term unlikely in places, and they have  
21 not defined it?

22 MR. CUNNINGHAM: That is my understanding.  
23 We have got somebody that who will talk to us a little  
24 bit about that.

25 MR. LESLIE: Bret Leslie from NMSS, Risk

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1 Task Group, but previously from High Level Waste.  
2 When Part 63 was finalized, the EPA in their 197  
3 standards had used the term unlikely and left it up to  
4 the NRC to decide what was an appropriate range for  
5 features, events, and processes to be screened out  
6 associated with the human intrusion and the ground  
7 water protection standards.

8 The staff made a decision to go out with  
9 Part 63 with unlikely not defined, and the Commission  
10 had guided or told the staff to come back with a  
11 quantitative number for unlikely specifically for this  
12 rule making.

13 The public comment period closed on April  
14 12th, and they are in the process of putting that up  
15 to the Commission right now.

16 CHAIRMAN APOSTOLAKIS: That's interesting.  
17 Thank you. We don't use that term in reactors.

18 MR. CUNNINGHAM: We haven't.

19 CHAIRMAN APOSTOLAKIS: I don't remember.

20 MEMBER POWERS: No, we like to use highly  
21 unlikely, very unlikely.

22 MR. GRIMES: The legal standards from  
23 previous precedent is remote and speculative, and are  
24 the terms that were used to establish those things  
25 that should go or were beyond regulatory need.

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1 CHAIRMAN APOSTOLAKIS: You know, a famous  
2 mathematician, Amir Burrell, years ago said if you  
3 witness the occurrence of an event which probability  
4 is less than 10 percent, you have witnessed a miracle.

5 The probability and not the frequency.  
6 But he never heard of a nuclear reactor though. But  
7 it is interesting though. It is interesting to --

8 MEMBER POWERS: And he did all of that  
9 without EBAs, too.

10 CHAIRMAN APOSTOLAKIS: So, 10 percent.  
11 Okay. Mr. Cunningham, let's go on.

12 MR. CUNNINGHAM: We will go to the next  
13 slide, please. There are about seven new activities  
14 that are described and that are new to this version of  
15 the implementation plan. Two of them are in the  
16 reactor arena; the coherence issue that we will talk  
17 about later, and the new reg guide on PRA adequacy.

18 For your information, in the waste and  
19 materials arenas, there are several of them. They are  
20 developing guidance on how they should be performing  
21 risk analyses throughout the spectrum of regulated  
22 activities that they have.

23 They are developing -- and we are working  
24 with them on research to develop safety goals for the  
25 different types of licensees that they have. They are

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1 looking at risks associated with low level source  
2 material, and we are talking about amending Part 63.

3 And then looking at a set of what they  
4 call cost-cutting issues related to risk of spent fuel  
5 management. Again, the paper continues, and there is  
6 an Attachment 1 to the paper, which is a set of  
7 accomplishments over the last six months.

8 And again Attachment 2 is the more  
9 detailed implementation plan that gives you a kind of  
10 two page summary of each of the activities in the  
11 implementation plan.

12 With that general overview, I am going to  
13 spend a couple of minutes talking about one particular  
14 topic in that reactor arena, which is the possible  
15 changes to 50.46.

16 We have under way now a study of looking  
17 at several changes to 50.46 to make it more risk-  
18 informed, and we are talking about replacing the  
19 current requirements with more performance-based  
20 requirements.

21 We are looking at a possible change to the  
22 evaluation model to allow for more realistic analyses,  
23 and we are looking at developing or changing the way  
24 that the reliability requirements are implemented for  
25 ECCS.

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1 CHAIRMAN APOSTOLAKIS: The title of this  
2 is risk-informed regulation and implementation plan.  
3 What is a plan? I mean, these are activities that you  
4 are already doing.

5 MR. CUNNINGHAM: Yes.

6 CHAIRMAN APOSTOLAKIS: Is there a plan of  
7 getting somewhere?

8 MR. CUNNINGHAM: Yes, there will be.  
9 Let's go back to that when we get into the coherence,  
10 because that is exactly the issue that has come up in  
11 several different ways.

12 CHAIRMAN APOSTOLAKIS: So we know where we  
13 want to go, and we have a plan to get there?

14 MR. CUNNINGHAM: That is the coherence  
15 issue, and we will come back to that in a minute.

16 CHAIRMAN APOSTOLAKIS: Okay.

17 MR. CUNNINGHAM: So 50.46, and we have had  
18 a number of things under way. Next slide. We have  
19 completed an evaluation of the technical feasibility  
20 of plant specific reliability of evaluations for ECCS  
21 equipment, and that was completed in April.

22 We have completed the technical evaluation  
23 of changes to the acceptance criteria and the  
24 evaluation model and that was just provided to NRR in  
25 June. And we will complete the evaluation of a

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1 generic approach for assessing reliability  
2 requirements for ECCS equipment at the end of this  
3 month.

4 Basically, this is a set of technical work  
5 to look at the feasibility of possible changes to the  
6 rules, and starting in April through this month, we  
7 are making a transition from technical assessment to  
8 looking at potential rule changes.

9 So the focus and the lead for the work  
10 moves from research to Chris' people and the NRR folks  
11 to look at the possible ways to implement rules to  
12 make these types of changes.

13 MEMBER WALLIS: I thought we already had  
14 allowance for realistic analyses in the ECCS  
15 evaluation model. What is it that is becoming more  
16 realistic?

17 MR. GRIMES: The proposal that has been  
18 submitted to the NRR is a recognition that there are  
19 certain features of the analytical techniques that  
20 could be improved by using more current --

21 MEMBER WALLIS: Well, you can do that now.

22 MR. GRIMES: You can do that, and in fact,  
23 the research information letter that was sent to us  
24 makes some specific recommendations about undertaking  
25 rule making. You are correct that 50-46 and Appendix

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1 K currently provide for a realistic model.

2 And, in fact, I think you have heard some  
3 of the industry feedback on the proposed rule making  
4 changes, and a question of whether or not the cost of  
5 making the model improvements will be offset by  
6 benefits.

7 MEMBER WALLIS: Industry is backing off?

8 MR. GRIMES: We are still trying to gather  
9 information from the industry and in fact this is the  
10 point where I should interject that we are reviewing  
11 the recommendations in the research information  
12 letter, and we are also going to look at the July  
13 generic findings, in order to determine whether or not  
14 we are ready to start developing draft rule language,  
15 or whether or not in the context of future planning  
16 whether we will postpone any rule making activity in  
17 this area to put more effort into looking at the cost  
18 benefit aspects, and do some preliminary regulatory  
19 analysis work in order to determine how to proceed.

20 MEMBER WALLIS: But my question though was  
21 about the more realistic analyses. I thought we had  
22 the ability to put in more realistic analyses, and I  
23 wondered what new greater realism you were looking  
24 for.

25 MR. CUNNINGHAM: One particular piece is

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1 that we have changed to use the newer standard for  
2 decayed heat, the new 1994 or something ANS standard  
3 on decayed heat. There is a few things like that  
4 which would be implemented.

5 MEMBER WALLIS: And that have not been  
6 flexible in the past?

7 MR. CUNNINGHAM: Correct.

8 MR. GRIMES: That's correct.

9 MR. CUNNINGHAM: The regulation states  
10 specifically that you have to use --

11 MEMBER WALLIS: I think in the thermal  
12 hydraulics that you can use better methods all the  
13 time, and just bring them in.

14 MR. CUNNINGHAM: That's right. It is  
15 implementing those in a fairly prescriptive set of  
16 requirements. So you have to be fairly formal about  
17 making these --

18 MR. GRIMES: That is one of the reasons  
19 why we would like to also consider the specific  
20 recommendations that research sent in their research  
21 information letter.

22 In the context of what the most effective  
23 way to proceed with rule making might be, because  
24 obviously anything we can do in the rule making area  
25 that establishes more generic requirements, as opposed

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1 to simply setting forth a set of requirements that  
2 have to be implemented on a plant specific basis, or  
3 with topical report methods be reviewed on a case by  
4 case basis, we could be more efficient if we could do  
5 this on a generic basis.

6 MEMBER SHACK: I mean, particular research  
7 information that you are talking about really relates  
8 to reliability requirements rather than best estimate  
9 thermal hydraulic codes.

10 MR. CUNNINGHAM: The June research  
11 information letter that we talked about, talks about  
12 changes to the acceptance criteria, and the evaluation  
13 model. And that is separate from the April and July  
14 deliverables related to the reliability requirements.  
15 And there is three distinct products.

16 MR. GRIMES: It also offers up the  
17 prospect of performance-based criteria for fuels that  
18 is going to take some more work and requires some  
19 implementing guidelines that are still being worked  
20 on.

21 MR. CUNNINGHAM: We will turn at this  
22 point then to talk more about the plan for improving  
23 coherence among reactor-risk informed activities.

24 MR. JOHNSON: Thanks, Mark. Let me just  
25 point out that I am joined at the side table by Stu

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1 Magruder and Mary Druin, and they are actually going  
2 to do the bulk of the presentation on coherence. I  
3 just want to say a few words about coherence, and  
4 where I think we are headed.

5 We believe that we have witnessed  
6 considerable progress in terms of risk informing our  
7 regulatory activities. And, in fact, examples like  
8 the reactor oversight process, and many of the things  
9 that have been captured in the current implementation  
10 plan, some of which are well underway, and many of  
11 which are still ongoing, sort of demonstrate that we  
12 are continuing to make progress on risk-informing our  
13 activities.

14 But we believe, and in fact we have -- the  
15 Commission has pointed out to us, and others have  
16 pointed out, that if we are going to continue to make  
17 progress and get to the next level that we are going  
18 to need to be clearer about what we desire, in terms  
19 of an End State if you will, and what approaches we  
20 see in terms of trying to reach that End State.

21 And we are going to need to be more  
22 integrative between the various activities, some of  
23 which we sort of did in isolation so that we can  
24 inconsistencies and overlaps, and address those  
25 overlaps, and in addition to that, look for holes and

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1 address those holes.

2 And as a sort of relatively new  
3 initiative, we are going to need to manage the  
4 internal environment to make sure that that  
5 environment -- and I am talking now about the staff  
6 and the staff's understanding of, and ability to be  
7 able to implement our activities because they are  
8 trained in the area to communicate and the processes  
9 that support them.

10 And we need to manage the environment, and  
11 so all of those things are wrapped up into this notion  
12 about working towards improving the coherence among  
13 our risk-informed activities.

14 So let me just say that in terms of an  
15 introduction, and turn it over to Stu to talk through  
16 the slides.

17 MR. MAGRUDER: Thanks, Mike. Can I have  
18 the next slide, please. Actually, Mike went through  
19 some of this, but I just would remind you that we do  
20 have an SRM directing us particularly to move forward  
21 with this, and the result of I think a reactor safety  
22 arena briefing for the Commission in January.

23 So that is one of the inputs that we have,  
24 although I should say that we started this process  
25 well before the SRM as a result of our own internal

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1 discussions, and external input from GAO and others in  
2 the ACRS area.

3 Obviously, stakeholders believe that we  
4 are inconsistent in our approaches, and as Mike said,  
5 the NRC staff itself is often frustrated in trying to  
6 implement some of the se activities. Next slide,  
7 please.

8 So the goal of this effort, at least at a  
9 high level, is to develop a common understanding of  
10 the objectives. And it sounds simple, but we found  
11 that if you asked 10 people, you would get at least 10  
12 different answers about what the goals should be.

13 Everybody understands the highest level of  
14 goals of protecting public health and safety, and most  
15 people agree on the quantitative health objectives,  
16 but not everybody agrees that those are appropriate  
17 for all types of reactors.

18 So our goal is to reach a common  
19 understanding, a unified goal, or unified  
20 understanding and then obviously get the staff and the  
21 stakeholder buy in that we are headed in the right  
22 direction.

23 CHAIRMAN APOSTOLAKIS: But what would that  
24 common understanding be? I mean, I don't understand  
25 this. I think what we discussed with the

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1 Commissioners earlier today, this afternoon, is  
2 probably an element of this, and that the agency has  
3 developed a regulatory structure that has a number of  
4 objectives.

5 And everything that is risk-informed seems  
6 to have as objectives the controlling of the frequency  
7 of core damage in larger releases. Isn't that an  
8 obvious place to start?

9 That is creates a gap between risk  
10 informed activities and traditional regulatory  
11 activities? And I think we had a good start with the  
12 reactor oversight process when we asked you guys to  
13 develop the hierarchy and you did.

14 And you identified the cornerstones and  
15 you said, look, we really worry about initiating  
16 events, and we worry about this and that. Is that a  
17 common understanding that we are going to develop?

18 MR. GRIMES: Dr. Apostolakis, if I may,  
19 yes, to all of the above. As the project manager for  
20 all of the rule making activities and guidance  
21 development work that needs to be processed as part of  
22 this program, what I look to this effort to do is to  
23 basically define the performance measures that I can  
24 use in order to determine whether or not all of these  
25 various activities are working to a common set of

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1 performance standards.

2 How will I know when the rules are going  
3 to achieve the desired outcome? And as you described  
4 to the Commission, there may be some fundamental  
5 policy issues associated with the regulatory  
6 structure, and how we implement the regulations, and  
7 how we establish the threshold for regulatory  
8 analysis, and that is the degree of regulatory  
9 involvement.

10 And so this very high level statement  
11 actually should read the development of a common  
12 understanding of risk-informed performance, and based  
13 risk management regulatory program planned activities.

14 MEMBER POWERS: You will get chastised to  
15 no end by Commissioner Diez if you come on to him with  
16 those words.

17 MR. GRIMES: I understand.

18 CHAIRMAN APOSTOLAKIS: So this is really  
19 your goal with this?

20 MR. GRIMES: That's correct.

21 CHAIRMAN APOSTOLAKIS: Well, that's great.

22 MR. GRIMES: And I would also point out  
23 that Stu didn't put enough emphasis on that  
24 stakeholder buy-in aspect, because besides the  
25 description of what the ACRS views about what is right

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1 and wrong that you just described to the Commission,  
2 as well as your own individual views about what is  
3 right and wrong, we also have a large number of other  
4 stakeholders.

5 And as you correctly pointed out to the  
6 Commission, ultimately the program is going to succeed  
7 or fail based on whether or not it is credible to the  
8 majority of the people who ultimately are going to  
9 implement it.

10 And so if we don't have credibility that  
11 we know that we are doing, and that we have some idea  
12 about the outcome of these efforts are going to be,  
13 then we are just going to make a bunch of rules and  
14 people are going to ignore them, especially if those  
15 rules continue to be constructed as voluntary  
16 alternatives to traditional design basis requirements.

17 MEMBER SIEBER: I agree.

18 MEMBER WALLIS: This is very strange. I  
19 mean, you are here to tell us why you are doing  
20 something, and you do something because you have  
21 objective and that's why you do things. And so what  
22 you are telling me is that the agency has decided to  
23 performance base its regulations without knowing why?

24 MR. GRIMES: No, we know why, because the  
25 performance goals in the strategic plan that give us

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1 the high level outcomes are, and the reactor oversight  
2 process translated those into cornerstones.

3 And at the risk of defining yet another  
4 term, I would say that we would use the cornerstone  
5 concept now and extent that to all of our other  
6 regulatory features.

7 MEMBER WALLIS: So now you are going to be  
8 more specific or more detailed about the objectives,  
9 but the major objectives you understand?

10 MR. GRIMES: Yes, sir.

11 MEMBER WALLIS: Okay. I think we need to  
12 know that, because I think the impression has been  
13 given here that you didn't know what the objectives  
14 were.

15 MR. GRIMES: No, we know what the very high  
16 level objectives are. The purpose here is to  
17 translate those into detailed objectives.

18 MEMBER WALLIS: And it is very simple to  
19 deduce the details from the high level?

20 MR. GRIMES: I would suggest, and I will  
21 ask Mike to add to that; that the work that went into  
22 developing the cornerstones for the oversight process  
23 was not a trivial matter.

24 MR. JOHNSON: This is really just a  
25 fundamental step that we are taking, and it is just

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1 trying to be clear about where we want to be at some  
2 time in the future with respect to risk-informing the  
3 regulations and all of these activities that we have  
4 ongoing.

5 It is trying to crystalize that and you  
6 don't have to look very far into the staff internally  
7 or even with external stakeholders to figure out that  
8 while it may be clear to some of us, it is not clear  
9 to everybody about where we are trying to go.

10 And the approaches that we are using to  
11 get there, and so that is sort of a fundamental step,  
12 but this is sort of a fundamental step, but it is not  
13 a trivial step actually.

14 CHAIRMAN APOSTOLAKIS: So this is what you  
15 mean on page 6 by articulate and propose clear and  
16 consistent statements of the vision for risk-informed  
17 regulation? This is it? This is the most important  
18 bullet in this document?

19 MEMBER ROSEN: Let me talk about the staff  
20 and stakeholder buy-in for a minute, because I have  
21 been through an analogous process at a utility, where  
22 developing risk-informed objectives, and techniques,  
23 and processes, was -- we clearly understood, we and  
24 the management, clearly understood what it was that we  
25 were trying to do.

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1           But we couldn't get it done until we got  
2 staff and stakeholder buy-in. Well, it turns out that  
3 no amount of talking worked. No amount of discussion  
4 worked. Pretty soon you have to realize that the  
5 people that have to do the job want to know what is in  
6 it for me.

7           And so one of the pieces of this that my  
8 experience teaches me and that you need to include is  
9 a clear discussion of how it will affect to the better  
10 hopefully the lives of the people whose buy-in you  
11 want or that you are seeking.

12           MR. JOHNSON: And if I could just add to  
13 that. The other thing that we are finding, I believe,  
14 is that risk informing is not a spectator sport if you  
15 will. You don't get it until you do it.

16           So, that is a part of that statement that  
17 I made at the very end about having to manage the  
18 environment internally, but also having to work with  
19 stakeholders to make sure that they understand, and  
20 that they are participating in the process as well.

21           MEMBER ROSEN: I am thrilled with what you  
22 said about it not being a spectator sport, and that  
23 you absolutely have to have and to create an  
24 environment where people want this to go forward,  
25 because my experience tells me that is what you need

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1 to make it work.

2 And where we have made it work at one  
3 utility. Now, the question that I am going to be  
4 thinking about as you go forward is what is it in  
5 there that -- what is in it for them, and can you  
6 focus a little bit of your discussion on how, if that  
7 is what you are intending, which I hope it is, how are  
8 you going to get there.

9 MEMBER WALLIS: And what is in it for the  
10 public.

11 MR. GRIMES: All of the stakeholders, and  
12 in fact that is the point; that we need to get all of  
13 the stakeholders, including the utilities that are  
14 looking for reduced and unnecessary burden, the public  
15 advocates who are looking for public confidence, and  
16 the practitioners who are looking to better safety.

17 We tie all of the special interests back  
18 to performance goals, and then get the spectators  
19 involved in developing the tools and the regulatory  
20 structure so that they feel that they have some  
21 ownership of it.

22 CHAIRMAN APOSTOLAKIS: And how are you  
23 going to do this? Are you going to have workshops and  
24 all that stuff?

25 MR. GRIMES: We are planning on a workshop

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1 in the late summer or early fall, as soon as we can  
2 without interfering with progress, near-term progress,  
3 and then start the dialogue process.

4 CHAIRMAN APOSTOLAKIS: I suggest that you  
5 come to us as soon as you have some half-baked ideas.

6 MR. GRIMES: Well, at the end of this  
7 presentation, we are going to talk about where we are  
8 going from here, and next steps, and --

9 CHAIRMAN APOSTOLAKIS: Because we are very  
10 much interested in this subject, and we will be happy  
11 to brainstorm with you in fact. I mean, this is the  
12 way that we did 1.174.

13 MR. GRIMES: And my attitude has always  
14 been that since I don't have to go get technical  
15 assistance contracts to get your assistance, you are  
16 a freebie resource that we would like to take  
17 advantage of as frequently as possible.

18 CHAIRMAN APOSTOLAKIS: And that is not the  
19 only reason. Come on now.

20 MR. GRIMES: I didn't say the only reason.  
21 I just said I am motivated.

22 MEMBER POWERS: I want to remind you,  
23 Chris, that you get what you pay for.

24 CHAIRMAN APOSTOLAKIS: Okay. So where are  
25 we now, Slide 11. Are we already to move on to 12?

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1 MR. MAGRUDER: Yes, let's move on to 12.  
2 Let me go back quickly to Dr. Wallace's point about  
3 taking the high level goals and going down to a more  
4 detailed level.

5 Some of the issues that we are struggling  
6 with, and that we have done a lot of reading of ACRS  
7 reports and letters, are issues such as the balance  
8 between prevention and mitigation, defense in depth  
9 and what that means, and things like that.

10 So as Chris said, the more input that we  
11 get from you and other stakeholders, the better on  
12 that. On Slide 12 here, as Mike has already said, we  
13 are going to utilize existing efforts, or ongoing  
14 efforts, including the oversight program, the  
15 framework that has already been developed for risk-  
16 informing Part 50.

17 And as we talked about, make sure that we  
18 need to identify what the goals are and the products  
19 that we want to come up with. The approach for  
20 achieving the goals is going to be consistent  
21 obviously with the Commission's papers on risk-  
22 informed and performance-based regulations, and the  
23 SECY-98-0300 on laying out the approaches here.

24 Things that we will be looking for  
25 obviously are inefficiencies in the process, and

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1 unnecessary regulatory burden, and safety concerns and  
2 where they come up. The advantage of obviously doing  
3 this approach is to give a holistic view of the  
4 regulations, or at least that is what we are going to  
5 attempt to do.

6 And if we uncover some areas that we need  
7 to tighten up on, we will do that obviously.

8 MEMBER ROSEN: I would have been happier  
9 if your inefficiencies said something like  
10 inefficiencies and unnecessary workload for NRC staff,  
11 because of this business of getting staff buy-in.

12 I know that the staff feels it is  
13 overburdened and overworked, and they are. So this  
14 approach would identify something that they really  
15 don't need to do.

16 CHAIRMAN APOSTOLAKIS: And that is an  
17 unnecessary burden on the NRC staff.

18 MEMBER ROSEN: Yeah.

19 MEMBER WALLIS: I think you would be  
20 better off if you said that the approach to identify  
21 opportunities for better efficiency rather than  
22 putting it in a negative way like this.

23 MR. GRIMES: That's a good point. And we  
24 continue to try to stress the positive, and we  
25 sometimes fall into these habits of using outdated,

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1 half-empty class language.

2 And in fact I think that this would be an  
3 appropriate point to mention that I think the first  
4 step in this activity is my desire to organize a  
5 public meeting to settle language use, and to pick out  
6 terminology and say there is a common set of  
7 terminology that we are going to use to communicate  
8 these activities.

9 And what does risk-informed mean, and what  
10 does performance-based mean, and what is risk  
11 management, and how does it relate to the tech spec  
12 activities that Bill is going to describe, because a  
13 lot of the frustration that we have is simply our  
14 inability to communicate with each other about what it  
15 is that we really are trying to accomplish.

16 MR. MAGRUDER: Real quickly, the last  
17 bullet down there, the interface with advanced  
18 reactors has been talked about, and I know that you  
19 talked about it on Monday, and I am sure that you will  
20 talk about it tomorrow also.

21 But we just wanted to point out that we  
22 are looking at this, and that we are starting with the  
23 approach that there should be one regulatory framework  
24 that covers all reactor designs, and that we will  
25 diverge when we have to.

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1           And rather than starting out with a  
2           different structure for gas reactors, or other  
3           advanced designs, we are going to try to start and  
4           proceed down the path that way, and we will see where  
5           it takes us.

6           MEMBER WALLIS: This is the technology  
7           neutral part that we heard about the other day?

8           MR. MAGRUDER: Yes.

9           CHAIRMAN APOSTOLAKIS: But you will not be  
10          so ambitious as to go to frequency consequence curves  
11          and drop CDF are you?

12          MR. GRIMES: Not immediately. The idea  
13          here is that we look at -- we want to look at the  
14          vision of the future, which is technology independent,  
15          but we emphasize that we are not going to stop what we  
16          are doing now, or try to make changes too fast and  
17          confuse ourselves.

18          CHAIRMAN APOSTOLAKIS: Well, if you  
19          develop some sort of frequency consequence curve for  
20          some other type of reactor, then the CDF that we are  
21          using now should be consistent with that.

22          MR. GRIMES: Right.

23          MEMBER ROSEN: You just introduced another  
24          key point in terms of stakeholder buy-in, that my  
25          experience teaches me, and I will share it with you.

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1 That early on when we decided to go forward, we  
2 determined to control the pace and quality of what we  
3 were doing in a pro-active way.

4 Because to get buy-in, which is crucial,  
5 one must not swamp the stakeholders with change. It  
6 takes time to get used to change. So you need to  
7 control the pace, and how well you do things.

8 Not everything has to be done perfectly,  
9 but you need to know how well certain things need to  
10 be done. If you feel that establishing control of the  
11 language, for instance, your last point is a crucial  
12 matter, and then you need to say we are turning the  
13 dial way, way down in terms of speed as part of this  
14 process so that we can spend more time, and give  
15 people a chance to adopt to the language consciously  
16 as part of the management control

17 So that was another thing that we found  
18 necessary to implement change in a culture, because  
19 that is what you are doing. You are trying to affect  
20 a culture change. So you control the pace and  
21 quality, and you tell the people what is in it for  
22 them.

23 MR. GRIMES: Correct. And in fact this is  
24 not only relevant to this specific compliment of  
25 programs, but it is part of our efforts to instill

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1 planning, budgeting, and performance monitoring, and  
2 management techniques within our organizational  
3 improvements.

4 So we have cross-cutting interests here,  
5 in terms of -- and as the now popular textbook says,  
6 we are practicing moving the cheese, and the textbook  
7 is called, "Who Moved My Cheese."

8 It is one of a series of change management  
9 technique texts that is used for rereading some of us  
10 old managers.

11 CHAIRMAN APOSTOLAKIS: Is this a good time  
12 to also make a few comments on Part One, Risk Informed  
13 Regulation that is part of the document?

14 MR. CUNNINGHAM: It might be better to  
15 wait a minute or two, and let's finish with the  
16 coherent part, and then move on.

17 MR. JOHNSON: Right. Stu has one more  
18 slide to finish up on.

19 CHAIRMAN APOSTOLAKIS: I thought he was  
20 done.

21 MR. MAGRUDER: Let's go to the last slide  
22 here read quick We have already talked about many of  
23 these, and obviously there is an outline of these  
24 activities in the RIRIP, and the version that you have  
25 is a little bit dated.

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1           The version has marks in it, and the  
2 latest version is with the EDO, and it should be  
3 forwarded to the Commission any day. The Commission  
4 TAs have expressed interest in this process also, and  
5 so after they have read the RIRIP paper, we are going  
6 to set up a briefing for them.

7           And as we have talked about a lot, we want  
8 to have many interactions with stakeholders. We  
9 tentatively have planned to try to get onto the ACRS  
10 calendar for September, along with a discussion of  
11 50.69.

12           And as is obvious, we don't have a  
13 detailed plan yet, but we are hoping to put one  
14 together. Obviously, we want to set the goals and  
15 objectives first before we write out plan, and to get  
16 agreement on the language and everything.

17           MR. GRIMES: This is a more detailed plan.  
18 We don't want to diminish the fact that we are  
19 continuing with this RIRIP, which is a series of  
20 planned activities. And those are reflected in our  
21 budget assumptions.

22           This is a more detailed plan that looks  
23 more like a 5 year plan, and that is going to lay out  
24 a series of activities that are logically leading from  
25 one stage to the next stage.

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1 CHAIRMAN APOSTOLAKIS: Now, okay, I read  
2 what is called Part Roman One, Risk Informed  
3 Regulation, and I think it has the same tone that was  
4 adopted back in 1997 when we were thinking about  
5 writing 1.174. It assumes to a large extent that  
6 everybody knows what a risk-informed regulation is,  
7 and just real quick on the things that you really have  
8 to worry about; defense in depth, safety margins, and  
9 so on.

10 I think it is too negative that way, and  
11 then there is a whole section on defense in depth, and  
12 safety margins, performance-based and so on. I think  
13 the time has come to have a section up front that  
14 actually describes what a risk-informed approach is,  
15 and what it is that it brings to the table that is not  
16 already there.

17 And I think that Stu in his presentation  
18 actually alluded to that. You know, you have a  
19 holistic view of the thing, and the classic words are  
20 socio-technical system. You find this and you find  
21 that. You know, that kind of stuff, and to say why  
22 are we trying to do this.

23 You know, in '97, we really didn't want to  
24 rush into it, and we put all sorts of constraints, and  
25 this and that, and there is no reason for us to do

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1 that any more.

2 And then after you do that, praise it a  
3 little bit since you are planning to work on it for 5  
4 years, but then you say, but look, there are certain  
5 shortcomings, and we still don't want to abandon the  
6 defense-in-depth, and so on. So the tone is kind of  
7 negative. That's what I am saying. It could be more  
8 positive.

9 There I have a minor comment on defense in  
10 depth. The defense in depth philosophy ensures that  
11 safety will not be wholly dependent on any single  
12 element of the design for structural maintenance or  
13 operation. Does that include the reactor vessel?

14 MR. GRIMES: It is one of the core areas.

15 CHAIRMAN APOSTOLAKIS: So then I guess I  
16 stick to my earlier comment that we really have to  
17 change the attitude. And then at the end, you know,  
18 you can have a treatise on uncertainty, and then say  
19 that an traditional way of handling it was defense in  
20 depth and safety margins, and as I said to the  
21 Commission earlier, the PRAs right now largely  
22 quantify the in-part of defense in depth because it is  
23 the easiest thing to do.

24 If I have three trains, two trains, two  
25 pumps, it is easier. But I think that would place

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1 things in perspective and in fact I think we wrote a  
2 letter back in '97 that has a long discussion of that.

3 And I asked the staff to prepare a copy of  
4 that. I think it would be worthwhile for you guys to  
5 go look at it. By the way, when we write letters,  
6 they are valid 5 or 6 years later. This is from '97.

7 MR. GRIMES: I think Stu pointed out that  
8 they did a very thorough search, and obviously didn't  
9 uncover all the nuggets in that search.

10 MEMBER ROSEN: They are rather more like  
11 wine actually.

12 MEMBER SIEBER: Or kernels of corn.

13 CHAIRMAN APOSTOLAKIS: No, because the  
14 issue of uncertainty, I think that in a document like  
15 this, like we did in that letter, start out by saying,  
16 look, from day one of this industry uncertainty has  
17 been a major issue.

18 Before the PRA was unquantified, they were  
19 handling it with defense in depth, and this and that,  
20 and now we can quantify part of it. How do we bring  
21 all these things together. I think that is the real  
22 issue, and what are the benefits of a risk-informed  
23 approach, rather than always saying, oh, but we have  
24 to do this and do that, and make sure that it is not  
25 risk-based, but heaven forbid. Okay. Now we can go

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1 on.

2 MEMBER WALLIS: Well, when you interact  
3 with your stakeholders, you may find that some of them  
4 are less favorably inclined to this objective than  
5 they were before. The objective has been around for  
6 quite a while, and some people's experience with it  
7 has not been as positive as maybe it could have been.

8 CHAIRMAN APOSTOLAKIS: Now, as part of the  
9 package that I received, there was an NEI 02-02, a  
10 risk-informed, performance based regulatory framework  
11 for power reactors. Is that for our information or --

12 MR. GRIMES: Yes. As a matter of fact, it  
13 was originally envisioned that NEI had intended that  
14 that white paper was going to establish their vision  
15 of the regulatory framework for advanced reactors, but  
16 there are so many commonalities that they took the  
17 advanced reactor title off, and they presented it as  
18 a means of starting dialogue.

19 MEMBER ROSEN: Well, the members will know  
20 all the letters by heart.

21 MR. GRIMES: In answer to your question,  
22 02-02 is essentially an NEI vision of what regulatory  
23 framework could aspire to, and we are going to use  
24 that as one of the inputs, as one of the stakeholder  
25 inputs, to things that we should consider for this

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1 coherence plan.

2 It also I think nicely lays out and  
3 organizes what the industry views as the issues that  
4 need to be overcome.

5 MEMBER ROSEN: You will of course  
6 understand that any NEI viewpoint will be -- there  
7 will be members of NEI, utilities specific, that don't  
8 agree a hundred percent with that. That is ont a  
9 homogenous view out there, and so you always need to  
10 be alert to the outliers, who if you can get them to  
11 tell you what they are thinking, may offer you a more  
12 diverse viewpoint.

13 MR. GRIMES: That's true, and that is a  
14 very important point of our communication plan, is  
15 making sure that we get as homogenous group as  
16 possible, and that the same is true of the public  
17 advocates.

18 There are extremes and middle of the road  
19 views, in terms of what the public interest groups  
20 think are the advantages and disadvantages.

21 MEMBER ROSEN: I think you misunderstood  
22 my point. My point was that you need to understand  
23 the homogenous view if there is one.

24 MR. GRIMES: Yes.

25 MEMBER ROSEN: But you also need to listen

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1 to the non-homogenous, the heterogenous viewpoints,  
2 because there may be some wisdom in the heterogenous  
3 viewpoints as well.

4 MR. GRIMES: Yes, I understand. Are  
5 right.

6 MR. CUNNINGHAM: Are we ready to talk  
7 about tech specs?

8 MR. BECKNER: All right. Yesterday, we  
9 were trying to figure out just why I was going to  
10 talk, and I think that the approved answer here is  
11 that as a number of people alluded to, we are  
12 developing an overall plant while there are a number  
13 of ongoing activities in progress, and I think we need  
14 to strike a balance between continuing progress, and  
15 at the same time not getting ahead of ourselves.

16 I think that was the reason that I wanted  
17 to talk about one of many programs that has made some  
18 progress and give you a status report. I may change  
19 my remarks just briefly, because some of the  
20 experiences that we have had do relate to some of the  
21 comments that have been made here.

22 And so I will try to tailor them a little  
23 bit. If you want to go to the first slide, Slide 15,  
24 we have talked to the ACRS before, but it has been  
25 quite some time, and so I think it is probably

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1 appropriate that we give you a brief, and let me  
2 emphasize very brief, update, and wet your appetite,  
3 and if you want to hear more, we will be glad to come  
4 back.

5 There have been 7 or 8 initiatives around  
6 for a very long time. The eighth one is in effect the  
7 Option 3 rule making and do we need a tech spec rule  
8 or not.

9 But there have been 7 or 8 initiatives  
10 that have been evolving over the years, but they are  
11 very, very similar, at least in terms of title, and I  
12 have a slide in there that lists what those eight are.  
13 I am not going to specifically go over those.

14 What I will do is go over the first four,  
15 primarily from a status and experience standpoint of  
16 where we stand. One thing I want to point out is the  
17 objective of what we are trying to do, and in what we  
18 are not calling risk management tech specs.

19 And if you want to know where we got that,  
20 that is really in 1.174 and in integrated decision  
21 making, and there is a small paragraph there that  
22 describes it very well. But what we are trying to do  
23 is that we are trying to make tech specs and the  
24 maintenance rule work together.

25 And that idea actually emerged long before

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1 the maintenance rule had the shall and it used to have  
2 a should. We have a configuration of a risk  
3 management program that was in 1.177 and that later  
4 the Commission asked us to replace the maintenance  
5 rule.

6 But our objective remains the same, is  
7 trying to make these two activities, tech specs and  
8 the maintenance rule activities, work together in a  
9 synergistic manner, and that remains, and I think we  
10 are getting there to various degrees.

11 So with that, if we can go to Slide 16.  
12 I am going to list the first four initiatives, but in  
13 order of chronological order. We have completed one  
14 of the initiatives on missed surveillances.

15 And rather than talking about what it is,  
16 I may talk about some of our experience because some  
17 comments were made here about stakeholder buy-in, and  
18 also what is in it for me. I think we learned a lot  
19 with this one. We viewed this as a relatively small  
20 and straight-forward change to tech specs.

21 And boy did we learn different. We have  
22 some stakeholder interaction to learn about, and we  
23 had some issues about what is in it for me, relative  
24 to the maintenance rule was one of the areas, and I  
25 will talk about that briefly.

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1           But the bottom line is this is one of the  
2 first risk-informed initiatives and it basically gets  
3 surveillances that are missed off the table, in terms  
4 of potentially shutting down a plant in most cases,  
5 because they are not risk-significant.

6           We are going to treat them in a manner,  
7 and make sure that they don't happen very often, but  
8 basically manage any risk if there is one from this  
9 surveillance. That has been offered, and we came up  
10 with a model safety evaluation that we put out for  
11 public comment under our consolidated line under item  
12 improvement process.

13           And we offered it back in September for  
14 plant specific adoption, and about half the plants now  
15 have come in and requested that, and I don't have the  
16 numbers as far as how many we have approved, but under  
17 the consolidated line item process, that is simply  
18 turning the crank with a relatively straightforward  
19 process.

20           So that is a success, and which I would  
21 call is a small initiative in terms of changing the  
22 text specs, but it is a big step in terms of what we  
23 are learning, and I will talk more about that when I  
24 get to Initiative 4.

25           Initiative 3.       Again, this is an

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1 initiative that is fairly well along. We have  
2 completed the safety evaluation and we expect to be  
3 putting that out for public comment very soon under  
4 the consolidated line item improvement process.

5 We will provide that to the ACRS and other  
6 stakeholders, and we won't make you look in the  
7 Federal Register, and we will make sure that you see  
8 it coming so that you will be able to look at it.

9 This is what I would call just a simple  
10 tech spec change for consistency. Right now tech  
11 specs allow plants to stay at power for some period of  
12 time with equipment out of service, but it won't let  
13 the plant go up to power with that same equipment out  
14 of service.

15 There is an inconsistency, and as long as  
16 there is nothing special about the mode change, or a  
17 licensee trying to go up knowing that they can't get  
18 it fixed, there is an inconsistency there.

19 This attempts to make that more  
20 consistent, and there are some notable exceptions that  
21 prevent licensees from going up to power with risk  
22 significant power, such as diesels.

23 And I view this more as a consistency  
24 within tech spec changes and making it make sense, and  
25 if there is any safety improvement here, it is

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1 primarily that regulations make sense, and they work  
2 better when they make sense.

3 The third initiative, an chronologically  
4 was what we called our first initiative, is right  
5 behind it. We are working on a safety evaluation and  
6 again our goal would be to put this safety evaluation  
7 out for public comment, and hopefully this month.

8 This is End States. Right now most tech  
9 specs and the standard tech specs drive you to cold  
10 shutdown eventually with equipment out of service.  
11 Obviously cold shutdown may or may not be any safer  
12 than hot shutdown, depending on the particular  
13 equipment.

14 In fact, in some cases, depending on the  
15 equipment out of service, hot shutdown may actually be  
16 the preferred state.

17 MEMBER POWERS: Do you have a  
18 quantification for the risk in cold and hot shutdown?

19 MR. BECKNER: This has been done  
20 generically, I believe so, but I think if Bob Dennig  
21 wants to help me, but I think I am looking at what  
22 equipment is available and what function is needed.  
23 Do you want to add to that, Bob?

24 MR. DENNIG: Yes. The risk analysis has  
25 been reviewed by Mike Johnson's outfit, and the

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1 analyses are being provided by owners' groups. I do  
2 not believe that they are quantitative. They are  
3 primarily qualitative with regard to what assets are  
4 available for accident mitigation in different modes  
5 given the loss of equipment that is meant to be  
6 repaired.

7 MEMBER POWERS: Well, when I have seen  
8 these analyses of a qualitative nature, I find that,  
9 for instance, as an example, at Brown's Ferry, they  
10 showed me an example, and they were quite proud of  
11 having made a decision to avoid a situation in which  
12 all of the metrics that they used were green, except  
13 for one that was red, and replaced it with one where  
14 they were all green and two were orange.

15 Okay. And they said this is much safer,  
16 and for the life of me, I could not understand how one  
17 decided that two oranges was safer than one red. Is  
18 this the kind of qualitative analyses that you are  
19 getting?

20 MR. DENNIG: Actually, I don't think this  
21 relies on anything that is even that subtle. These  
22 are fairly straightforward understandings of I've got  
23 steam, and I've got pressure, and I can run a steam  
24 driven off-speed pump in hot shutdown, and I can't do  
25 that in cold shutdown.

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1 Or that I have impaired my RHR and why am  
2 I going to cold shutdown. These are not really subtle  
3 points. But --

4 MEMBER POWERS: These are a presumption of  
5 what your initiating events are going to be.

6 MEMBER SIEBER: Yes.

7 MR. DENNIG: Yes.

8 MR. BECKNER: Again, it is primarily  
9 looking at the --

10 MEMBER POWERS: I think this kind of risk  
11 analysis is not good.

12 CHAIRMAN APOSTOLAKIS: Is not god you  
13 said?

14 MEMBER POWERS: Not good.

15 MR. BECKNER: We would be interested in  
16 any comments you might have then. The fourth one I  
17 think is where the rubber meets the road, and this is  
18 one where I think both stakeholder input and also what  
19 is in it for me, we learned some very good lessons  
20 under the initiative, too.

21 This is one where basically the  
22 maintenance rule and tech specs would start becoming  
23 highly integrated and would be a significant change.  
24 This is where your completion times, which currently  
25 in tech specs are fixed now, would become variable

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1 under an (a) (4) type process.

2 And where you would look at basically what  
3 the overall plant status is, and you would look at  
4 your cumulative impacts and so forth, and the tech  
5 specs would rely heavily on a (a) (4) like process for  
6 this.

7 The concerns that we immediately had was  
8 that the maintenance rule is not up to that, and  
9 concerns about what the maintenance rule requires and  
10 so forth.

11 And we spent a lot of time very concerned  
12 about that, and then we realized that we had a  
13 solution to it in the fact that through the tech specs  
14 we can bolster the maintenance rule.

15 MEMBER ROSEN: Through the tech specs you  
16 can what?

17 MR. BECKNER: We can bolster the  
18 maintenance rule to in effect say maintenance rule  
19 plus. And what we did after we saw the licensees were  
20 doing a lot of very, very good things relative to the  
21 maintenance rule, but the question was, yes, but they  
22 are not required to do that. They are just doing good  
23 things.

24 And so we said, okay, and again this isn't  
25 what is in it for me. And then suddenly the

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1 maintenance rule people were very happy, because some  
2 of the things that they saw was going on was good, and  
3 in terms where licensees were getting this type of  
4 thing, and certain tech spec requirements, as far as  
5 criteria capability, PRA, and so forth could in effect  
6 be part of a tech spec program.

7 So the bottom line is that this initiative  
8 is really the big one. Where we are in status is that  
9 we have agreed with NEI on an initial concept, and we  
10 have also talked to a number of licensees who are  
11 interested in piloting this and that is where we  
12 stand.

13 We have also looked at -- and I think you  
14 made the point that there is a variety of capability  
15 out there. We don't want to pilot something that one  
16 licensee can make use of, but the other one can't.

17 We want to cater to a spectrum of  
18 capabilities potentially, and that is one of the  
19 things that we want to pilot.

20 MEMBER LEITCH: Do I understand correctly  
21 here that you are allowing or the proposal is to allow  
22 various out of service times, depending upon --

23 MR. BECKNER: Yes. Getting into some  
24 details, basically the current concept is front stops  
25 and back stops. The front stops would probably be the

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1 existing completion times, and licensees and operators  
2 have comfort in a fixed set of rules, and they would  
3 be deviating from the fixed set of rules on an  
4 infrequent basis.

5 But, yes, they could extend then a  
6 completion time beyond the current time and up to some  
7 back stop, which might be 30 days or some number; and  
8 based on an (a) (4) like assessment. But that would be  
9 what I would call (a) (4) plus.

10 MEMBER LEITCH: But conceptually you might  
11 have a normal out of service time with a diesel of  
12 seven days, and that would still be expected under  
13 normal situations.

14 MR. BECKNER: Right.

15 MEMBER LEITCH: And you may have an  
16 unusual failure or tear down, and you would analyze  
17 that from a risk perspective.

18 MR. BECKNER: Well, it could be emergent  
19 or it could also be planned. Either way, (a) (4)  
20 basically requires you to look at the overall plant  
21 activities and take appropriate action to basically  
22 minimize the risk.

23 MEMBER POWERS: I would like to pose a  
24 question to Dr. Apostolakis. Earlier today, you  
25 hypothesized a reason for the slow pace of risk-

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1 informing the regulatory process as arising because of  
2 a lack of confidence, and the rigor with which risk  
3 assessments were being done.

4 And where we have a variety of activities  
5 moving along in which I would characterize as ersatz  
6 risk assessments are being done. Do you think that  
7 contributes to the lack of confidence in the risk  
8 assessment?

9 CHAIRMAN APOSTOLAKIS: These activities?

10 MEMBER POWERS: Yes.

11 MEMBER ROSEN: Well, before you answer  
12 that, I think you should understand that Dana has  
13 posited that these are ersatz and I am not sure that  
14 he is correct.

15 MR. GRIMES: Actually, I wanted to add to  
16 that. I would characterize the End States activity as  
17 not being risk informed, but avoiding being risk  
18 stupid. Regulation 50-36 requires that if you don't  
19 satisfy your license requirements that you shut down  
20 the plant, even if all your RHR is out.

21 And so the End State concept was one of  
22 not so much an ersatz risk analysis, but simply a  
23 logic diagram that says if you are in this condition,  
24 what is the most sane thing you can do that is not  
25 risk stupid.

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1 MR. BECKNER: Yeah, I think we would  
2 characterize them as two categories. One is the pre-  
3 analyzer of the fixed condition that you typically  
4 have in tech specs, where the specific action relative  
5 to condition is fixed.

6 All of the initiatives are along that  
7 line, except for 2 and 4, which we call process-based  
8 actions; the action is not fixed, but is based on a  
9 pre-defined process.

10 MEMBER ROSEN: Could you go back to that  
11 last one? I want to address Dr. Power's comment about  
12 ersatz, and to indicate just how far it is from  
13 ersatz, this Initiative 4, and where ersatz I  
14 understand to mean wrong, false, improper, in those  
15 kinds of words.

16 50.65 (a)(4) control of completion times  
17 at a plant that I am familiar with is based on a set  
18 of analyses that are each individually based on a full  
19 PRA quantification, based on a PRA that has been  
20 declared state-of-the-art by the staff after many  
21 years of review.

22 It is as far from ersatz as you can be,  
23 and it is based upon real quantification of risk, and  
24 it is a method to manage risk rather than to stumble  
25 along without knowing what the risk is.

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1 MEMBER POWERS: I have no doubt that you  
2 can do these analyses with a great deal of rigor and  
3 a licensee might well choose to do them with a great  
4 deal of rigor. What he is being required to do,  
5 however, does not demand that level of rigor.

6 MR. BECKNER: It sounds like to me that we  
7 should come back and talk to the subcommittee in  
8 detail. It might be useful.

9 CHAIRMAN APOSTOLAKIS: That's a good idea.

10 MEMBER ROSEN: You say Initiative 4 is one  
11 of the key initiatives, and I think just so we all get  
12 on the same page here, as obviously I feel strongly  
13 about it.

14 MR. DENNIG: Just a basis for four, and we  
15 have made clear -- and this is what Bill talked about  
16 that the maintenance rule folks are pleased with, is  
17 that the (a)(4) as it stands, you use qualitative,  
18 quantitative, or blended approaches.

19 In Initiative 4, we have made it clear  
20 that this is a quantitatively based approach. It  
21 requires an automated PRA with real time risk analysis  
22 capability, and meeting some quality standard for that  
23 PRA and update frequencies, and so on and so forth.

24 And we have gotten a very positive and  
25 very supportive response from the industry working on

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1 this proposal with us to put that on the table as a  
2 pre-condition for anyone being able to do this.

3 MEMBER ROSEN: I'm glad you said that,  
4 Bob, because earlier today, Mr. Chairman, you made  
5 some point about it not moving fast enough and not  
6 going ahead with these kinds of things.

7 If the Staff is telling licensees that if  
8 you do this well with a good PRA, kind of like what  
9 Bob just talked about, you can get major advantages in  
10 tech spec flexibility. The effect of that is to have  
11 more people who do the job well.

12 CHAIRMAN APOSTOLAKIS: There is no  
13 question about that. The problem is that there are  
14 many, many other instances where they get benefits  
15 with less than adequate PRAs.

16 MEMBER ROSEN: And this is a good case,  
17 and so I think we --

18 CHAIRMAN APOSTOLAKIS: We are running out  
19 of time and I think we should --

20 MR. BECKNER: That's my presentation

21 CHAIRMAN APOSTOLAKIS: Okay.

22 MEMBER ROSEN: I heard a promise that you  
23 would come back and talk in more detail.

24 CHAIRMAN APOSTOLAKIS: Yes.

25 MR. BECKNER: Well, I get an offer and I

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1 heard it was a good idea.

2 MEMBER ROSEN: Which subcommittee, the PRA  
3 subcommittee?

4 CHAIRMAN APOSTOLAKIS: Usually that is the  
5 one.

6 MEMBER ROSEN: Operations and PRA.

7 CHAIRMAN APOSTOLAKIS: Chris, are you  
8 going to wrap it up?

9 MR. GRIMES: Yes, sir. Could I have Slide  
10 20, please. I do want to point out that the success  
11 of any program plan consists of both having a long  
12 term vision, but also having some short term  
13 deliverables.

14 So our immediate interest is that we are  
15 working feverishly. As a matter of fact, earlier  
16 today there was a meeting with NEI to discuss their  
17 proposed guidance for categorization.

18 We are going to complete a proposed rule  
19 for 50.69, the treatment rule, and whether it is the  
20 treatment rule or the categorization rule, it is one  
21 of those linguistic exercises that I would like to  
22 sort out very quickly.

23 But that is a near term success, and  
24 getting the 50.69 rule and associated regulatory  
25 guidance, there are a lot of associated PRA

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1 application issues, and risk-informed issues, and  
2 performance issues, and so that will be something that  
3 we can chew on together with you and our other  
4 stakeholders.

5 So we are on the agenda for the September  
6 meeting and we will deliver a product to you in August  
7 so that you will have sufficient time to prepare for  
8 that meeting.

9 Mark had previously described the  
10 activities that are going to lead to a regulatory  
11 guide on the quality standards for the tools. And  
12 Prasad Kadambi has a draft, NUREG BR, which is a high  
13 level guidance on performance-based regulations.

14 Both NRR and MNSS basically have  
15 regulatory analysis guidelines that encourage  
16 performance-based regulations. But the guidance that  
17 Prasad is going to present is a deliverable from  
18 research that we have agreed -- and when I say we,  
19 this collection constitutes the smallest number of  
20 first-line SESers that I felt could work together to  
21 improve coordination.

22 And I refer to us as the risk management  
23 team, and we meet every week to --

24 MEMBER POWERS: You mean the smallest or  
25 the largest?

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1 MR. GRIMES: The smallest, because the  
2 largest is all of the first-line SES supervisors in  
3 the NRC who have a piece of this, and we needed to  
4 start with a core group and work out, as opposed to  
5 try and take everybody at once.

6 MEMBER POWERS: Well, you said the  
7 smallest group that could work together effectively.  
8 Don't you mean the largest group that could work  
9 together effectively?

10 MR. GRIMES: We have already added one to  
11 our number, Gene Imbro, who is the Chief of the  
12 Mechanical Engineering Branch, who has the biggest  
13 investment in the treatment issues. We have  
14 designated him to lead the staff activity and the  
15 dialogue on what are the appropriate treatment  
16 requirements associated with categorization.

17 And I am working with Trish Holahan to see  
18 whether or not we can bring the two rule making  
19 programs and the implementation of the performance  
20 guidance which exists in different forms in both  
21 offices, and try and bring some coherence to those  
22 activities as well.

23 And Mark can have the last word, but the  
24 other piece of this is trying to figure out how to  
25 bring Mr. Lyons' organization into alignment with this

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1 effort.

2 MEMBER ROSEN: What is his organization?

3 MR. GRIMES: New Reactor Licensing Project  
4 Office, LRLPO.

5 MR. CUNNINGHAM: But again in the context  
6 of advanced reactors, you have heard something from  
7 Mary on Monday, and you will hear some more tomorrow  
8 about an advanced reactor framework, and that work is  
9 very much related to the coherence issues that we have  
10 been talking about earlier.

11 Mary is involved with both activities, and  
12 so we can help ensure that whatever issues come up  
13 with for the licensing of new reactor designs in a  
14 framework standpoint are different only by design if  
15 you will from the current reactor core.

16 MEMBER POWERS: And we can have great  
17 confidence that it will be done in a superior fashion.

18 CHAIRMAN APOSTOLAKIS: Any further  
19 comments or questions? Well, thank you very much,  
20 Gentlemen. We are in recess.

21 (Whereupon, the meeting was recessed at  
22 5:23 p.m.)

23

24

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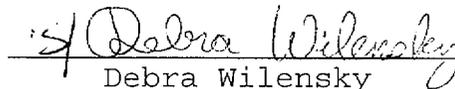
This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on  
Reactor Safeguards

Docket Number: N/A

Location: Rockville, Maryland

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.

  
Debra Wilensky  
Official Reporter  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D.C. 20555-0001

June 18, 2002

SCHEDULE AND OUTLINE FOR DISCUSSION  
494<sup>th</sup> ACRS MEETING  
JULY 10-12, 2002

WEDNESDAY, JULY 10, 2002, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH,  
ROCKVILLE, MARYLAND

- 1) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open)
  - 1.1) Opening statement (GEA/JTL/SD)
  - 1.2) Items of current interest (GEA/SD)
  
- 2) 8:35 - 10:00 A.M. Pressurized Thermal Shock (PTS) Reevaluation Project: Risk Acceptance Criteria (Open) (TSK/FPF/MWW)
  - 2.1) Remarks by the Subcommittee Chairman
  - 2.2) Briefing by and discussions with representatives of the NRC staff regarding the risk metrics and associated criteria that can be used in reevaluating the technical basis of the PTS rule.

Representatives of the nuclear industry may provide their views, as appropriate.
  
- 10:00 - 10:15 A.M. **\*\*\*BREAK\*\*\***
  
- 3) 10:15 - 11:15 A.M. Draft Final Revision 1 to Regulatory Guide 1.174, "An Approach to Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and Associated Standard Review Plan Chapter 19 (Open) (GEA/AWC/PAB)
  - 3.1) Remarks by the Subcommittee Chairman
  - 3.2) Briefing by and discussions with representatives of the NRC staff regarding the draft final revision 1 to Regulatory Guide 1.174 and the associated Standard Review Plan Chapter 19, "Use of Probabilistic Risk Assessment in Plant-Specific, Risk-Informed Decisionmaking: General Guidance."
  
- 4) 11:15 - 12:45 P.M. Discussion of Topics for Meeting with the NRC Commissioners (Open) (GEA, et al./JTL, et al.)

Discussion of topics for meeting with the NRC Commissioners on July 10, 2002.
  
- 12:45 - 2:00 P.M. **\*\*\*LUNCH\*\*\***
  
- 5) 2:00 - 4:00 P.M. Meeting with the NRC Commissioners (Open) (GEA, et al./ JTL, et al.)

The Committee will meet with the NRC Commissioners, Commissioners' Conference Room, One White Flint North, to discuss the following:

  - Overview (GEA)
    - Core Power Upgrades and License Renewals
    - Future Committee Activities



- 11) 1:00 - 2:30 P.M. Development of Review Standard for Reviewing Core Power Uprate Applications (Open) (GBW/JDS/PAB)  
 11.1) Remarks by the Subcommittee Chairman  
 11.2) Briefing by and discussions with representatives of the NRC staff regarding the development of a "Review Standard" for use in future reviews of core power uprate applications.
- 2:30 - 2:45 P.M. \*\*\*BREAK\*\*\***
- 12) 2:45 - 6:00 P.M. Proposed ACRS Reports (Open)  
 Discussion of proposed ACRS reports on:  
 12.1) PTS Reevaluation Project: Risk Acceptance Criteria (TSK/FPF/MWW)  
 12.2) Draft Final Revision 1 to Regulatory Guide 1.174 and SRP Chapter 19 (GEA/AWC/PAB)  
 12.3) Risk-Informed Regulation Implementation Plan (GEA/AWC/HJL)  
 12.4) Advanced Reactors Research Plan (TSK/MME)  
 12.5) Development of Review Standard for Reviewing Core Power Uprate Applications (Tentative) (GBW/JDS/PAB)

**FRIDAY, JULY 12, 2002, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

- 13) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open) (GEA/JTL/SD)
- 14) 8:35 - 10:15 A.M. Application of the Probabilistic Fracture Mechanics Methodologies to Reactor Vessel Integrity Assessment (Open) (FPF/AWC/MME)  
 14.1) Remarks by the Subcommittee Chairman  
 14.2) Briefing by and discussions with representatives of the NRC staff regarding application of the probabilistic fracture mechanics methodologies (including the FAVOR computer code) to assess reactor pressure vessel integrity.
- 10:15 - 10:30 A.M. \*\*\*BREAK\*\*\***
- 15) 10:30 - 2:30 P.M. Proposed ACRS Reports (Open)  
 (12:00 - 1:00 P.M. LUNCH) Continue discussion of proposed ACRS reports listed under Item 12.
- 2:30 - 2:45 P.M. \*\*\*BREAK\*\*\***
- 16) 2:45 - 3:30 P.M. Future ACRS Activities/Report of the Planning and Procedures Subcommittee (Open) (GEA/JTL/SD)  
 16.1) Discussion of the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee during future ACRS meetings.

- 16.2) Report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, and organizational and personnel matters relating to the ACRS.
- 17) 3:30 - 3:45 P.M. Reconciliation of ACRS Comments and Recommendations (Open) (GEA, et al./SD, et al.)  
Discussion of the responses from the NRC Executive Director for Operations to comments and recommendations included in recent ACRS reports and letters.
- 18) 3:45 - 4:45 P.M. Format and Content of the 2003 ACRS Report on the NRC Safety Research Program (Open) (FPF/RPS)  
18.1) Remarks by the Subcommittee Chairman  
18.2) Discussion of the format, content, schedule, and assignments for the 2003 ACRS report to the Commission on the NRC Safety Research Program.
- 4:45 - 5:00 P.M. **\*\*\*BREAK\*\*\***
- 19) 5:00 - 6:00 P.M. Proposed Papers for the Quadripartite Meeting (Open) ) (GEA, et al./JTL, et al.)  
Discussion of proposed papers on the following:  
19.1) Safety Culture and Safety Management (MVB/DAP)  
19.2) Risk-Informed Regulation (GEA/TSK)  
19.3) Thermal-Hydraulic Analysis and Code Issues (GBW/VHR)  
19.4) Stress Corrosion Cracks in Pressure Retaining Components in Nuclear Power Plants (FPF/WJS)  
19.5) Risk Analysis of Spent Fuel Storage (TSK/DAP)
- 20) 6:00 - 6:30 P.M. Miscellaneous (Open) (GEA/JTL)  
Discussion of matters related to the conduct of Committee activities and matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

**NOTE:**

- Presentation time should not exceed 50 percent of the total time allocated for a specific item. The remaining 50 percent of the time is reserved for discussion.
- Thirty-Five (35) copies of the presentation materials should be provided to the ACRS.

G: Rowe: Introductory  
Introductory Statement by the ACRS Chairman  
494<sup>th</sup> Meeting, July 10-12, 2002

The meeting will now come to order. This is the first day of the 494<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will consider the following:

- (1) Pressurized Thermal Shock Reevaluation Project: Risk Acceptance Criteria
- (2) Draft Final Revision 1 to Regulatory Guide 1.174, "An Approach to Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and Associated Standard Review Plan Chapter 19
- (3) Discussion of Topics for Meeting with the NRC Commissioners
- (4) Risk-Informed Regulation Implementation Plan
- (5) Proposed ACRS Reports

In addition, the Committee will meet the NRC Commissioners from 2:00 - 4:00 p.m. in the Commissioners' Conference Room, One White Flint, North, to discuss topics of mutual interest.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act.

Dr. John T. Larkins is the Designated Federal Official for the initial portion of the meeting.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's sessions. A transcript of portions of the meeting is being kept, and it is requested that the speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so that they can be readily heard. I will begin with some items of current interest.

At the request of Westinghouse, videoteleconferencing arrangements have been made for Westinghouse to observe the meeting sessions on the Pressurized Thermal Shock Reevaluation Project: Risk Acceptance Criteria.