ACRST-3118

OFFICIAL TRANSCRIPT OF PROCEEDINGS
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

Title: MEETING: 472ND ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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Docket No.:

Work Order No.: ASB-300-1281

LOCATION: Rockville, MD

DATE: Thursday, May 11, 2000

PAGES: 1 - 266

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UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

May 11, 2000

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, taken on May 11, 2000, as reported herein, is a record of the discussions recorded at the meeting held on the above date.

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

1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

3 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

4 ***

5 MEETING: 472ND ADVISORY COMMITTEE ON

6 REACTOR SAFEGUARDS

7

8 U.S. NRC

9 Two White Flint North, Room T2-B3

10 11545 Rockville Pike

11 Rockville, MD

12 Thursday, May 11, 2000

13 The committee met, pursuant to notice, at 8:30

14 a.m.

15 MEMBERS PRESENT:

16 DANA A. POWERS, Chairman

17 GEORGE APOSTOLAKIS, Vice-Chairman

18 JOHN J. BARTON, Member

19 MARIO V. BONACA, Member

20 THOMAS S. KRESS, Member

21 ROBERT L. SEALE, Member

22 WILLIAM J. SHACK, Member

23 JOHN D. SIEBER, Member

24 ROBERT E. UHRIG, Member

25 GRAHAM B. WALLIS, Member

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

2 [8:30 a.m.]

3 DR. POWERS: The meeting will come to order. This
4 is the first day of the 472nd meeting of the Advisory
5 Committee on Reactor Safeguards. At today's meeting, the
6 committee will consider the following initiatives related to
7 risk-informed technical specifications: potential revisions
8 to the pressurized thermal shock acceptance criteria;
9 proposed revision to Regulatory Guide 1.174, an approach for
10 using probabilistic risk assessment in risk-informed
11 decisions on plant-specific changes to the licensing basis;
12 proposed Regulatory Guide and Standard Review Plan sections
13 associated with NRC code reviews; proposed ACRS reports -- I
14 am anxious in our work on the reports to get through the
15 three letters listed on the board today.

16 This meeting is being conducted in accordance with
17 provisions of the Federal Advisory Committee Act. Dr. John
18 T. Larkins is the designated Federal official for the
19 initial portion of the meeting. We have received no written
20 statements or requests for time to make oral statements for
21 members of the public regarding today's session. A
22 transcript of portions of the meeting is being kept, and it
23 is requested that speakers use one of the microphones;
24 identify themselves and speak with sufficient clarity and
25 volume so they can be readily heard.

1 We begin with some items of current interest.
2 First, I will note that Dr. Kress and Professor Seale have
3 been attending the CSUP meeting, and some members may want
4 to interrogate them closely on any revelations concerning
5 severe accidents that came from that meeting.
6 Next, I wanted to acquaint members with some
7 additions to our staff. Joining our staff engineers is Meg
8 Weston. Meg has a B.S. degree in physics and 20 years of
9 experience in the NRC. She has recently been working with
10 Sam Cullins. We've looked at her impressive resume and
11 maybe during one of the breaks, she'd even talk to me about
12 the impressive recommendations she has. In particular, she
13 has experience in the area of electronics, and so, Bob, you
14 may find her a very useful addition to your team working on
15 digital electronics.
16 Another addition is Jenny Gallo, in the operations
17 support branch. Jenny? Jenny has a bachelor of science
18 degree in sociology from Northeastern University. She has
19 promised me she is not using this time to develop research
20 for a master's degree.
21 [Laughter.]
22 DR. POWERS: She'll be working on budgetary
23 activities, trying to keep us square with the law, right,
24 Jenny?
25 DR. SEALE: Is she writing a tell-all book?

1 [Laughter.]

2 DR. POWERS: Each of the members should have
3 detailed resumes on these individuals. I encourage you to
4 introduce yourself to them, because they are part of our
5 permanent team. So welcome aboard to both of you.

6 Do members have any comments they would care to
7 make before we open the session today?

8 [No response.]

9 DR. POWERS: Seeing none, then, we'll turn to our
10 first item, which are initiatives related to risk-informed
11 technical specifications, and Jack, I think you're going to
12 start us on this subject.

13 DR. SIEBER: Yes, sir; thank you, Mr. Chairman.
14 Two weeks ago today, actually, there was a joint meeting of
15 the subcommittees on reliability and probabilistic risk
16 assessment and plant operations to discuss two of seven
17 initiatives in risk-informing the topic of specifications.
18 Those two items or two initiatives were initiatives two and
19 three, one of which involved missed technical surveillances
20 and how those would be treated and also the mode preference
21 for action statements when plant maneuvering is required
22 because of LCOs.

23 At the conclusion of the subcommittee meeting,
24 individual members, of which seven of the 10 members of the
25 full committee were there to provide their views and

1 comments related to the reservations, and the staff is
2 prepared to address the more important of those today that I
3 think will help us all understand basically how these items
4 will be resolved.
5 So without further discussion, I'd like to
6 introduce Mr. Robert Denning technical specifications branch
7 of the Office of Nuclear Reactor Regulatory who will
8 introduce the speakers and conduct this session.
9 MR. DENNIG: Thank you, Mr. Sieber.
10 We're pleased to be back here again before the
11 ACRS to discuss this important subject. Today's
12 presentation, the way we structured it, we're going to have
13 Mr. Biff Bradley from NEI present the industry's
14 presentation and discussion on initiatives two and three and
15 any feedback they have on our last meeting, and the staff
16 will follow. And with me today from the staff is Scott
17 Newberry, deputy director of my division; Rich Barrett,
18 branch chief from probabilistic safety assessment branch;
19 Mark Reinhart, who is a section chief in the probabilistic
20 safety assessment branch and Nanette Gilles, who will also
21 help make some presentations.
22 Before I turn things over to Mr. Bradley, Scott or
23 Rich, do you have anything that you'd like to say?
24 [No response.]
25 MR. DENNIG: Okay; it looks like we can just go

1 ahead and get into the presentation, Biff?

2 DR. BRADLEY: Thank you; I'm Biff Bradley of NEI.

3 I actually just found out I was going first, so I didn't

4 have an opportunity to give you copies of my material, but I

5 will pass it out as quickly as I can.

6 The industry views these initiatives on tech specs

7 as a first step in an important evolution -- actually, the

8 next step in an important evolution in plant configuration

9 control, and this is a slide I used at the subcommittee

10 meetings, but this is just a brief background of the history

11 of how we've dealt with plant configuration, starting out

12 with custom tech specs; moving on to standard tech specs;

13 NUMARC 91-06, which provides control of shutdown outage

14 maneuvering and improves standard tech specs which will come

15 about and are widely adopted by the industry now over the

16 last several years.

17 And, of course, in the last couple of years, we've

18 had some success finally with risk-informed applications on

19 AOTs, and a fair number of those have actually made their

20 way through the system in the last year or so.

21 The next and important step is coming up in the

22 fall of this year. The Commission just approved issuance of

23 the maintenance rule (a)(4) implementation guidance with

24 180-day implementation period, so in around November of this

25 year, the industry will have a new regulatory requirement

1 for a risk-informed plant configuration control approach
2 through 50.65(a)(4). And one of the conditions that the
3 staff has put on the reg guide that endorses the industry's
4 guidance on (a)(4) is that you still have to meet your
5 technical specifications. So we're left now with both a
6 tech spec and a maintenance rule (a)(4) provision
7 controlling plant configuration.
8 DR. APOSTOLAKIS: Biff?
9 DR. BRADLEY: Yes.
10 DR. APOSTOLAKIS: You have custom tech specs and
11 standard tech specs? Could you explain a little bit?
12 DR. BRADLEY: Sure; well, I think this really
13 predates my involvement in the industry, but back in the
14 early licensing days, plants pretty much -- every plant had
15 their own unique tech specs, starting off with some very
16 small tech specs for the early units, and there was an
17 evolution -- and there really was no standardization. Every
18 plant -- I used to work at Plant Hatch back in the early
19 eighties. We had custom tech specs on unit one and standard
20 tech specs on unit two; two identical units and, you know,
21 one set of operators, so that made life interesting.
22 But the standard tech specs evolved -- I think
23 there was a recognition as more units got licensed that the
24 tech specs ought to be standardized, so it started, I guess,
25 in the early to mideighties, standard tech specs came about.

1 And then, the ITS improved standard tech specs came about as
2 a result of a 50.36 revision that put the four criteria in
3 and then allowed tech specs to be scoped accordingly to
4 those four criteria, which actually resulted in some
5 reduction in scoping.
6 DR. APOSTOLAKIS: But we still have custom tech
7 specs.
8 DR. BRADLEY: Yes; there are some -- a fair number
9 of plants -- a small number, I should say -- that still have
10 custom tech specs.
11 DR. APOSTOLAKIS: But isn't this contrary to the
12 risk-informed regulatory approach? I mean, you have allowed
13 outer -- and all of that, and these are specified for all
14 plants without regard to how many diesels you have or, you
15 know, other things?
16 DR. BRADLEY: I wouldn't say so much -- it is now
17 contrary to the risk-informed approach. I think at the time
18 it was evolved, it was, you know, deterministic --
19 DR. APOSTOLAKIS: Sure.
20 DR. BRADLEY: -- and it was all we had at the
21 time. At the time the custom tech specs first came out,
22 PRAs were just starting to be developed. That is correct; I
23 think maybe my second slide -- the scope and the process of
24 (a)(4) is a risk-informed process. I'm just getting at what
25 you're talking about, looking at all of the equipment in the

1 plant that may be out of service and looking at the risk
2 impact.
3 DR. APOSTOLAKIS: So we are going back, then, to
4 customized tech specs but through the risk route.
5 DR. BRADLEY: Yes; well, I'm not suggesting we go
6 back to custom tech specs. What we want to suggest is that
7 these initiatives are the first step in a process that will
8 bring the current tech specs into -- so that they are --
9 comport with (a)(4), and there's no longer a potential to
10 have a dichotomy between what (a)(4) tells you to do and
11 what the tech specs might tell you to do.
12 With (a)(4) becoming a requirement later this year
13 and, of course, obviously, you still have to meet your tech
14 specs, there is potential for a conflict and, you know,
15 (a)(4), because of its risk-informed scope, it's looking at
16 the conditions of much equipment that's not even covered by
17 tech specs.
18 DR. APOSTOLAKIS: Another question that puzzles me
19 a little bit: a lot of these things depend on risk
20 assessments, don't they, and risk information?
21 DR. BRADLEY: Yes, yes.
22 DR. APOSTOLAKIS: And they will be mandatory,
23 correct?
24 DR. BRADLEY: That is correct.
25 DR. APOSTOLAKIS: So why are we allowed to do this

1 here, but when the staff wants to ask for risk information,
2 immediately, we have legal problems? What's the difference?
3 DR. BRADLEY: I don't think that when we get to
4 that issue later this morning or this afternoon that we
5 would necessarily suggest that there are significant legal
6 problems with what the staff is proposing on the request for
7 risk information. That's my later presentation.
8 DR. APOSTOLAKIS: I understand.
9 DR. BRADLEY: I don't want to go into that now.
10 But I think, you know, that one of our first bullets, which
11 you'll see later, is we agree that there are instances where
12 the staff should look at risk issues even though you're
13 meeting the deterministic licensing basis so --
14 DR. APOSTOLAKIS: Yes, but the thing that strikes
15 me is that -- I mean, we are talking about another subject
16 now, but the staff had to invoke issues of adequate
17 protection to be allowed to ask for risk information there,
18 and yet here, both the industry and the staff seem to be
19 working together to develop regulations that are
20 risk-informed. So I'm trying to understand what the
21 difference is. Maybe we can discuss it later.
22 DR. BRADLEY: I guess my simplistic view of it is
23 there is no conflict or difference in the approach we're
24 suggesting. There -- maybe we can talk about that in more
25 detail when we get to --

1 DR. APOSTOLAKIS: Fine.

2 DR. BRADLEY: -- that consideration.

3 DR. APOSTOLAKIS: But I'm just interested in my --

4 DR. BRADLEY: Yes.

5 DR. APOSTOLAKIS: -- questions.

6 DR. BRADLEY: Yes; we're not suggesting that the
7 staff should not be raising those risk issues. As we'll
8 talk, we think there does need to be a clear definition of
9 the threshold, and it may not be the same as some of the
10 other thresholds we've been using in, say, Reg Guide 1.174,
11 but I don't see a conflict there.

12 DR. APOSTOLAKIS: Okay.

13 DR. BRADLEY: Okay?

14 You got me off track; I've got to refocus here.

15 [Laughter.]

16 DR. POWERS: It's a plot.

17 [Laughter.]

18 DR. BRADLEY: Very clever. We are --

19 DR. APOSTOLAKIS: Nothing less is expected from
20 us.

21 DR. BRADLEY: Of course.

22 We are -- these two initiatives that we're going
23 to discuss today really represent the first efforts, I
24 think, to use risk insights and adjust principles and
25 technical specifications that go beyond just AOTs, which is

1 typically what we've looked at before, but when you look at
2 tech specs, you have action requirements, mode change
3 restrictions, issues like missed surveillances, 303, 304.
4 All of those are really amenable to risk-information, and
5 really, all of those types of situations will have to be
6 addressed through (a)(4), so what we're proposing to do
7 today is to make the first step toward bringing the tech
8 specs in (a)(4) such that they'll give you the same result.
9 And this is the first step in a lengthy process.
10 Ultimately, you know, we'd like to see the tech specs in
11 (a)(4) be -- I don't know if they'll ever be equivalent but
12 at least remove any conflicts.
13 For instance, today, you may have a seven-day AOT
14 in tech specs; (a)(4), because of other things you have out
15 of service that may not even be covered in tech specs will
16 tell you a four-day AOT is probably all you should do before
17 you hit the risk thresholds. That's the example of a
18 conflict, and that's a regulatory requirement where you're
19 pretty much going to have to meet (a)(4). And then, of
20 course, you're going to have the inverse, where the tech
21 specs will allow you seven days, but in-force says you can
22 keep the equipment out of service for much longer.
23 And so, those are the kinds of conflicts that
24 we're going to be working, and this is the first step to get
25 there.

1 We'll talk specifically about the first initiative
2 on missed surveillances. The requirement is that enter the
3 LCO, which is typically a shut-down requirement. If you've
4 missed a surveillance, and it can't be performed within 24
5 hours plus the existing AOT; what we're proposing is that
6 the missed surveillance, when you discover that you've
7 missed a surveillance, could be performed at the next
8 reasonable opportunity up to the total surveillance
9 interval, and to do that would require a risk evaluation.
10 There was considerable discussion at the
11 subcommittee meeting about the potential for mischief or
12 misuse of this provision, and I wanted to reemphasize today
13 that there is no intent whatsoever to establish a provision
14 in tech specs that would allow surveillances to be willfully
15 missed. This is intended to address situations where you
16 discover after the fact or the surveillance has been missed,
17 and whereas tech specs right now would tell you to shut down
18 and go through a plant transient, with the vast majority of
19 the equipment in the plant, the risk impact of delaying a
20 surveillance is dwarfed by the risk impact of a plant
21 transient to shut it down and take it back up to power to
22 perform a surveillance.
23 Another thing I would mention is that the vast
24 majority of surveillances in tech specs can be performed
25 online, and really, this provision wouldn't even come into

1 play, but there are some tech spec surveillances where you
2 would have to change the plant condition in a containment,
3 what have you, to make a surveillance, and those are the
4 scope of things that would be impacted here.
5 DR. POWERS: Could you explain to me how I do a
6 risk evaluation on a missed surveillance?
7 DR. BRADLEY: Yes; I'll get to that in just a
8 moment. I guess I'll do that now and come back. We've made
9 some changes to the -- we're in the process of making some
10 changes to this tech spec on the TSTF 3.58, which is
11 initiative two as a result of some of the discussions we had
12 with the subcommittee as well as the meeting we had with the
13 staff and industry several weeks ago, and the way that you
14 would do what you're asking, Dr. Powers, is that basically,
15 the missed surveillance is like any other emergent condition
16 that can be treated under 50.65(a)(4).
17 50.65(a)(4) provides most of the foundation that
18 you need to address this issue, and it contains provisions
19 on temporary and aggregate risk guidelines; that is, as well
20 as the risk management actions that you could consider based
21 on the result of that risk evaluation and the temporary and
22 aggregate impacts and also contains a discussion of how you
23 control additional emergent work that's going -- that may
24 emerge once you've performed the assessment. Now, how do
25 you actually do the risk evaluation?

1 It's fairly simple for a missed surveillance. You
2 can screen using RAW basically on the assumption that the
3 equipment is available, and for a large amount of the
4 equipment in the plant with this type of screen, you would
5 still be able to demonstrate a relatively small risk impact,
6 generally within the guidelines of Reg Guide 1.182, which is
7 the (a)(4) guidance on a temporary CDP and LERF.
8 DR. POWERS: So I go in, and I say I want to do
9 this and this for surveillance, and I go to the RAW value.
10 And I make my decision based on that.
11 DR. BRADLEY: You could make the decision based on
12 the RAW value. It's a screen; I mean, clearly, in most
13 cases, missing a surveillance isn't equivalent to having the
14 equipment unavailable, but there's a simplified approach for
15 it, and for the plants that are implementing this in, like
16 Southern Cal Edison which would look at this and run the PRA
17 models, for most of their components and tech specs, they
18 can just use a RAW approach.
19 And the way this would work is if you would have
20 to make the assumption that that equipment is unavailable
21 and roll that into your (a)(4) program, okay? So, from now
22 on, all the plant configuration evolutions you're
23 undertaking would be with the assumption that that equipment
24 is unavailable, and then, you'd have to factor in the impact
25 of everything else you may be taking out of service. So if

1 you're going to take out the other train of that safety
2 function, it probably would change that plan.
3 Now, if you want to go beyond the screening
4 approach and do something that uses the model -- maybe
5 you've failed the screen, but you still believe that the
6 condition is not significant, then, you can adjust the
7 failure rate in the PRA based on the fact that you've missed
8 the surveillance and run the modeling and get a --
9 DR. POWERS: I guess what I'm interested in is if
10 you screen something out, and there have been any
11 precipitous surveillances that have been missed are going to
12 be ones that are really going to have really little impact.
13 DR. BRADLEY: Right; that is correct.
14 DR. POWERS: And you're going to say, okay, I
15 missed this thing, and based on my PRA, what confidence
16 level do you have to have on this?
17 DR. BRADLEY: You mean quantitatively, what
18 confidence level?
19 DR. POWERS: No, I'm looking, you know, am I 99
20 percent certain that it's below this screening criteria? Or
21 am I 50 percent certain? With that kind of quantitative
22 accuracy.
23 DR. BRADLEY: I guess -- and I can't really answer
24 that question. We generally view this for the vast majority
25 of surveillances you can miss as a fairly simple risk

1 assessment.

2 DR. POWERS: What you're saying is that -- I think

3 what you're saying --

4 DR. BRADLEY: Yes.

5 DR. POWERS: -- is that most of these

6 surveillances are going to have such a low -- that it's

7 going to be able to say it doesn't matter squat.

8 DR. KRESS: It raises another question, which is

9 why are they in a surveillance program in the first place.

10 DR. POWERS: Of course.

11 [Laughter.]

12 DR. BRADLEY: Yes, and that's why initiative five

13 of this effort, which we will I am sure be discussing at

14 some point later this year looks at optimizing the

15 surveillances that are in there now.

16 DR. APOSTOLAKIS: Is it possible that if this is

17 allowed, at some point, there will be a de facto extension

18 of the interval between surveillances? In other words, you

19 know, for components whose RAW is very low, or the failure

20 rate changes do not affect anything?

21 DR. BRADLEY: That is not the intent. Whether

22 it's possible or not, I guess, is a theoretical question,

23 but I don't believe that would be the case because of the --

24 and that is that de facto, making this a de facto mechanism

25 for surveillances would result in routinely missing

1 surveillances, and as I mentioned earlier, that's not the
2 intent.
3 I think when we move to initiative five and look
4 at optimizing intervals as well as the actual tests
5 themselves, that is the mechanism for a, you know, de facto
6 permanent kind of change to the approach, and that's not
7 what we're trying to do here. This is just an initial step
8 in that direction.
9 DR. APOSTOLAKIS: Is the number of missed
10 surveillances part of the new oversight program?
11 DR. BRADLEY: Yes; the corrective action program
12 will track that, and the corrective action program is one of
13 the major elements of the new oversight process, and if you
14 miss a surveillance, you would be under the CAP program. I
15 think that is an important element of what we're proposing
16 to do here.
17 Personally, I don't think that this change would
18 cause any increase in the number of missed surveillances.
19 It's just to allow us to have a smarter approach when we do
20 discover that we've missed one.
21 DR. KRESS: When you miss a surveillance and go
22 ahead with operation to the next surveillance, you've
23 essentially handed what I would call a temporary spike to
24 the baseline risk, and this committee has advocated in the
25 past that there should be some sort of criteria on the spike

1 that's allowed and with how to deal with some interval over
2 time.
3 Are you advocating some sort of criteria on this?
4 DR. BRADLEY: Essentially, the answer to that is
5 yes. As I mentioned, the way this would work, it would be
6 rolled into your (a)(4) program, and as you remember from
7 reviewing the (a)(4) guidance, we have guidelines in (a)(4)
8 on the spike, and that's a 10-3 CDF. We have guidance on
9 the CDP, which is a 10-6. And then, we have guidance -- we
10 don't have quantitative guidance, but there's a discussion
11 in there of the need to track and control the aggregate risk
12 impact and look at this in light of where you've been
13 previously.
14 So I think the answer to your question is yes.
15 That's one of the reasons we advocate directly referencing
16 1.182 in this change.
17 DR. KRESS: So there is a -- existing now in the
18 rules, there is a spike criterion, in essence. Do you know
19 what the technical basis for that is, or would you explain
20 it to us?
21 DR. BRADLEY: Well, as you know, that's a subject
22 that's been discussed at great length for a number of years,
23 and what we used was out of the EPRI PSA applications
24 guideline, and that's the best -- we picked the best number
25 that we knew based on all of the information that we had,

1 and the applications guideline, I think, is what we chose,
2 because that's the best information we have. Beyond that,
3 it's pragmatic in that it allows you to -- it's typically
4 equivalent to taking something like a diesel generator out
5 for several days. I mean, that's typically what's going to
6 give you that kind of CDP. So it's sort of a bounding thing
7 for the single most significant component in the plant.
8 That's, you know, a loose technical basis for it.
9 Yes?
10 DR. SIEBER: A quick question that's two slides
11 back, the second bullet, where it says change failure rates
12 to address missed surveillance. Assuming that the item that
13 was to have been surveilled is actually in your PSA, which I
14 think a lot are not --
15 DR. BRADLEY: Right.
16 DR. SIEBER: -- how are you going to change the
17 failure rates?
18 DR. BRADLEY: If it's not in the PSA?
19 DR. SIEBER: If it is in the PSA. If it's not --
20 DR. BRADLEY: Right.
21 DR. SIEBER: -- there's probably no raw value.
22 DR. BRADLEY: We are not prescriptive in the tech
23 spec itself about how you would do that. I think that would
24 be a function of the specific component and the surveillance
25 and what you know about its history. Some components -- for

1 instance, you have a raw water system or something where,
2 you know, there is a degradation over time, you have to take
3 those things into account. But we're not -- there is no
4 single number that we're proposing. I think typically, you
5 might double the failure rate, you know.
6 DR. APOSTOLAKIS: Actually, I'm not sure that you
7 should do that. I mean, you would take the unavailability
8 that's calculated using the standard interval between
9 surveillances, and if you missed one, then, you'd double
10 that.
11 DR. BRADLEY: Right.
12 DR. APOSTOLAKIS: But the failure rate really
13 shouldn't change.
14 DR. SIEBER: Well, it's not clear to me that
15 that's the correct solution either, but having it as sort of
16 an ad hoc thing where, well, you have to consider this, and
17 you have to consider that, and to me, that seems a really
18 vague technical basis for doing that. On the other hand,
19 the decision as to how long you can go or whether you should
20 shut down or take some other action because of the missed
21 surveillance depends on the robustness of how you treat this
22 issue, and it just seems to me that, you know, it's not
23 there right now.
24 DR. KRESS: I think George is right, though. To
25 try to develop some sort of correlation for the missed

1 surveillance versus the change in reliability just is not
2 going to be able to do that. So you just work on the
3 surveillance time, and whatever the change in the
4 surveillance time, you put that into your thing. I think
5 that's the only practical way you could approach it. But
6 that would tend to make it -- that would tend to make it a
7 very small impact, though.
8 DR. APOSTOLAKIS: All of these impacts, I think,
9 are very small.
10 DR. SIEBER: Yes, well, there are some pieces of
11 equipment that at least in my experience that have sort of a
12 lifetime to them, you know, a piece of rotating equipment is
13 going to perform its function for a certain period of time,
14 and during that time, it's wearing out; things are happening
15 to it, and the longer you run it, the higher the likelihood
16 probably on an exponential basis is that it's going to
17 ill-perform properly or fail altogether.
18 DR. KRESS: Well, that concept is not built into
19 PRAs. It would be nice to have that. George is working on
20 that.
21 DR. APOSTOLAKIS: Well, although this is not
22 aging, because you talk about shorter time scales, but in
23 general, the failure rate in the PRA -- in fact, not in
24 general; 100 percent of the time is assumed to be constant.
25 DR. SIEBER: Yes.

1 DR. APOSTOLAKIS: So this particular phenomenon is
2 not modeled. So these components would have to be treated
3 separately if indeed you have this increase in the failure
4 rate.
5 DR. BRADLEY: And that's the same comment I was
6 making about a raw water system where you may be getting,
7 you know, like a heat exchanger, where you may, over time,
8 have clogging or whatever.
9 DR. APOSTOLAKIS: Yes.
10 DR. BRADLEY: And the same thing is true of
11 rotating equipment, where if you know there's a degradation
12 that's going to increase with time, you have to -- you know,
13 you have to take that into account.
14 DR. SIEBER: Well, it seems to me that this is
15 sort of a weakness, in my view.
16 DR. APOSTOLAKIS: Maybe those equipment, Jack,
17 should be identified in advance.
18 DR. SEALE: You know, it's one thing to use a
19 constant failure rate when you have fairly well documented
20 defense-in-depth in a wide number of areas to protect you.
21 On the other hand, when you start taking things out of
22 service, you don't have all of those defense-in-depth things
23 and so on, and, you know, we all know that light rub curves
24 exist, and those aren't constant failure rates either.
25 DR. APOSTOLAKIS: No, but, you know, very often,

1 in fact, if the failure rate exhibits an increasing
2 behavior, the constant value we use is sort of an upper
3 bound.
4 DR. KRESS: It's an average.
5 DR. APOSTOLAKIS: It could be an average; it could
6 be a slight --
7 DR. SEALE: It could be an upper bound.
8 DR. KRESS: So it's accounting for it, basically
9 from the database.
10 DR. APOSTOLAKIS: Yes so --
11 DR. SEALE: If it were an upper bound, that might
12 be appropriate in the case of equipment out of service,
13 whereas, the average may be more appropriate if you're
14 talking about, you know --
15 DR. APOSTOLAKIS: I think we're getting into a
16 detail now that -- other questions that --
17 DR. SEALE: What kind of details that this kind of
18 question may bring up.
19 DR. APOSTOLAKIS: You really have to understand
20 how the particular failure rate of that component was
21 calculated, and I think that in the vast majority of cases,
22 it's a conservative bound, because you go with the
23 statistics of failures and so on.
24 DR. KRESS: Well, of course, if he uses the RAW,
25 why, that's conservative enough.

1 DR. APOSTOLAKIS: The RAW is overly conservative.
2 Maybe for those distinct components, they should not be
3 allowed to do the second bullet; maybe they could do just
4 the first for some of these components if indeed there is
5 evidence that if you miss one surveillance, things get much
6 worse.
7 DR. BRADLEY: And don't forget that you're still
8 under the other provisions of the maintenance rule to
9 balance availability and reliability and take corrective
10 action if the performance of the equipment is outside your
11 goals that you set through the maintenance rule, the other
12 elements of the maintenance rule.
13 Are there any other questions on the missed
14 surveillance?
15 DR. APOSTOLAKIS: Just a note that I really think
16 what is happening now is something that PRA guides, you
17 know, have been expecting for a long time. The actual
18 applications now are forcing us to go back and look at the
19 assumptions behind the individual calculations in the PRA,
20 so this is the most useful feedback. Because up until now,
21 if you told anyone that you would do something to the
22 failure rates, it's good enough; what we're doing is good
23 enough. But now that we have this kind of feedback, you may
24 go back and really examine those.
25 DR. BONACA: I have a question to do with -- until

1 now, when you missed the surveillance in the tech spec, you
2 declared equipment inoperable, and so, this proposal has an
3 effect also on the definition of repairability at large; I
4 mean, how does it apply to other definitions of
5 repairability within the licensing domain? And maybe that's
6 a question I should ask of the staff as it relates to other
7 equipment or other actions, not to do necessarily with
8 surveillances.
9 Here, we have a risk basis to say that the
10 equipment is not any more inoperable. It will be operable
11 until the next surveillance.
12 DR. KRESS: Same principle applies to appendix J
13 on the leak rate testing and containment. When you --
14 DR. BONACA: I just would like to hear from the
15 staff maybe during the presentation that they're having, you
16 know, this has implications that go beyond the tech specs as
17 a principle.
18 DR. BRADLEY: Yes, and that's a good point, and as
19 we move more and more toward a risk-informed configuration
20 control approach, the conflict between the definition of
21 operability versus, say, functionality or availability
22 becomes complicated, and that's another of our initiatives
23 that -- I think that's number seven, and the current
24 definition of operability basically states that you've met
25 your surveillances. I guess the way I would interpret that

1 is that through this provision, you can continue to assume
2 that you've met that as long as you've done the risk
3 evaluation and, you know, will take the appropriate actions.
4 DR. BONACA: But we're still talking about within
5 the confines of the tech specs. I can think of -- you
6 discover that a pump doesn't meet some code requirements,
7 but it is fully functional. I mean, you know, until now,
8 you called it inoperable, because it did not meet the code
9 requirements. Now, this is a true precedent for saying that
10 the system should be called operable if, in fact, it's
11 possible. It would be important, maybe, that the staff will
12 tell us a little bit if they are viewing this as a
13 redirection for the whole concept of operability.
14 DR. REINHART: This is Mark Reinhart in the
15 probabilistic safety assessment branch. We will address
16 that point, and really, I think you've hit it: it's a
17 matter of degree and how that degree is evaluated and
18 addressed, but we'll talk about that.
19 DR. BONACA: Again, I'm not against it. I'm just
20 looking at this as a precedent that will affect the whole
21 definition of operability.
22 DR. REINHART: We agree, and that -- like this, at
23 issue number seven, which is a separate issue from what
24 we're really focusing on today really, ultimately gets to
25 the heart of that issue, and I think that's important.

1 DR. BONACA: But that's only tech specs.
2 Operability goes much beyond --
3 DR. REINHART: Agree, agree.
4 DR. BONACA: -- tech specs, and it seems to me
5 that a lot of events that we've had in the past where we had
6 LERs ended up with equipment inoperable and were
7 characterized by there wasn't a piece of equipment
8 functioning at a plant are going to change.
9 DR. REINHART: When you get into tech specs, that
10 definition becomes more legal.
11 DR. BONACA: Oh, yes, I understand.
12 DR. REINHART: Where a piece of equipment that's
13 not in tech specs, you can, in an outside the tech spec
14 definition say does this work good enough to satisfy its
15 intended safety function?
16 DR. BRADLEY: And there are other instances where
17 their (a)(4), for instance, will allow you to make a
18 temporary plant alteration to support a maintenance
19 activity. That might involve something like removal of a
20 barrier or opening a door. And (a)(4) will allow you, for
21 up to 90 days, to control that under (a)(4) versus 50.59.
22 However, you're still presented with a conflict with tech
23 specs, because with that barrier off, the equipment is not
24 technically operable, so if that's a tech spec piece of
25 equipment, those kinds of conflicts arise.

1 Any other questions on the missed surveillance
2 issue?
3 DR. APOSTOLAKIS: How many can they miss in a row
4 for a particular component? I mean, is it just a random
5 thing, we missed one, or can they miss three of them?
6 DR. BRADLEY: I would certainly -- some of the
7 tech spec branch here may have more of a history of this,
8 but, you know, my view is that missing more than one in a
9 row would be -- I mean, giving that missing any surveillance
10 is a fairly unusual event, missing two in a row or more than
11 one in a row would be very, very unusual. There's no
12 specific limit, but again, you know, the intent here is not
13 to -- remember, you're going to have your corrective action
14 program. I assume if you miss the same surveillance twice,
15 you would get hammered pretty hard in the CAP for that,
16 because you've failed to correct it the first time around.
17 So I view that as a very unlikely situation.
18 DR. APOSTOLAKIS: Do we what the causes for
19 missing surveillances are?
20 DR. BRADLEY: Yes; I think the staff has spoken to
21 some of those before. You may have procedure changes that
22 may change a surveillance, or you may have missed some
23 portion of a surveillance, not completed it. I don't know
24 if there are others that you guys are familiar with.
25 DR. REINHART: This is Mark Reinhart again. I

1 think I would address -- our expectation is the proposal is
2 going to be for just one. If you miss the surveillance,
3 then, we get into this process, and there's not a provision
4 to miss it again.
5 DR. BONACA: But what about to miss another
6 surveillance?
7 DR. REINHART: Okay; another surveillance is, you
8 know, a separate situation. But say we miss surveillance SR
9 whatever it is on pump X. That same SR, there's not a
10 provision to the next time say, oops, I missed it. No way;
11 the focus on that has to be so great that we achieve it.
12 Now, if you have valve Q over here, that's a
13 separate issue, but I think what the industry has presented
14 to us, their survey of data is that missed surveillances
15 are, is it fair to say, extremely rare?
16 DR. BRADLEY: I think there were 10 NOEDs in the
17 last 5 years. I think that's some data like that.
18 DR. BONACA: Yes, but that's because in the past
19 you got hammered if you missed it.
20 DR. BRADLEY: Yes.
21 DR. BONACA: In the future, you won't. So, you
22 know, I'm only pointing out that if you go in an outage,
23 oftentimes, surveillances are in critical path.
24 DR. BRADLEY: Right.
25 DR. BONACA: And if you get pressure to restart,

1 you say oops, you know, so, we have one. And I'm only
2 saying that technically, there should be a monitoring of the
3 part of how this rate is going to increase, because the past
4 is not going to reflect --
5 DR. BRADLEY: If you're talking about a willful
6 violation, you know, that's something that --
7 DR. BONACA: No, no, I'm not talking about
8 willful; I'm only talking about conditions that at times are
9 plenty legitimate, and they are conditions under which you
10 may discover that you have the surveillance done may delay a
11 restart, for example, by a significant time, and there are
12 -- and it may not be the best decision, in fact, and now,
13 you have an opportunity for saying it doesn't make sense,
14 and the staff may agree with you. In fact, it may make
15 sense in that particular case to put it off.
16 DR. BRADLEY: I think what would happen in today's
17 world is you would go in for an NOED enforcement discretion.
18 DR. BONACA: Yes.
19 DR. BRADLEY: And with a good case, a good risk
20 case, it would probably be granted. So the net effect is no
21 different; it's just that the process is built in.
22 DR. BONACA: I agree with you.
23 DR. BRADLEY: Yes.
24 DR. BONACA: I'm only saying that -- I was talking
25 more in terms of oversight and --

1 DR. BRADLEY: Right.

2 DR. BONACA: -- you know, I mean, there could be
3 almost a certain post-PI on the part of any plant to see how
4 you perform on this.

5 DR. BRADLEY: And the correct -- I know the
6 corrective action program is a key element of the new
7 oversight process, and I believe that the disincentive to do
8 this remains strong. It's just a different disincentive.
9 It's not you're going to shut the plant down. It's you're
10 going to get hit on the corrective action program element.

11 DR. REINHART: This is Mark Reinhart again. We're
12 well aware that the oversight program has to mesh with this
13 program and be aware of the kind of potentials you're
14 talking about and pick up on them, but clearly, the intent
15 is not that a licensee would use this as a convenience to
16 extend or shorten an outage or extend some frequency just
17 because they need to start up.

18 DR. SIEBER: I would doubt that that condition
19 would exist in any plant where people would intentionally
20 miss surveillances to pressure start-up.

21 MR. MARKLEY: But, Jack, I don't think they'd miss
22 surveillances, but I don't think they'd hesitate to use this
23 at all every startup, every outage if they needed to.

24 DR. SIEBER: If they missed a surveillance, and it
25 would mean going back, changing a plant condition to go back

1 to pick it up, I imagine that if it was a legitimate miss
2 that they would use this mechanism.
3 DR. BRADLEY: Yes.
4 DR. SIEBER: And that's what it's intended to do.
5 DR. BRADLEY: That is correct; that is correct.
6 DR. SEALE: And you tell me that these events are
7 so rare that there's really no reason to make any provision
8 for what you would do if you had two of these independent,
9 now, in the bank at one time.
10 DR. BRADLEY: I don't believe there is a need to
11 do that; that is correct.
12 DR. SIEBER: It would be a rare situation to have
13 two at one time in any given year in one plant.
14 DR. BRADLEY: Yes.
15 DR. SIEBER: Okay.
16 DR. BONACA: I can see outages in the middle of
17 the summer where, you know, you have the great strain where
18 it doesn't make any sense to stay down for a day and a half
19 because you have to complete the surveillance, and you would
20 go back for --
21 DR. SIEBER: NOED.
22 DR. BONACA: -- for discretion --
23 DR. SIEBER: Right.
24 DR. BONACA: -- today. But for a utility to do
25 that, it's actually one event; that they don't do it again

1 for two years maybe. You know, if you have this, it's going
2 to be more. I mean, I think monitoring is an important
3 thing; just monitoring that this is not the grading fact,
4 the past good performance that is supporting, you know,
5 going in this direction so --
6 DR. REINHART: This is Mark Reinhart again. A
7 thought on the missing two surveillances, again, that that
8 would be picked up in the risk assessment. I mean, it
9 wouldn't be missed. Another point is when we were
10 developing the improved standard tech specs, we tried to
11 think of a lot of what if scenarios early on but did
12 conclude that the bookkeeping associated with trying to
13 track such rare situations would be more burdensome than
14 keeping our eye on the risk-significant aspects of operating
15 the plant.
16 DR. POWERS: Okay.
17 DR. BRADLEY: Okay; well, last call on the missed
18 surveillances?
19 [Laughter.]
20 DR. BRADLEY: All right; I want to talk a little
21 bit about the initiative three, and that's on mode change
22 restraints. I don't have as many slides on this one. Let
23 me just talk about it a little bit. The existing tech spec
24 3.0.4 in the standard tech specs precludes making plant mode
25 changes up in mode when you are in an LCO that would be

1 applicable or when you have a piece of equipment whose LCO
2 would be applicable in the mode that you are preparing to
3 enter.
4 Currently, a large number of those 3.0.4 -- there
5 are 3.0.4 exceptions provided in the standard tech specs for
6 a fair number of the systems and components in tech specs
7 right now. Those 3.0.4 exceptions have evolved over time
8 and are not what I would call risk-informed exceptions.
9 They may be qualitative or obvious types of issues where
10 it's clear that the -- going up in mode that this particular
11 component would not have an impact. And what we're
12 proposing to do with initiative three is to essentially make
13 the 3.0.4 exception a risk-informed process rather than what
14 we have now, which is just a mixed bag of exceptions in the
15 tech specs.
16 This one involves -- what it basically would allow
17 you to do is to -- is require each -- the way this would
18 work is that each owners' group will have to develop a
19 model, a transition risk study that will look at the impact
20 of various components as a function of plant mode and
21 various initiators that you could have in those modes and
22 what are the accident sequences that are important and what
23 areas of those components contribute to.
24 And this has been done for one of the four owners'
25 groups already, CE. What that showed for their line of

1 plants was that there were about four systems in the plant
2 that would generally require a more rigorous risk evaluation
3 before you could remove the mode change, existing mode
4 change constraints. However, for the remainder of the
5 systems in the plant, they were basically able to show
6 generically through this CE model that the impact was very
7 small.
8 And what this means is that when you move up in
9 mode, you would still have to return the equipment to
10 service within its AOT time, so the difference from where
11 you are today is that you couldn't move up in mode at all
12 now with this change, unless you have the 3.0.4 exception,
13 which many systems do. This would allow you to go on out,
14 but you still have to get the component back in service by
15 the end of the AOT time.
16 This, again, is -- the types of things you have to
17 consider here are very similar, again, to what we're doing
18 in (a)(4). (A)(4), as a matter of fact, talks about mode
19 changes and the impact -- you have to evaluate the impact of
20 mode changes on your plant configuration control program, so
21 again, here, we're trying to develop some symmetry with what
22 (a)(4) would require.
23 DR. KRESS: Would you make the allowed outage time
24 then consistent with the criteria that's in (a)(4), the
25 spike criteria?

1 DR. BRADLEY: Under (a)(4), you would have to do
2 that. Now, ultimately, as we go to initiative four, we will
3 try to globally make the AOTs and tech specs compatible with
4 what (a)(4) would do. I mean, this particular initiative
5 won't do that on its own, so we'll still be in the
6 existing --
7 DR. KRESS: What do the tech specs say on this?
8 DR. BRADLEY: The existing AOT; but ultimately,
9 when initiative four goes through, that AOT would be a
10 risk-informed AOT. But (a)(4) would still control you to
11 the risk-right element of this.
12 This one requires a little more analysis in
13 initiative two. It does require that each of the -- and the
14 other three owners' groups need, in order to get this change
15 into the ITS, do have to go develop a similar work to what
16 CE has done. But once the plants -- the owners' groups have
17 done that, it will be a list of systems that basically, you
18 couldn't do this -- make this exception unless you do a
19 plant -- if you have a plant-specific model that would allow
20 you to make a finer resolution on that risk impact and show
21 it was okay.
22 DR. KRESS: But we haven't seen this transition
23 risk model.
24 DR. BRADLEY: It was discussed at the subcommittee
25 meeting. I forget; was it supposed to be performed?

1 MR. MARKLEY: The CEO's group was supposed to be
2 providing it.
3 DR. BRADLEY: And they have not provided it?
4 DR. APOSTOLAKIS: Yes; and also, the point about
5 the supplementary meeting for a full transition.
6 DR. KRESS: Yes; it's an outshot of --
7 DR. APOSTOLAKIS: Right.
8 DR. BRADLEY: It's a simplified --
9 DR. APOSTOLAKIS: Yes.
10 DR. BRADLEY: I will make sure that you guys get
11 that.
12 DR. UHRIG: When does the clock start on the AOT?
13 Is it the time the mode changes or when the equipment went
14 out of service initially?
15 DR. BRADLEY: Typically, the equipment is not --
16 since you're going up in mode, it's generally going to be a
17 case where the equipment may not have been in service
18 previously, so that the clock would start when you enter the
19 modal applicability for the LCO.
20 DR. SIEBER: For the other reactor vendors, when
21 they do this analysis, some vendors have differences in --
22 within a category, for example; General Electric, just to
23 pick -- different types of plants, they are going to have to
24 perform a transformation model for each type?
25 DR. BRADLEY: What the owners' groups would do --

1 and the BWR owners' group, I presume, will have to look at
2 the different BWR types, containment types, and if there are
3 differences in how this would be impacted for the BWR Four
4 Mark One or whatever, Mark Two, what have you, then, yes;
5 the answer to your question is yes. It may not be purely
6 generic, you know, how here's all BWRs do it. There may be
7 deltas based on specifics of the plant.
8 DR. SIEBER: So for some types of reactors, there
9 would be more involved than for other types.
10 DR. BRADLEY: Right; what these studies are trying
11 to do is basically show which components can't be
12 dispositioned generically that, you know, here are the four
13 things that you can't remove the exception from unless you
14 can do a plant-specific study and show that you're meeting
15 the 1.182 type threshold.
16 DR. SIEBER: Than you.
17 DR. BRADLEY: Sure.
18 Any questions, further questions?
19 DR. APOSTOLAKIS: A more general question; it will
20 probably be addressed more later. Are we really
21 extraordinizing our -- if it doesn't look any different,
22 you're missing one surveillance; as long as they remain
23 rare. From the risk perspective, it seems to me --
24 DR. KRESS: I think you're right, George.
25 DR. APOSTOLAKIS: We're doing this because we are

1 used to the existing regulatory approach as being, you know,
2 very prescriptive and very deterministic. In the larger
3 scheme of things, does it really matter? Maybe there's one
4 of the components that, as Jack mentioned, that you really
5 don't want to do that.
6 DR. KRESS: Somebody brought up the issue of
7 slower motion -- but that's the only place I can see where
8 -- but you're right; this has an essentially insignificant
9 impact on risk.
10 DR. BRADLEY: To use our overused term, this is
11 the low-hanging fruit of the tech spec risk-informing, and
12 these are the -- the reason we did these first was to get
13 our toe in the water and understand how to make this work
14 for a simple application.
15 DR. KRESS: What I'm interested in, George, is
16 this is sort of a precedent for things to come, maybe, and
17 we're scrutinizing it, I think, because we want to be sure
18 it's spelled right even though it has no real risk impact.
19 And the things you want to ask are the things we're asking,
20 like what is your criteria for a spiking risk, and how do
21 you apply it? What's the role of the PRA? How does it fit
22 in there? How do you do it? And so, I think those are the
23 things that we're trying to establish, even though this
24 particular issue, I think, we can almost set off and say
25 never mind.

1 DR. SEALE: You know, the comment is made there on
2 the side that most plant systems have insignificant risk
3 effects. That's most; it's not all. I would be curious to
4 have some idea of what the exceptions are. I have a sort of
5 an intuition that tells me what I think they are, but I'd be
6 interested to know what the exceptions are, if nothing else
7 than to reinforce my wrongheadedness, maybe.
8 DR. KRESS: Prejudices?
9 DR. SEALE: My prejudices, yes.
10 DR. BRADLEY: I believe there were four systems.
11 Can the staff help me here? I don't recall the exact
12 systems in the CE.
13 DR. REINHART: Well, this is Mark Reinhart again.
14 It was HPCI, aux feed water and diesels.
15 DR. SEALE: I feel smarter already.
16 [Laughter.]
17 DR. APOSTOLAKIS: Would you tell me about the
18 risk-significance of the systems, the four systems?
19 DR. BRADLEY: Those are the ones that you -- that
20 absent some plant-specific evaluation, you couldn't
21 generically make a 3.0.4 exception; you couldn't come up in
22 mode with those systems out of service.
23 DR. REINHART: A train; we're looking at a train.
24 DR. BRADLEY: Yes, where the tech specs were for
25 some of the -- right.

1 DR. SEALE: It's nice to see that you think that
2 -- discrimination, really.
3 DR. APOSTOLAKIS: Is the staff going to review
4 these transition list models and see if they are acceptable
5 for risk orientation?
6 DR. REINHART: Review in the sense that we'll look
7 at them; we'll make an evaluation. We don't -- we're not
8 going to go into a minutely-detailed review.
9 DR. APOSTOLAKIS: Well, you will make a decision
10 as to whether they are good enough for this application.
11 DR. REINHART: Yes.
12 DR. APOSTOLAKIS: Not whether they are -- yes, you
13 will do that, and we will get a chance to see your
14 evaluation, the ACRS?
15 DR. REINHART: We can make that available, sure.
16 DR. APOSTOLAKIS: Yes; I would like to see it,
17 because I see this as a great way to improve the PRAs, the
18 applications.
19 DR. KRESS: Yes, I agree.
20 DR. SIEBER: Well, individual licensing actions
21 will be made licensee by licensee.
22 DR. BRADLEY: Yes.
23 DR. SIEBER: So no generic program.
24 MR. MARKLEY: Will we be issuing SERs based on
25 that?

1 DR. REINHART: Bob Denning -- he's going to cover
2 how we're looking at the application, how the TSTF will be
3 reviewed and how a plant-specific application will be
4 reviewed.
5 DR. APOSTOLAKIS: It's interesting that if you
6 look at the workshop proceedings for the staff that there
7 was almost universal agreement that transition risk was not
8 more than -- and people were very -- what is it here that
9 makes us comfortable with the transition modeling? You
10 informed me in a statement from industry, for example, that
11 -- the staff -- and you would not have that concern?
12 DR. REINHART: We could add the thought that
13 between then and now, industry has done on a lot of work on
14 your transition models. We've had staff look at San
15 Onofre's AFLPs, so I guess my overall answer is that over
16 time, it has improved, and we're looking to improving. I
17 know that the CE owners' group -- San Onofre is a CE plant
18 -- is generously sharing their information or offering to
19 share their information with the others so they can get not
20 only the information out there but obviously some peer
21 feedback.
22 DR. APOSTOLAKIS: It seems to me that this is an
23 important enough issue that perhaps we should get a
24 supplement on this, not on this issue of mode change but the
25 transition risk models. And I haven't even seen anything

1 like that so --

2 DR. KRESS: Good issue.

3 DR. APOSTOLAKIS: And, you know, in the broader

4 context, what do these models give you, and how do they use

5 it?

6 DR. KRESS: Yes; I think that would be a good

7 issue.

8 DR. SIEBER: It looks like at the beginning, if

9 you get enough discrimination in their application that it's

10 worthwhile to look at what they're doing now.

11 DR. APOSTOLAKIS: Yes.

12 DR. SIEBER: Before they had that, it wasn't --

13 DR. APOSTOLAKIS: Yes.

14 DR. SIEBER: The kind of models that you're

15 looking at, for example, with combustion are not true

16 transition models. They're snapshots after a mode change.

17 So you aren't modeling in the issues.

18 DR. APOSTOLAKIS: That's why we need a supplement.

19 DR. SIEBER: This is not, to me, transition risk.

20 DR. APOSTOLAKIS: It's better than nothing but --

21 DR. SIEBER: Well, I think that it's adequate to

22 do this kind of work.

23 DR. SEALE: It's a first step.

24 DR. SIEBER: Well, it supports what they're doing.

25 DR. SEALE: Yes.

1 DR. APOSTOLAKIS: Who on the staff would be the
2 person to comment if we wanted to establish a supplement?
3 Is it Cunningham or --
4 MR. BARRETT: Yes; I would think that this is
5 something the Office of Research would take the lead for,
6 you know, if you're talking about the accuracy of methods,
7 state-of-the-art as far as PRA methodology is concerned.
8 DR. SIEBER: In order to avoid shortchanging the
9 staff on their presentation time, I might ask if anybody has
10 any more questions for Mr. Bradley or if he has anything
11 more to present? You do not?
12 DR. BRADLEY: I do not. Just in closing, I would
13 just say that we appreciate the efforts of the staff and
14 this committee in helping us move forward with these
15 prototypical changes to tech specs, and as someone said
16 here, I thought it was the best comment: these are the
17 kinds of things we need to incentivize the industry and get
18 that movement toward a more risk-informed approach across
19 the board, and that's why we think this is important.
20 DR. SIEBER: Thank you very much.
21 DR. SEALE: I think we ought to let Biff lead off
22 all the time.
23 [Laughter.]
24 DR. APOSTOLAKIS: Now, speaking of that, by the
25 way, this was a highly unusual order of presentations. Why

1 did the staff feel that NEI should go first?

2 MR. DENNIG: Well, I that part of our reasoning

3 was that in our last discussions, there was a lot of

4 interest in some details of the industry proposals, and

5 those details are -- as far as the staff is concerned,

6 they're now being worked into things that we haven't got

7 yet. We haven't seen the revision of the things that we

8 have under review that address a lot of the things that were

9 brought up, and I thought Biff did a good job of bridging

10 the gap between what the staff has seen and what we're about

11 to see as far as those kinds of details.

12 So we figured that would be the most productive

13 way to go and then come behind and then anything that was a

14 concern from the last meeting that hadn't been adequately

15 addressed or was something that was peculiar to us, then, we

16 would just take that on. So that was the extent of the

17 reasoning.

18 I'm Bob Denning again, and I have Mark Reinhart to

19 my left and Ann Gilles. We're going to coordinate our

20 presentation. Again, let me say at the beginning, I think

21 our major message: we hear you. The focus of our

22 presentation is to tell you what we heard at the last

23 meeting by way of your concerns and to give you a response

24 to those concerns as to how they've already been addressed

25 or they will be addressed.

1 What we have up initially is basically a punch
2 list of what we thought were the major categories of how we
3 might bin your comments to us, and we will -- we'll go
4 through these in some detail. Let me go to the next one.
5 The first item is the details of plant risk decision
6 process, and again, Biff has done, I think, a very good job
7 of filling in the blanks about how the specifics of the
8 process that would be used in initiatives two and three is
9 being fleshed out in view of the approval of the (a)(4) reg
10 guide and some thinking that the industry has done. We
11 reiterate that we will be getting more detailed proposals in
12 response to comments that we've provided, comments that
13 you've provided and some thought that the industry has
14 given; that we will be focusing on the kinds of issues that
15 Mr. Sieber brings up: how do you do this calculation where
16 the options for doing this calculation, where the
17 quantitative and qualitative aspects of that.
18 We're aware of the concern about risk-informing by
19 committee, if you will. That lets us all get together and
20 see what we think and then decide that that's risk-informed.
21 We will, in our safety evaluation, outline what we believe
22 -- what we will require those decision processes for
23 initiatives two and three to contain, and individual plant
24 amendment requests will include more detail if necessary.
25 And I'm going to come back to that a little bit later when

1 we described a process for -- that's recently been put into
2 place for adopting generic changes to the standard. And I
3 think now, I turn this over to Mark Reinhart.
4 DR. REINHART: I just wanted to cover a couple of
5 aspects on the slide Bob just talked about, and one relates
6 to the question that was raised earlier on missed
7 surveillance. And I guess my thought is what do we really
8 mean by a missed surveillance? If you just say that phrase,
9 oh, they missed a surveillance, that brings up one picture.
10 What often really happens is a licensee has a program that
11 tracks their surveillances, so it's very rare that they just
12 miss their schedule.
13 What most often happens is there will be a
14 procedure change, a change in the way the surveillance is
15 performed, and in review, they find out they missed some
16 technical detail that officially says they missed a
17 surveillance, but the large majority of it was actually
18 performed.
19 So in the missed surveillance arena, one, the
20 licensee definitely needs a program or a process to go in
21 and look at whether they used the RAW; look at their failure
22 rate; whether they have some qualitative evaluation, but
23 they can say what parts of the surveillance have we
24 performed? What does that tell us? What is the history of
25 this surveillance? What are the pieces we missed? What can

1 we do with the physical plant to go in and give us some
2 level of confidence that the piece we can't get in whatever
3 condition we're in -- what is our feeling of that status?
4 So, by and large, they're going to be able to go a long way
5 to say whether that surveillance was actually completely
6 missed or just some portion of it. And then, they decide
7 whether they look at RAW, the failure rate, and come up with
8 a quantitative but also qualitative risk-informed decision
9 as to what to do with that plant and that surveillance.
10 So all of that is, in our thinking, hoping we see
11 this in whatever the licensee proposes in these TSTFs, some
12 sort of process that gives us that flavor.
13 DR. SIEBER: There will be some kind of
14 description someplace as to how to do this, though.
15 DR. REINHART: My view is the licensee is going to
16 have a program that would describe that, yes.
17 DR. SIEBER: And you will look at that program and
18 say yes, this is adequate or not, somebody will.
19 DR. REINHART: The program is going to be
20 available at the plant site. I'm sure that the regional and
21 the resident, in their inspection process, will have a look
22 at that.
23 DR. SIEBER: Okay; thank you.
24 DR. REINHART: We likely, in our -- maybe our
25 safety evaluation of looking at their submittal are going to

1 see what aspects they propose to have in the program.

2 DR. SIEBER: Right.

3 DR. REINHART: Then, if we go to the next one, one

4 of the things we're looking at is right now, we're saying

5 what is the quality of the PSA that licensee has, the

6 quality that backs the submittal for the TSTF or the tech

7 spec task force change document that makes the change but

8 also the individual licensee's program that tells the

9 quality of their program. Now, today, we look at what

10 they're doing. A licensee performs a PSA. Then, they come

11 back, and they say okay, I had a certain independent review

12 internally; maybe a contractor; maybe a peer review; maybe

13 some certification process. The staff goes and does some

14 looking at that PSA, whether it's the exact application or a

15 little bit broader for what we think is coming down the

16 road.

17 And so, we're looking at a de facto, if you will,

18 compilation of how good is that standard today? We're

19 looking eventually to have some agreement, some standard,

20 that we all agree with that, yes, we meet this structure.

21 DR. APOSTOLAKIS: I'm a bit confused now. My

22 understanding is that the agency has been very cautious not

23 to demand the PSA from the licensees. Now, what's happening

24 here now? Do they have to -- if a licensee says I was

25 licensed 25 years ago; I didn't have to do a PRA; I don't

1 want to do it now; I'm going with the old system --
2 DR. REINHART: They may do that.
3 DR. APOSTOLAKIS: How do they do this?
4 DR. REINHART: They can't. This is a
5 risk-informed application. They're saying I'm requesting,
6 staff, this program.
7 DR. APOSTOLAKIS: They may choose not to implement
8 this?
9 DR. REINHART: They don't have to apply if they
10 don't want -- they can stay with the tech specs they have.
11 DR. APOSTOLAKIS: Okay.
12 DR. REINHART: It's voluntary.
13 DR. APOSTOLAKIS: All these are voluntary.
14 DR. REINHART: Yes.
15 What the industry --
16 DR. APOSTOLAKIS: So if they miss a surveillance,
17 then, the staff cannot ask for the risk-significance of that
18 missed surveillance, because it's not an issue of public
19 protection.
20 DR. SIEBER: Well, you answer the question.
21 DR. REINHART: We've gone through a process to get
22 in place staff authority to ask for risk information, and
23 we're kind of into what if space, but if the situation
24 arose, and we felt that it was necessary to have risk
25 information, we would have the authority to ask for it.

1 DR. APOSTOLAKIS: But you would have to say
2 something about adequate protection, the way I understand
3 it.
4 MR. BARRETT: Could I add a word? I think we'll
5 be talking about this this afternoon.
6 DR. APOSTOLAKIS: Yes.
7 MR. BARRETT: The question of when we can ask for
8 risk information, but in a case like this, you know, I think
9 the main distinction is asking for information that's
10 relevant to compliance with the regulation, which is what we
11 might be talking about here, for instance; if someone wanted
12 to miss a legally-binding surveillance requirement, they
13 might be asking for us to give them relief. The situation
14 we're having this afternoon is a situation where we want to
15 bring risk into a licensing application in a situation where
16 risk is not required under the legally-binding requirements
17 and where a licensee is perfectly within their rights to
18 meet the regulations without reference to risk. So that's
19 the distinction between what we're talking about here and
20 what we're talking about this afternoon.
21 MR. MARKLEY: George, there are really kind of
22 three options, you know. If they have a problem there, we
23 would expect them to comply with the technical specification
24 requirements. Their first alternative would be enforcement
25 discretion, which is what they currently do now, and then,

1 the new option is the risk-informed approach. So that's
2 kind of where they fall together.
3 DR. SIEBER: But they would be in one category or
4 the other. They would be in a deterministic set of tech
5 specs or a risk-informed set of tech specs.
6 DR. REINHART: Yes.
7 DR. SIEBER: And you follow the tech specs that
8 you have.
9 DR. SEALE: Could a licensee go to a set -- to the
10 standard set of risk-informed tech specs but not play this
11 game with regard to missed surveillances and so on?
12 DR. REINHART: For a licensee to get the piece
13 they're asking for, if it's risk-informed, they need a PSA
14 and a program --
15 DR. SEALE: Yes.
16 DR. REINHART: -- in place sufficient to that
17 application.
18 DR. SEALE: To invoke these processes.
19 DR. REINHART: Yes.
20 DR. SEALE: But what I'm saying is you could have
21 a -- you could adopt the risk-informed tech spec format and
22 still play the old game.
23 DR. REINHART: There's an improved standard
24 format --
25 DR. SEALE: Yes.

1 DR. REINHART: -- that all licensees have the
2 option to go to. The risk-informed improvements would
3 maintain that format.
4 DR. SEALE: Yes.
5 DR. REINHART: There might be some slight nuances
6 programmatically on how they would invoke their particular
7 regulations, their particular pieces, but they couldn't pick
8 up what's proposed in these TSTFs without that information.
9 The only exception might be if industry successfully makes a
10 case, proposal X, whatever that might be, we have enough
11 generic information to show that really, the risk puts it
12 over here rather than over there, and that's applicable to
13 everybody, and we accept that. Then, they could go that
14 way.
15 For these two issues, two and three, the industry
16 is proposing that the maintenance rule (a)(4) guidance gives
17 them an adequate place to start with the requirements
18 they're looking for. Now, with that in mind, if we back up
19 a little bit, first, there was the old maintenance rule, if
20 you will, the (a)(3). Then, the staff had the configuration
21 risk management program that it worked out with the industry
22 for risk-informed tech spec applications. The thought all
23 along was that (a)(4) was going to pick that up, and the
24 thought was rather than have a different program for this
25 application versus that application, we come up with one

1 program that we can apply without thinking in mind the
2 program the licensee has to support this application ought
3 to support also a four and vice versa.
4 So for these areas, particularly two, this may be
5 the right level. For area three, I'm not sure. I think we
6 need to see exactly what they propose there. But in any
7 case, when we're done, we want to make sure that the safety
8 evaluation -- and again, Bob is going to explain a little
9 more about this in a minute -- but the safety evaluation
10 outlines the requirements we're looking for to support the
11 particular application under discussion.
12 DR. APOSTOLAKIS: We have 11 minutes left.
13 DR. REINHART: With that in mind, I'm going to
14 turn over to Nanette Gilles.
15 DR. APOSTOLAKIS: Good.
16 MS. GILLES: I'm Nanette Gilles from the technical
17 specifications branch, and I'm going to very quickly talk a
18 little bit about the oversight process rule. This was a
19 concern that was brought up at the subcommittee meeting.
20 And to make just a few points, one, we have some ongoing
21 discussions with the NRR staff involved in the oversight and
22 inspection process. We have met with Mr. Dean and explained
23 the initiatives to him, and we are working with them to try
24 to both give them some understanding of the changes we're
25 making in tech specs and how that might affect the oversight

1 process and gain some understanding ourselves of how the
2 oversight process might help us in monitoring such changes.
3 And we have identified some specific inspection
4 procedures which would be useful in inspecting the areas in
5 which the changes are being made. Those are inspection
6 procedures in the areas of surveillance testing, maintenance
7 risk assessments and emergent work control which would help
8 you in initiative three, and then, the identification and
9 resolution of problems which is the inspection procedure
10 that covers licensees' corrective action programs, and since
11 all missed surveillances will be entered into the corrective
12 action program, that would be an important procedure from
13 our point of view.
14 We also have accepted an invitation to become
15 involved in the research risk space performance indicator
16 program, which will help us feed back to them the usefulness
17 of the current indicators and perhaps the need for future
18 indicators as we proceed with risk-informed changes to tech
19 specs. I'll also point out that in the reporting area, any
20 missed surveillance that is subsequently failed once it is
21 finally performed will still be a reportable issue.
22 In the area of public involvement and support, we
23 did have some early dialogue with concerned groups on this
24 issue. You may recall at the first subcommittee meeting in
25 December, Public Citizen, Jim Riccio, presented a letter to

1 the ACRS subcommittee, and we did follow up with Mr. Riccio
2 and respond to that letter and have some discussions with
3 him, and we have been inviting him to our meetings and
4 keeping him informed of our activities.
5 In addition, we do plan to implement a process
6 called the consolidated line item improvement process for
7 these changes to the technical specifications. That is a
8 new process that will involve publishing the draft safety
9 evaluation for public comment, and this is the safety
10 evaluation on the generic request for the change to the
11 standards. So we will give the public some time to comment
12 on that, and then, we will take their comments into
13 consideration before we put that change up for use by
14 individual licensees.
15 But again, the public has a second opportunity to
16 get involved on the individual license amendment request
17 because, of course, those will be noticed as all license
18 amendment requests are.
19 Finally, we have identified a need for a
20 communications plan on these tech spec initiatives that
21 would help us to reach out to more external stakeholders as
22 far as communicating what the staff is contemplating, what
23 the industry is proposing.
24 DR. SEALE: You mentioned that Mr. Riccio, I
25 believe, you followed up with him and so on. Has he taken

1 advantage, or has he exercised your invitation and
2 participated further in discussions on this issue?
3 MS. GILLES: He has not come to any of our
4 subsequent meetings, but he has indicated to us that he has
5 become rather overwhelmed with work in the risk-informed
6 regulation area, and I think that is not from a lack of
7 interest. It's just that there is so much going on in this
8 area that he's trying to cover that he hasn't been able to
9 make it to subsequent meetings, but we are providing us with
10 our meeting notices and our meeting summaries.
11 DR. SEALE: That's all he came to?
12 MS. GILLES: And now, I'm going to turn it back
13 over to Mark Reinhart, who is going to discuss effects on
14 safety culture.
15 DR. REINHART: Just briefly, well -- very
16 delicately --
17 DR. APOSTOLAKIS: This is not the term the agency
18 is using, is it?
19 DR. REINHART: This was an issue that the
20 subcommittee brought up, right, and we were assured that
21 this isn't a technical issue but an issue that you all are
22 aware that it could have an impact, so what we were going to
23 try and do in the way of addressing it is say that our
24 premise, and we understand the licensee's premise, is that
25 they will operate their plant safely and that -- I'll jump

1 in under here -- really, by taking a look at risk
2 information, looking more at the risk, the safety of the
3 configuration, where it is and where they want it to go
4 moreso in the past because of what the PSA is doing for them
5 is going to actually increase that safety culture by
6 focusing the licensee on the safety significant aspects of
7 the plant.
8 At the same time, we're going to have our
9 inspection process looking at the programmatic situation;
10 making sure there's no breakdowns there and not only an
11 issue by issue look but an annual, overall problem
12 identification, and as Nanette mentioned, also working for
13 some performance indicators that would give us some trending
14 on the situation, so however we want to define it, we
15 believe that this is making licensees more aware of the risk
16 of their plant configurations, which is an improvement.
17 So with that in mind, I'll turn it back to Nan.
18 MS. GILLES: The last concern that we had to
19 discuss was a concern about some NRC staff programmatic
20 aspects and perhaps how some of these changes might be
21 communicated to the rest of the staff, and we had mentioned
22 previously that we are going to become involved with
23 research and their performance, risk-based performance
24 indicator program and have been working with the oversight
25 process staff, and we also, again, have identified the need

1 for a communications plan to help us reach the remaining
2 parts of the agency staff.
3 I believe that concludes our presentation. I'll
4 take any questions.
5 DR. BONACA: Well, I had a question for general
6 identification of this change, where by now, this definition
7 of repairability in tech specs has changed, and it has
8 applications for all of Part 50, and clearly, you know, it
9 has that kind of implication that Dr. Kress put before, I
10 mean, that implication is large from limited changes we make
11 here, and do you have any --
12 DR. REINHART: I'll add for a long time, industry
13 and the staff has been aware that particularly in tech
14 specs, the legal definition of what is operable is not
15 always coincident with the equipment works well enough right
16 now to perform its safety function, and how to solve that
17 problem is still a piece we're working with. Issue number
18 seven of the seven issues is to address that more head on.
19 This obviously is a precursor. It's not the final answer.
20 MR. BECKER: This is Bill Beckner. I'm chief of
21 tech specs. I'm sure we'll address that a little bit more.
22 Throughout regulations, we have the ability to, in fact,
23 address the degraded but operable. It isn't quite up to
24 pedigree, but we know it's going to work. In tech specs, we
25 also have that ability to take a look, and tech spec

1 definition is basically can it perform its function?
2 However, there's one thing that trumps that, and that's if
3 it doesn't meet the surveillance, regardless of what the
4 equipment is, it's inoperable, even if we know it's fully
5 functional, and I think that's the issue here is if we know
6 it can perform its function or if we know there's no safety
7 concern to basically get rid of what I call that failed
8 surveillance trump, and that's, I think, what we're trying
9 to address here.
10 DR. BONACA: The only point I was making is that
11 there is Part 50, and then, there are the tech specs.
12 MR. BECKNER: Correct.
13 DR. BONACA: The importance of tech specs is such
14 that it is -- the issue of the operability of a component to
15 tech specs, okay, is almost in my mind of higher importance
16 than either a definition for components which are not in
17 tech specs.
18 MR. BECKNER: Correct.
19 DR. BONACA: For which now we are going to relax
20 the definition of operability for components in tech specs,
21 okay? I think it begs a revising of the definition of
22 operability within Part 50, I mean, because -- do you see
23 what I'm trying to say? Here, we are taking the most
24 important components, which are in tech specs, and changing
25 the operability definition.

1 MR. BECKNER: No, let me say I'm not sure I'm
2 totally following you. If a piece of equipment cannot
3 perform its function --
4 DR. BONACA: No, let me give you an example now.
5 Here, you have a component which is because it was not --
6 did not have the surveillance done on time, we recognize
7 it's still operable.
8 MR. BECKNER: Correct.
9 DR. BONACA: Okay; so one part of its attributes
10 that define operability wasn't met. But the functionality
11 is there; therefore, we call it other. Now, there is a
12 component there you find in the plant that doesn't really --
13 we discover it doesn't meet the requirements of, I don't
14 know, code requirements on the temperature or pressure, but
15 you know that in the regulation that it would perform its
16 function. So one attribute is found not to meet the
17 requirements of operability for a lesser component, because
18 it's not in tech specs.
19 And I think that then, the same should continue to
20 be applied to the component for recognizing functionality.
21 I'm not pushing the issue here but showing how I'm making
22 minor changes here in a very important group of documents,
23 which is the tech specs, begs the question for similar
24 initiatives, you know, for lesser components of the same
25 principle.

1 MR. BECKNER: I think I understand your concern,
2 and we'll have to do some thinking about it. I think the
3 fundamental can the equipment do its function is still the
4 operability definition, and I think it's just a matter of,
5 like I said, of making sure that a surveillance -- not a
6 surveillance failure but just not performance bounds doesn't
7 trump that in my terminology, but we'll think about it and
8 see if we can -- see if there's any obvious need for other
9 changes.
10 MS. GILLES: I will point out that initiative
11 number seven is number seven on the list of seven just for
12 this issue that you've raised, that we all recognize that it
13 is tied intimately to so many other parts of the regulation
14 that it's one that we have to pursue cautiously, and I think
15 that we've even, you know, seen some of these concerns rise
16 up in the risk-informing Part 50 Option II area, where they
17 are trying to separate, you know, the definition of
18 safety-related from some of these special treatment
19 requirements, which is very similar to the operability
20 concern where you're also talking about seismic concerns and
21 equipment qualifications, which all come into play, and how
22 do you separate those from functionality?
23 DR. REINHART: Any further questions?
24 DR. SEALE: Well, at the bottom of the comment was
25 the question whether or not we think we need to write a

letter on this.

DR. APOSTOLAKIS: I think that's to be discussed later.

DR. SEALE: All right.

DR. APOSTOLAKIS: Yes; yes, we'll discuss it later.

DR. SEALE: Okay.

DR. SIEBER: Well, I'd like to thank Mr. Bradley and the staff for their presentations, and I think it increased our knowledge, and so, Mr. Chairman, I'll turn it back to you.

DR. APOSTOLAKIS: Thank you.

We'll recess until 10:18.

[Recess.]

DR. APOSTOLAKIS: We're back in session; okay, the next item on the agenda is potential revisions to the pressurized thermal shock acceptance criteria, and the cognizant manager is not here, so we'll go ahead anyway.

Mr. Cunningham, you're in charge.

DR. CUNNINGHAM: Thank you, sir.

My name is Mark Cunningham. I'm the chief of the PRA branch in the Office of Research. I'll be making part of the presentation this morning. The other part will be made by Ed Hackett, who's the acting chief of the materials engineering branch in the Office of Research.

1 As Professor Apostolakis said, we are here to talk
2 about the revisions to one aspect of the screening criterion
3 that's used in the pressurized thermal shock pool. A few
4 weeks back, we provided the committee and the subcommittee a
5 draft Commission paper on the subject of potential revisions
6 to the PTS screening criteria. Today, we're going to
7 summarize some background on the purpose of that paper and
8 some information on the screening criteria itself and PTS
9 accidents. I want to provide some more information that's
10 relevant to potential revisions; Ed will talk about work
11 that's been going on over the last few years or number of
12 years in materials research with respect to better
13 understanding of reactor vessel flaws, and I'll talk some
14 more about Commission guidance in the context of PRA, and
15 we'll talk about some approaches, some potential approaches
16 for revisiting the screening criteria and where the staff
17 intends to go with this.
18 I should note that when we talked to the
19 subcommittee, we talked in the context of a notation vote to
20 the Commission with options and a recommendation for an
21 option. Based on our conversations with the subcommittee,
22 we've revised our approach so it's more of an information
23 paper at this point, informing the Commission of where we
24 intend to go with this and laying out a couple of issues
25 that the staff is going to have to work on. We'd like to

1 get some input from the full committee today on where we
2 think we're going.
3 At this point, based on the fact that we're
4 changing this to an information paper, we're not formally
5 asking for a letter from the committee at this time. Again,
6 that's somewhat different than what we talked about at the
7 subcommittee meeting, but we don't think the nature of the
8 paper as you'll hear it today is such that we don't think
9 it's necessary to have -- and it may be a bit premature to
10 have the committee write a letter at this point.
11 By the way of background, the last 9 months or so,
12 the staff has had work underway to revise the technical
13 basis for the pressurized thermal shock rule. We're doing
14 that because there are some indications that the work that's
15 been done in the previous years in materials research and
16 our experiences with implementation of the rule say that we
17 may want to revise the rule and provide a more realistic
18 basis, technical basis, for the rule.
19 The purpose of the Commission paper that we
20 provided the subcommittee was to provide -- basically to get
21 some early decisions on a couple of elements or one
22 particular element of the rule revision or the technical
23 basis revision. That deals with one part of the screening
24 criteria that's used in the PTS rule, and I'll discuss that
25 in more detail later. Basically, the paper would be, then,

1 to inform the Commission of what we're up to and where we're
2 going with this and then telling them about some issues that
3 we're going to have to work on.
4 Again, by way of background, the impetus for the
5 rule in the early 1980s was some experience with overcooling
6 transients in some reactor vessel operating experience.
7 Basically, PTS accidents are initiated by small locas or
8 transients in the plant which lead to a situation where you
9 have an overcooling of the reactor vessel with either -- at
10 pressure or with a subsequent repressurization of the
11 reactor coolant system. This has the potential to impact
12 some of the preexisting flaws that are a result of the
13 fabrication of the reactor vessel. They have the potential,
14 these flaws, with a pressure transient and overcooling
15 transient have the potential to lengthen and deepen to the
16 extent that some, if they're at an initial critical length,
17 if you will, have the potential to go all the way through to
18 the reactor vessel wall.
19 If such a flaw proceeds through the vessel wall,
20 it has a good likelihood, if you will, of opening into a
21 very large opening in a reactor vessel and basically
22 seriously compromises the ability to core the cool -- cool
23 the core.
24 DR. APOSTOLAKIS: Is it the other cooling that
25 really is supervisor for the flaws going?

1 DR. HACKETT: If I could address that, it's
2 actually both, because we have looked at the situations for
3 BWRs where we just looked at the thermal shock portion. The
4 thermal shock without the repressurization is a much less
5 critical situation. The repressurization is where you're
6 going to drive the flaw through the wall and end up with
7 this big opening that Mark was describing, so you really
8 have to have both, but the initiator is the thermal shock.
9 And then, the subsequent significant driver is the
10 repressurization if that occurs.
11 DR. APOSTOLAKIS: And what time scale are we
12 talking about on there?
13 DR. HACKETT: This would be many seconds,
14 generally, that type of time scale.
15 DR. APOSTOLAKIS: Pretty fast.
16 DR. CUNNINGHAM: The repressurization.
17 DR. HACKETT: I probably would defer to someone
18 else on the --
19 DR. APOSTOLAKIS: If it's another cooling event
20 and repressurization; it's a matter of seconds.
21 DR. HACKETT: For the materials response. What I
22 was referring to was the materials response, and actually,
23 if you're going to get one of these large flaws that's
24 growing like Mark talked about, that's going to be even
25 milliseconds. If you get something initiated and the

1 repressurization occurs, it's going to pop through very
2 rapidly. It will be a catastrophic fracture from a
3 materials perspective. From the operational assessment, you
4 know, what drives that, I'm sure, is, again, much slower.
5 It may be more in the range of minutes or many minutes.
6 DR. CUNNINGHAM: Okay; if you were to have one of
7 these through-wall cracks propagate to a large opening in
8 the reactor vessel, one of the key issues then becomes the
9 containment response. You have a dynamic loadings, just the
10 fact that you're putting a severe load on the vessel, and
11 that could cause the motion of the vessel, which could
12 impact what's happening inside on the core itself and could
13 have an impact on penetrations and that sort of thing on the
14 lines that are attached to the reactor coolant system.
15 You're also obviously going to blow down the reactor vessel,
16 so you'll have pressure loadings. You have some potential
17 for dispersal of the core in this -- during the blowdown of
18 the reactor vessel.
19 On the other hand, this is an accident that's
20 driven by large amounts of water, so you have core -- you
21 have cooling capability from the water, and you also have
22 the potential availability of containment ESS. So the
23 containment situation is complex, to say the least, and it's
24 not very well understood at this point. And we'll come back
25 to that later in terms of what approach we want to take in

1 terms of reassessing the technical basis for the rule.

2 The question came up in the subcommittee of what

3 do PRAs tell us about these events? Typically, most PRAs

4 you see today will not have a PTS set of scenarios in there

5 with a frequency. There's a couple of reasons for that.

6 One is for most reactor vessels, PTS is a very low frequency

7 event, because the number of flaws that they would have are

8 not such that you would expect any substantial challenge to

9 the vessel from flaw growth. There are some special

10 characteristics of a few reactor vessels that make them more

11 susceptible to PTS accidents.

12 DR. APOSTOLAKIS: But is it just the number of

13 flaws or also the fact that you don't have this reactor --

14 DR. HACKETT: I think it's a number of factors. I

15 think Mark was correct that the principal materials driver

16 is the number of flaws that have been assumed in these

17 analyses before when we last talked to the joint

18 subcommittee was based on a distribution attributed to

19 Marshall from quite a ways back now. What we've found since

20 is that we don't tend to see things as severe from what

21 we're actually examining with vessels.

22 Another factor is the materials themselves are

23 generally significantly tougher than we give them credit for

24 in these analyses or have given in the past, because we

25 basically use lower bound approaches on materials toughness.

1 Another element would be -- and when we discuss these, I
2 guess we're probably getting a little bit ahead here, the
3 embrittlement predictive methodologies have been refined,
4 too, such that that piece is changing, and at least it's
5 still iterating, so I can't say for sure exactly where this
6 is going to end up, but at least preliminary versions of
7 that were predicting less embrittlement than what we had
8 seen before with -- and here, we're talking Regulatory Guide
9 199 revision two is what was used before. We're working on
10 a database that will go into revision three that at least
11 previously has indicated we might be seeing less
12 embrittlement. So there are a number of materials factors
13 that add up to this being a better situation.
14 George, from a PRA standpoint, I think basically
15 what we have is a conservative screening criteria on the
16 transition temperature so that if the screening criteria is
17 met, then, the contribution of PTS to risk for that given
18 plant would meet your screening criteria for not including
19 it in your cut sets, not including it in your PRA.
20 DR. APOSTOLAKIS: I don't know if there's a
21 presumption, but that's if you can meet the criteria, then,
22 your weight is 5x7-6.
23 DR. KRESS: It's lower than that actually?
24 DR. APOSTOLAKIS: Lower?
25 DR. KRESS: You would screen it out in your PRA

1 because of that.

2 DR. APOSTOLAKIS: Is it 1160 grams here?

3 DR. CUNNINGHAM: Not really; not really. We

4 discussed it but not in any serious way, if you will.

5 There are some plants that are more vulnerable, if

6 you will, to PTS accidents where you've seen PRAs done for

7 those -- that set of initiators, and the program that we're

8 running here in the office is taking advantage of that.

9 There's at least a couple of PRAs that licensees have done

10 to assess their PTS risk.

11 DR. KRESS: Those are the ones that are projecting

12 to exceed the screening criteria; is that right?

13 DR. CUNNINGHAM: Not necessarily exceeding it but

14 approach it at the end of life. And we'll come back to the

15 screening criteria, but it's a projection out to the end of

16 life, so many different PRAs, a snapshot of today, are going

17 to begin to reach their margin of what it will be at the end

18 of life.

19 DR. UHRIG: Presumably, this could be extended

20 further if a plant came in for licensing?

21 DR. CUNNINGHAM: Yes; that is correct. It's

22 whether it's a 40-year end of life or 60-year end of life;

23 that's right. In fact, there are a number of plants that

24 would not experience -- have an issue with PTS in a 40-year

25 life but could in a 60, so that's one impetus for doing this

1 work.

2 I'm going to turn back and talk about the
3 acceptance criteria a little bit now. PTS rule was
4 established in 1983, so it's been awhile since this was put
5 together. It was put together as an adequate protection
6 rule. We've been kind of dancing around the issue of
7 talking about the issue of the acceptance criteria.
8 Basically, there's an embrittlement screening criterion
9 that's built into the rule in the form of what they call an
10 RTPTS, and that specifies an acceptable temperature for
11 reactor vessels and for the inside wall of the reactor
12 vessels in these PTS events. There's a -- if the plant is
13 projected to exceed that temperature at the end of its life,
14 then, they have to do additional analyses to demonstrate
15 that the vessel can operate safely. Reg Guide 1.154
16 provides one method of performing that safety analysis.
17 Associated with that screening criteria, the
18 RTPTS, is a frequency of what was perceived at the time to
19 be an acceptable through-wall crack frequency.
20 DR. APOSTOLAKIS: I understand how that was
21 established.
22 DR. KRESS: With great difficulty.
23 DR. CUNNINGHAM: It was very complex.
24 DR. APOSTOLAKIS: But there is a calculation?
25 DR. KRESS: You have to go through the Monte Carlo

1 calculation to get the --

2 DR. CUNNINGHAM: Maybe I can come back to that in

3 a minute.

4 DR. APOSTOLAKIS: Okay.

5 DR. CUNNINGHAM: So it shows up in two places,

6 that the frequency of 5x7-6 shows up in a couple of places.

7 One is that it was one factor in determining what the

8 acceptable RTPTS was that's used -- that's specified in the

9 rule. I'll come back to that in a minute. It's also noted

10 in Reg Guide 1.154, if you do this additional safety

11 analysis, in effect, you're doing a PRA for PTS accidents,

12 and you calculate a frequency equal to or less than 5x10-6,

13 then, Reg Guide 1.154 says that that's an acceptable

14 frequency, and so, it's acceptable for the two-year

15 operation of the plant.

16 DR. KRESS: A question: is that a CDF, or is it a

17 LERF, or is it safety goals, or is it adequate protection?

18 Because those are the -- and how do you deal with it instead

19 of this is one sequence versus the whole set of sequences,

20 and how do you deal with defense-in-depth in this context?

21 DR. APOSTOLAKIS: So 5x10-6 is the frequency of

22 what? Of the pressure vessel failing?

23 DR. KRESS: This is a through-wall crack.

24 DR. CUNNINGHAM: Through-wall crack.

25 DR. KRESS: I mean, you could say that when you

1 fail the vessel in this way, you also fail containment, so
2 it could be a LERF.
3 DR. HACKETT: We are equating a through-wall to
4 core damage, basically, is the assumption.
5 DR. CUNNINGHAM: The current rule does that. If
6 you have a through-wall crack, it's equivalent basically to
7 a large opening in the reactor vessel and equivalent to core
8 damage.
9 DR. APOSTOLAKIS: Is it equivalent to LERF?
10 DR. CUNNINGHAM: Not in the rules.
11 DR. APOSTOLAKIS: But is there a possibility of
12 that?
13 DR. KRESS: That's one of the issues.
14 DR. CUNNINGHAM: It's an issue that's before us
15 today. It's not an issue in the terms of the rule.
16 I wanted to use this figure, to get back to
17 Professor Apostolakis' issue of how does the 5x10-6 fit in?
18 What's right here is -- all this is from an analysis -- this
19 figure is drawn from a Commission paper in 1982 where they
20 were trying to develop a technical basis for the original
21 rule, and what they did, in effect, was come up with a --
22 did a PRA to looking at all types of initiators, all kinds
23 of initiators, from an operating experience and from more
24 PRA type of projected initiators.
25 We looked at the frequencies of the initiators; we

1 looked at the thermohydraulic response to those initiators
2 and looked at the vessel response to the thermohydraulic
3 transfer. So this is built upon basically different
4 frequencies of different challenges combined with the
5 fracture mechanics information. The fracture mechanics
6 information was in the form of what we call probabilistic
7 fracture mechanics, so that the key fracture mechanics
8 parameters had uncertainties associated with them or
9 distributions with them.
10 So using all that information and creating a PRA,
11 they created this figure of basically frequency versus the
12 mean surface temperature RTNDT. The 5x10-6 is down here in
13 the corner. But you see it there, and that -- this is an
14 idea that that was an acceptable value of frequency; that
15 leads you to say that an acceptable RTNDT would be 210
16 degrees. However, they recognize that there is variability
17 in this curve, and the estimate of that variability was that
18 one standard deviation was 30 degrees in this direction.
19 They said that because we want to make sure that we want to
20 have high confidence that we don't have trouble with these
21 vessels, we're going to add two sigma to the 210 degrees, so
22 that makes that 270 degrees. So that's what's specified in
23 the rule is 270 degrees.
24 So it's -- there's a lot of pieces of information
25 that went into the specification of 270: 5x7-6 was one

1 piece of the information base, if you will, so that came
2 into play there.
3 It also came into play in the Reg Guide 1.154
4 space, where they basically said if you have 5x7-6, it's
5 acceptable.
6 DR. KRESS: In a normal distribution, two sigma
7 correlates to what? Ninety-seven and a half pockets, right?
8 DR. HACKETT: Yes.
9 DR. CUNNINGHAM: The bulk of the work that's going
10 on in the Office of Research today to revisit the technical
11 basis for the rule is to reformulate that curve. We're
12 reconsidering the types of initiators that could cause PTS
13 accidents; looking at operating experience since the
14 eighties and modern PRA information; reassessing the
15 frequencies of those challenges; redoing the
16 thermohydraulics using what we have today, our state of
17 technology thermohydraulics capability, and we're redoing
18 the fracture mechanics, the probabilistic fracture mechanics
19 reflecting a lot of different things, including the
20 materials research that Ed will talk about in a couple of
21 minutes.
22 So most of that work is the reformulation of that
23 curve, and this is going to be going on for the next year,
24 year and a half basically. One of the factors that we
25 wanted to get an early decision on was, okay, when you

1 reformulate that, is the use of 5x10-6 still the thing that
2 you ought to be using, or should you be using a different
3 value? A lot has gone on in PRAs since 1982 or 1983, and
4 would that lead you to decide that that value is the right
5 one or not the right one or what? And that's the purpose of
6 the paper today, the paper that we're sending up to the
7 Commission this month.
8 So anyway, basically, if you go back to the rule
9 and the underlying technical basis, there's a few key
10 assumptions that in the context of revisiting the screening
11 criteria. One is that basically, there's a through-wall
12 crack frequency of 5x10-6 was, in effect, acceptable in Reg
13 Guide 1.154. The through-wall crack was presumed to be
14 equivalent to a large opening and was presumed to be core
15 damage.
16 DR. KRESS: Along with that key assumption should
17 be a statement, because your actual criteria is the
18 transition temperature.
19 DR. CUNNINGHAM: Yes.
20 DR. KRESS: There should be a statement of added
21 two sigma confidence level.
22 DR. CUNNINGHAM: Yes.
23 DR. KRESS: I mean, in order to complete that
24 statement.
25 DR. CUNNINGHAM: Yes.

1 DR. KRESS: It meets that.

2 DR. CUNNINGHAM: That's a good point.

3 DR. KRESS: Okay, because if you don't say that,

4 it could be interpreted as a mean.

5 DR. CUNNINGHAM: You're absolutely right.

6 DR. KRESS: Okay.

7 DR. CUNNINGHAM: Another key underlying assumption

8 if you go back to the 1980s was that containment performance

9 wasn't really impacted by the pressurized thermal shock

10 event, even with a large opening in the vessel, and as we

11 were discussing a little earlier, given today's thinking

12 about how we do this PRA, this comes to the issue of LERF

13 and how we consider LERF here.

14 A key factor in the early 1980s, as I mentioned

15 earlier, was that this is an accident that occurs with a

16 great deal of water. There's water in the reactor coolant

17 system when you start; the core is intact; when you start,

18 it's not melted, and you've got -- probably, you have the

19 containment engineering safety features available, and that

20 has -- could have considerable impact on your potential for

21 a large early release.

22 I'm going to talk now about a couple of things

23 where basically what's changed since 1982, 1983 in terms of

24 the technology. Ed Hackett is going to talk for a few

25 minutes about what they've been doing in terms of materials

1 research over the last few years to give us a much better
2 understanding of the flaws that are in the reactor vessel
3 and the potential for vessel failure given a challenge.
4 MR. ELTAWILA: This is Farouk Eltawila from
5 research. I'd like to make a comment on the last remark by
6 Mark Cunningham that the scenario has adequate supply of
7 water. That's the assumption. I think we cannot make that
8 as an assertion right now; that if you have all the water,
9 but you have no guarantee that this water is going to go to
10 the core. You know, if you open the vessel on the side, the
11 water is going to go outside of the break and is not going
12 to cool the core. So we don't know how the core is going to
13 stay during that thermal shock. You can get the fuel and
14 the movement of the fuel itself can use the coolable
15 geometry of the core.
16 So I think the correct -- it is a question right
17 now; not a statement.
18 DR. CUNNINGHAM: Just to be clear, I was talking
19 about what was the -- in 1982, what was basically how they
20 established the basis of the rule. Farouk is right that
21 that's a question.
22 DR. KRESS: It may be reevaluated.
23 DR. CUNNINGHAM: Yes; I think we're planning to do
24 some re-evaluation, and we think some re-evaluation will be
25 needed in that area.

1 DR. KRESS: It seems like it's also a good
2 sequence that would be considered in our regression.
3 MR. ELTAWILA: That's exactly another point. I'm
4 concerned about it from the other discussion we had with
5 you.
6 DR. HACKETT: From the material perspective, I
7 guess we touched on a few of them briefly in response to
8 Professor Apostolakis' questions. One of the key drivers in
9 these analyses from a materials perspective has been the
10 core size density and location. We've made a lot of
11 progress on that over the last -- I guess it's 15 years now,
12 and a lot of that is summarized here. I guess I don't need
13 to go through this in detail, but we've done detailed
14 nondestructive and destructive examinations of actual
15 reactor vessel welds over that time frame, and by and large,
16 what that has indicated is in many cases, a lot of flaws at
17 places where you'd expect them like the clad based metal
18 interface over the welds. But these flaws are very small.
19 By and large, you're talking about things that are two
20 millimeters in critical dimensions or two millimeters to
21 four millimeters.
22 What the probabilistic fracture mechanics would
23 tell you from that is these are flaws that don't participate
24 significantly in contributing to the failure frequency
25 overall, so this has largely been -- to summarize, largely

1 been a good news story.

2 What we're focusing on is development of a
3 generalized statistical distribution, if we can do it, for
4 all US LWRs; if not that, at least hopefully something
5 that's separable by fabricator, like combustion engineering
6 or Chicago Bridge and Iron, B&W, that type of thing. And we
7 hope to be able to come back to the committee -- I think we
8 are scheduling a September type time frame. We have an
9 expert elicitation process underway right now to try to
10 finalize some of that, and I believe we'll have that largely
11 sorted out within the next month, so we'll be able to
12 present you with a lot more information on that in the near
13 future, but that one is a key driver.

14 On the next slide, the next one is irradiation
15 embrittlement correlations, and again, I mentioned that one
16 previously. We have a much larger and more robust database
17 to draw from now on predicting irradiation embrittlement
18 trends, which at least previously seems to be indicating
19 that we would be expecting by and large less embrittlement
20 than is predicted by the current Regulatory Guide 199 Rev 2
21 for PWRs in general. This, as I mentioned earlier, there is
22 still some iteration going on on the exact form of what this
23 predictive equation is going to be, but there's no question
24 it will be a better prediction in terms of, you know,
25 accuracy and robustness.

1 We have a database now that's expanded on the
2 order of four times over what we had available to draw from
3 when Reg Guide 199 Rev 2 was done. So that that was more
4 cause for optimism. For the first time, this project is
5 considering statistical distributions on the material
6 fracture toughness. What's been done before is largely to
7 draw from the ASME fracture databases that were developed
8 for K-1-C and K-1-A, which were lower bounding curves. That
9 was dealt with computationally in the probabilistic fracture
10 mechanics code but was never addressed statistically before.
11 By and large, there's an expectation that this will be an
12 improvement. I think we have felt all along that the
13 material fracture toughness is greater than, you know, we
14 were giving credit for in the analysis, so we anticipate
15 there is some improvement, some gains to be made there.
16 Statistical distributions; the next one down on
17 material chemistry and initial RTNDT; these are some things
18 we've done on plant-specific bases. I was involved with an
19 evaluation we did for Palisades when I worked in NRR, and
20 this type of thing was done for Palisades when we did that
21 review but has not generally been applied on a generic
22 basis, so we're addressing that, again, really rigorously or
23 as rigorously as we can for the first time in this project
24 on a more generic basis, and there are improvements to be
25 gained or strides to be made there, too, in terms of the

1 understanding.

2 We have a lot better understanding of variability

3 of plate and weld material. It isn't always good news in a

4 lot of cases, but we think we understand it better.

5 DR. POWERS: Let me come back to the K-1-C K-1-A

6 curve. Additional engineering uses these lower bound curves

7 to come out of the ASME code, and they're used for a variety

8 of our purposes, not just for pressure vessel codes, which

9 is everything else that's designed with steel --

10 DR. HACKETT: Right.

11 DR. POWERS: -- is based on these kinds of curves.

12 How are you portraying the use of a curve different from

13 those and its technical justification here?

14 DR. HACKETT: Yes; first off, that's a really good

15 point, because it is true in a lot of things we do; if we

16 can afford to deal with the problem deterministically and

17 bound it, and we get an acceptable answer out of that, we

18 try to go that route, sometimes even just from the

19 standpoint of resources alone. And increasingly, though,

20 obviously, these days, we're trying to extend the lives of

21 the plants and so on. We're trying to get more accurate.

22 Where we're actually going with that in this case -- maybe I

23 should back up and say what we've done. In the

24 probabilistic fracture mechanics code which I'll come to on

25 the next slide, it's called favor. What's been done

1 previously, since this is supposed to be a best estimate
2 analysis, we would take the ASME K-1-C and K-1-A curves and
3 then do a -- basically, a two-sigma variation on those
4 statistically and then derive a mean curve out of that is
5 what has been done previously in favor.
6 What we're doing now is actually taking advantage
7 of the availability of some -- I don't know the exact number
8 -- but many hundreds more data points that have been
9 generated for K-1-C K-1-A on these materials since then and
10 actually doing a statistical and mechanistic evaluation of
11 that for, you know, the curve we would use. But I think to
12 get exactly to the point of your question, what we would do
13 is use a mean curve, a best estimate curve of all of that
14 data which, before this, has not been done for these types
15 of applications.
16 There's also another technology that you may have
17 heard about that we're not using specifically on this task
18 right now called the master curve, which is a different way
19 of coming at this thing, but, you know, we're using I guess
20 what I'd say is a similar approach to try to get there.
21 We're trying to give the proper credit this time around for
22 the material fracture toughness as opposed to any kind of
23 bounds. I don't know if that quite gets at your question or
24 not.
25 DR. POWERS: I think I understand exactly what

1 you're doing, and I'm trying to think of what the skeptic is
2 going to say. The skeptic is going to come in and say, yes,
3 you've got all these data points. These were laboratory
4 specimens that people took a great deal of care in preparing
5 and what not; put them into their Instron machines and did
6 their whatever it is that they did to test these things.
7 Now, what about the material that you actually
8 have making up the vessel? Okay? That's an engineering
9 material. I mean, it got treated in ways that are somewhat
10 mysterious to us, and it was produced at a plant, a steel
11 mill that was different from where these specimens are.
12 DR. HACKETT: Right.
13 DR. POWERS: How do I know that this mean of all
14 these data points here is the mean for this material here?
15 DR. HACKETT: I think the short answer is you
16 don't, and it also is one of those things that -- we're
17 really wrestling with this hard with regard to this master
18 curve issue, which is another iteration beyond this. But
19 you're getting exactly to the point of, you know, you're
20 trying to -- we're trying to eliminate margin here to the
21 extent that it's justifiable, because we've believed that
22 there are many conservative elements to this. One of the
23 nonconservative elements is what you've just pointed out:
24 how well do you know this material? You've tested these
25 hundreds, and I'm going to argue here to tell me that this

1 fairly represents every vessel out there.

2 I think my answer would be it probably captures

3 that to a great degree, but I don't think you can sit up

4 here and say that you've got everything covered. There's

5 variability; there are issues that get to be plant-specific

6 with regard to exactly how the fabrication was done;

7 copper-coated weld wire, things we've talked to the

8 committee about before that I guess were addressed on the

9 previous slide, too, in terms of the variability.

10 I think the short answer is it's always going to

11 need -- there will always be a need to add some sort of

12 margin for covering that type of situation.

13 DR. KRESS: Since we have Dr. Powers and Dr.

14 Apostolakis back, this might be a good time for you to

15 return to your curve on the acceptance criteria. I think

16 that would lend something to this, because I think what

17 you're saying is you will -- in the new process, you will

18 take this variability into account and develop not just the

19 one curve but a distribution and apply some of your

20 conservatism in your acceptance criteria; we're using the

21 two-sigma. So, if you could repeat that part of it, it

22 might be useful to these two.

23 DR. POWERS: Well, let me just interject that I

24 think I understand that argument, and I was surprised that

25 didn't come up immediately. I'm equally surprised that you

1 didn't appeal to the testing that you've done on some vessel
2 materials extracted from other plants and say that, yes, you
3 get a validation on at least this point. I mean, I can't
4 validate it for any specific plant, but I can take a vessel
5 that's been through this engineering sort of thing, abuse
6 and what not, and I can see that indeed, it's not obviously
7 flawed using this mean data.
8 DR. HACKETT: Okay.
9 DR. POWERS: I mean, I quickly get you trapped and
10 trained to produce -- prove a null hypothesis, and you can't
11 do that, but you can show the preponderance of the evidence
12 in support of your approach, and then, you can come to this
13 kind of an argument and say look: rather than putting the
14 conservatism on each of the elements that build up to this,
15 I'm going to put a conservatism on the final product.
16 DR. HACKETT: Right.
17 DR. POWERS: And I think that's where I certainly
18 become much more comfortable, because when you do it on the
19 individual elements of the thing, I don't know how
20 conservative you are at the end.
21 DR. HACKETT: Right.
22 DR. POWERS: Especially when you tell me that in
23 some cases, there are some nonconservatisms built into this
24 thing that creep into the process. They're sometimes
25 unquantifiable, and so now, have you built in enough margin

1 on it? Here, I can see did you build in enough margin.
2 DR. HACKETT: Right; that gets right to the heart
3 of it. I guess what I can say in a more global sense going
4 directly to the question that we've been able to show over
5 time is that what we're talking about in this process from
6 the materials perspective is this indexing to get to a
7 fracture toughness curve with sharpy specimens and RTNDT to
8 get to fracture toughness, your question being that if you
9 went there directly, and you're testing these specimens, you
10 know, maybe even large fracture toughness specimens from
11 actual vessel materials, the answers that we see over and
12 over again is by and large, those are better numbers than
13 what you'd get with the index, and the indexing process
14 generally is going to yield a conservative estimate of what
15 you'd get for the real toughness.
16 DR. POWERS: Sure.
17 DR. HACKETT: And that the real toughness of the
18 materials is generally greater.
19 DR. POWERS: I had occasion just recently to see
20 -- to witness a discussion of the materials issues
21 associated with the steel that was used to fabricate the
22 Titanic and the issue of fracture toughness there. There
23 had been some studies done some time ago, I think, arguing
24 that the fracture toughness of the steel in the Titanic was
25 low in salt brine temperatures, and these investigators said

1 that those tests probably weren't fair because they utilized
2 fairly high strain rates in looking at the toughness. I
3 think they used traditional sharpy tests with a hammer and
4 things like that.
5 And they went through and did studies at lower
6 strain rates under the argument that those particular carbon
7 steels were very strain rate sensitive. Are these steels
8 strain rate sensitive?
9 DR. HACKETT: They are; they absolutely are, and
10 that's why you've got consideration for both K-1-C and K-1-A
11 where, you know, the A is the arrests where the dynamic
12 value that you're getting at so that when you do the
13 probabilistic fracture mechanics, it is run in two loops
14 where you're going to look at the initiation event, which
15 would typically result from the thermal shock. Then, you're
16 going to see if that -- then, you run another loop to see if
17 that crack arrests. As you could imagine, that's a less
18 precise technology than just dealing with initiation, but
19 that is a factor, a major factor.
20 Should we revisit the --
21 DR. CUNNINGHAM: Do you think we should revisit
22 this or --
23 DR. KRESS: Yes, I think you might want to say a
24 few words about that still.
25 DR. CUNNINGHAM: The figure that's up here is a

1 figure from a 1982 Commission paper showing the information
2 they had at the time on frequency of challenges -- the pink
3 curve is a composite of the frequency of challenges; the PTS
4 challenges, the thermohydraulic response of the reactor
5 coolant system to that; and the probabilistic fracture
6 mechanics understanding at the time. It leads you to
7 generate a curve of frequency versus RDNDT for the surface,
8 reactor vessel surface.
9 What we're doing today in the program that's kind
10 of behind all of what we're talking about is a reformulation
11 or a revisitation of that curve; new PRA information; new
12 information on the initiators that could cause PTS events;
13 the frequency of those initiators; the state of technology
14 understanding of the thermohydraulic responses and the
15 information that Ed has been talking about on material
16 responses is all being lumped together, if you will, in a
17 model that will give us a new one of those curves.
18 I didn't mention it the first time through, but
19 part of this also is a more explicit analysis and
20 consideration of the uncertainties in that curve.
21 DR. KRESS: So you get a distribution rather than
22 just one value.
23 DR. APOSTOLAKIS: The distribution will be
24 vertical, right?
25 DR. KRESS: No, it will be both.

1 DR. APOSTOLAKIS: On the frequency.

2 DR. KRESS: It'll be on both.

3 DR. APOSTOLAKIS: No, the RTNDT is the independent
4 variable. It will be just a frequency. You know, what is
5 the frequency of exceeding a certain value of RTNDT or being
6 -- it can't be on both.

7 DR. WALLIS: Are the thermohydraulic
8 investigations are such that they lend themselves to
9 probabilistic output?

10 DR. APOSTOLAKIS: What does that mean, Graham?

11 DR. WALLIS: Well, I mean, are they just going to
12 give you a heat transfer coefficient, or are they going to
13 give you a distribution of heat transfer coefficients with
14 probabilities?

15 DR. CUNNINGHAM: My understanding is that it will
16 be in the form of some sort of a distribution, if you will,
17 of not just a point estimate.

18 DR. WALLIS: So they're going to give you
19 information in the right form to go into --

20 DR. CUNNINGHAM: Yes.

21 DR. WALLIS: -- a probabilistic type analysis.

22 DR. CUNNINGHAM: Yes.

23 DR. WALLIS: Thank you.

24 DR. CUNNINGHAM: That is correct. We talked about
25 -- Nathan Siu talked about that at one of the subcommittee

1 meetings. He'll probably come back and talk about it at the
2 next subcommittee meeting as well, the mechanism by which
3 we're doing the uncertainty analysis for this.
4 DR. APOSTOLAKIS: But make sure that you're
5 presenting it correctly. The horizontal axis is the
6 independent variable, and then, you have the uncertainty.
7 DR. CUNNINGHAM: Yes.
8 DR. APOSTOLAKIS: It's very similar to what we do
9 with the consequences, the risk curves.
10 DR. KRESS: But you might also mention the
11 acceptance criteria and the two-sigma part.
12 DR. CUNNINGHAM: Okay.
13 DR. APOSTOLAKIS: And then, you have the family of
14 curves, and you select two-sigma up and down?
15 DR. POWERS: Of course, I'm going to say, well,
16 Tom, why two? Why not one and a half?
17 DR. KRESS: That's a really good question.
18 DR. APOSTOLAKIS: Why not a percentile? I mean,
19 we do that all the time.
20 DR. KRESS: Both those are really good questions,
21 and I think part of this whole meeting is how do you arrive
22 at the right acceptance criteria for this?
23 DR. APOSTOLAKIS: When you deal with frequencies
24 of events, I mean, we rarely work with standard deviation
25 and take in two sigmas and so forth. We usually go with a

1 95th percentile or some appropriate percentile. I mean, the
2 standard deviation makes much more sense when you deal with
3 normal distributions and so on. When you're dealing with
4 highly skewed distributions, it's not --
5 DR. KRESS: This is likely to be normal, this
6 particular one.
7 DR. APOSTOLAKIS: Normal? It will be normal? The
8 frequency? I would be surprised. I would expect it to
9 be --
10 DR. POWERS: I bet it looks an awful lot like a
11 normal by the time it's done.
12 DR. KRESS: Yes; this particular one will.
13 DR. APOSTOLAKIS: It will have a long tail.
14 DR. POWERS: But it will be interesting to see,
15 and I agree with you that the standard deviation is a useful
16 term when it looks almost normal.
17 DR. APOSTOLAKIS: Yes.
18 DR. POWERS: Or log normal, and if it's at all
19 distorted from that, then, the standard deviation is pretty
20 difficult to interpret.
21 DR. APOSTOLAKIS: Yes.
22 DR. KRESS: A more general term would be a
23 confidence level, so you could always use that.
24 DR. APOSTOLAKIS: Sure; well, the percentile is a
25 confidence level.

1 DR. KRESS: Yes, yes.

2 DR. POWERS: But it still begs the question: you
3 take 95 percent --

4 DR. KRESS: Yes; it's exactly the same question.

5 DR. POWERS: Why not 80?

6 DR. APOSTOLAKIS: Well, let us face that when the
7 time comes. Let us make sure we have a solid uncertainty
8 analysis first.

9 DR. POWERS: Sure.

10 DR. KRESS: Then, we'll figure out --

11 DR. APOSTOLAKIS: They have a lot of work to do
12 until that time, but they seem to be on the right track.
13 This is the way to do it.

14 DR. KRESS: Oh, yes.

15 DR. APOSTOLAKIS: This is the way to do it.

16 DR. CUNNINGHAM: The point we were discussing
17 earlier is not so much what should be done today but what
18 was done in 1982 --

19 DR. APOSTOLAKIS: Yes.

20 DR. CUNNINGHAM: -- or in the early 1980s, and the
21 5x10-6 value that underlies the rule is associated with a
22 mean RDNDT of 210 degrees, mean value.

23 DR. APOSTOLAKIS: So this is the frequency, now?
24 The curve gives me the frequency, which is 5x10-6 --

25 DR. CUNNINGHAM: Yes.

1 DR. APOSTOLAKIS: -- of the RTNDT being that value
2 or less?
3 DR. CUNNINGHAM: Yes, that's probably right, yes.
4 DR. APOSTOLAKIS: That value or less.
5 DR. CUNNINGHAM: That's right; now, so, the RDNDT
6 value that they choose -- they came up with was 210 degrees.
7 DR. APOSTOLAKIS: Yes.
8 DR. CUNNINGHAM: They, at the time, associated --
9 did some fairly simple analysis of the uncertainty in the
10 materials properties, okay? And they estimated that one
11 standard deviation in RDNDT was about 30 degrees, so they
12 said, well, to be highly confident that this screening
13 criterion will be conservative and that sort of thing, let's
14 add two sigma to the 210 degrees.
15 DR. APOSTOLAKIS: Right.
16 DR. CUNNINGHAM: And that's how they arrived at
17 270 degrees.
18 The story of how they arrived at 270 is actually
19 much more complex than that, but from the context of the
20 probabilistic element, that's how it seemed to come into
21 play at least from what I can understand.
22 DR. APOSTOLAKIS: Sure.
23 DR. CUNNINGHAM: Seventeen or 18 years later.
24 DR. APOSTOLAKIS: Okay; although, of course, the
25 uncertainties here are primarily model-driven, I would

1 venture to say.

2 DR. CUNNINGHAM: I agree.

3 DR. APOSTOLAKIS: So my idea at the time really

4 dealt with the parameter.

5 DR. HACKETT: Yes, yes.

6 DR. APOSTOLAKIS: You guys are going to deal with

7 model uncertainty.

8 DR. HACKETT: Absolutely, and I think we did

9 mention that explicitly the last time we met with the joint

10 subcommittee, but we are considering -- in every case where

11 we're looking at uncertainties, we're looking at both the

12 epistemic, the state of knowledge and uncertainty, and the

13 aleatory uncertainty that the randomness uncertainty on the

14 materials perspective is pretty obvious. Dr. Powers is

15 talking about transition fracture. It's endemic to that.

16 For these materials, they are strain rate sensitive. You

17 see a huge variability in material response that's just a

18 randomness type situation when they're in transition.

19 But then, there's also -- we're using RTNDT to

20 model how you get the fracture toughness, so we have to

21 address the model uncertainty associated with that

22 parameter, and that's just one example.

23 Another example is the top of the slide; fluence

24 calculations previously had been done on taking the end of

25 life maximum fluence, applying that everywhere throughout

1 the belt line and then assuming there's basically an
2 uncertainty on the order of plus or minus 20 percent is what
3 has historically been done or what Mark referred to back to
4 the 82-465 paper.
5 So we're trying to get a lot better than that this
6 time. We are looking at, for the plants that are going into
7 the basis for the generic re-evaluation here, we're looking
8 at plant-specific fluence maps and considering the variation
9 of the fluence as a neuphaly around the vessel. There's
10 also a new draft regulatory guide, which will be something
11 else we'll be coming and talking to the committee about
12 later this year, which has got a more defined methodology
13 for getting there, let's say, for fluence, so we are dealing
14 with fluence uncertainty in a more rigorous way this time,
15 too, and are accounting for the fact that, you know, the
16 belt line doesn't see the maximum fluence everywhere.
17 The last piece that we cover here is the
18 improvements in the fracture mechanics methodologies. The
19 code is called favor. It's largely an evolutionary
20 treatment from a previous code that was called visa, which
21 was developed basically here. Ron Gamble is here
22 representing the industry. Ron, I think, deserves a lot of
23 the credit for initiation of that and Jack Strosnider, who
24 is currently in NRR. That code has evolved into what is now
25 favor. And then, you see these elements here that are now

1 addressed that weren't addressed previously in a lot of
2 these analyses.
3 Just to touch on a few residual stress
4 distributions, the basis for what went into 82-465, that
5 type of thing wasn't considered; doesn't tend to be a big
6 factor, but it is now factored in. The mathematical
7 solutions for semi-elliptical surface flaws have been
8 refined over time. Those are now included in there as are
9 solutions for subsurface flaws, to the effect -- to the
10 extent that they might participate, you know, in
11 contributing to the failure frequency. So there has been a
12 significant amount of fracture mechanics technology
13 improvements built into the code that will make things more
14 accurate than they have been before, too.
15 DR. POWERS: Do you have to assume orientation
16 from the flaws?
17 DR. HACKETT: You do assume orientation, and
18 typically, you assume the worst orientation; in this case,
19 as an axial-oriented flaw in the weld, whether the weld is
20 -- this has been a debate also, but if you have an axial
21 weld, you assume there is an axial flaw in that weld, and
22 that's typically the worst case.
23 DR. POWERS: And are you going to do worst case
24 assumptions here in this new analysis?
25 DR. HACKETT: There will be both addressed from

1 the standpoint that, you know, the circumferential situation
2 is usually much less limiting, but the idea would be that if
3 you have a circumferential limited situation, you would
4 postulate a circumferential flaw, so that not being worst
5 case, because you could also say, well, I'll take a
6 circumferential flaw, and I'll still -- I'll take a
7 circumferential weld, and I'll still put an axial flaw in
8 it.
9 So we're not doing that. I mean, these are the
10 kinds of things that have been done before that we won't be
11 doing now. This analysis specifically will still be driven,
12 I believe, by an axial flaw in an axial weld situation, you
13 know, which could exist. And then, when you look at the
14 question back to this idea of the large opening in the
15 vessel, what's typically going to happen is you're going to
16 assume that that crack could open up until it hits the
17 boundaries. If you're talking about a vessel that was
18 fabricated from plates, you would basically open that entire
19 weld seam until it hits the free surfaces where it's joined
20 to the, you know, the upper and lower circumferential
21 plates, so that we're not -- we're trying deliberately not
22 to make the worst case assumptions in this particular
23 analysis.
24 DR. POWERS: You're going to think I spend an
25 inordinate amount of time looking at sunken ships. I did

1 have a chance to look at a pressure vessel from the
2 Skipjack, which was a submarine that sunk under high
3 pressure, in high pressure water, and the pressure vessel
4 failed not at the welds but at the bulk plate. So you're
5 also looking at the bulk plate.
6 DR. HACKETT: We are also doing that. I guess
7 that's a point I didn't emphasize on the flaw distribution
8 piece. The advanced NDE examinations in addition to
9 capturing the weld, and for obvious reasons, they were
10 focused on the welds, but we also scanned at least a plate
11 thickness or two to either side of the weld to pick up flaw
12 distributions that would be in the heat-affected zone
13 immediately adjacent to the weld or in the base plate
14 itself.
15 The base plates themselves, assuming, you know,
16 especially nuclear grade or Navy grade QA, are generally
17 much less defected than you would ever expect of the weld.
18 The welds are -- the welds or the heat-affected zone are the
19 areas you would focus on as a metallurgist, but you raise a
20 good point. That's not to say you couldn't end up with a
21 flaw in the plate, and that could be a problem, so that will
22 be addressed also.
23 DR. CUNNINGHAM: Ed was talking about one key
24 piece of the information base that's changed since the
25 1980s. Another key piece we wanted to talk about today was

1 in terms of Commission guidance in the area of user risk
2 analysis. Basically, I'm going to touch on four that are
3 particularly relevant: the safety goal policy statement,
4 the rules that were established for station blackout and
5 ATWS; the backfit rule and Reg Guide 1.174.
6 We discussed the safety goal policy statement any
7 number of times before this committee and with this
8 committee. I think in the context of revisitation of the
9 PTS rule, I think the key piece is the middle bullet right
10 there, that basically, in 1990, the Commission established a
11 subsidiary core damage frequency goal of 10-4, and that
12 starts us down a path, if you will, along with other things
13 towards thinking about allocation of reliability goals or
14 acceptable core damage frequencies.
15 Station blackout and ATWS rules actually were done
16 in the mideighties.
17 DR. APOSTOLAKIS: This is an interesting point,
18 Mark, which really brings up the dangers of allocating risk
19 goals. I believe that this 10-4 is indeed a goal for core
20 damage frequency under the assumption that the containment
21 will have a condition of failure probability of about 0.1.
22 Is that correct? In other words, it's not an absolute goal.
23 If a core damage event could lead simultaneously to the
24 failure of containment with probability 1, I don't think
25 that was the intent of this, intent of this.

1 DR. BONACA: That is correct, because the
2 relationship on individual risk which was 10-6 is tied to
3 that performance of containment.
4 DR. APOSTOLAKIS: Yes; in other words, this one is
5 to be taken together with the LERF criteria.
6 DR. CUNNINGHAM: You know, historically, the
7 original safety goal had goals for individual fatality risk
8 and latent fatality risk and proposed in effect a large
9 release goal of 10-6. That was in the mid 1980s.
10 DR. APOSTOLAKIS: Right.
11 DR. CUNNINGHAM: In 1990, they approved this one
12 in addition, and I guess at that point, they still had in
13 mind, I think, that there would be margin between core
14 damage and containment.
15 DR. APOSTOLAKIS: Exactly.
16 DR. CUNNINGHAM: Main containment failure.
17 DR. APOSTOLAKIS: Exactly.
18 DR. CUNNINGHAM: I think that's right.
19 DR. APOSTOLAKIS: Exactly.
20 DR. CUNNINGHAM: That's fair.
21 DR. APOSTOLAKIS: So in our case here, where that
22 margin may not exist, that goal probably is not applicable.
23 See, this is the problem with surrogate criteria, that you
24 are deriving them under certain assumptions.
25 DR. CUNNINGHAM: Yes.

1 DR. APOSTOLAKIS: And if those assumptions are not
2 valid in a particular situation, then, you have to go back
3 to the original QHOs or whatever the case may be.
4 DR. CUNNINGHAM: Just to be clear, this 10-4 was
5 for the complete set of initiators.
6 DR. APOSTOLAKIS: Given the margin of the
7 containment.
8 DR. CUNNINGHAM: Yes, given all these other
9 things.
10 DR. APOSTOLAKIS: Yes.
11 DR. CUNNINGHAM: That is correct; the blackout and
12 the ATWS rules took another tack and said for these
13 particular initiators of core damage, we're going to have
14 goals, if you will, in rough terms, of having those be on
15 the order of 10-5 per year per reactor.
16 DR. APOSTOLAKIS: Yes; so, they reduced it there.
17 DR. CUNNINGHAM: That did it, too, and built into
18 that was their own analysis of containment performance and
19 that sort of thing associated with those.
20 DR. KRESS: The other point, George, is this was a
21 safety goal which was never intended to be a replacement for
22 adequate protection.
23 DR. CUNNINGHAM: Correct.
24 DR. APOSTOLAKIS: True.
25 DR. KRESS: Now we're talking about an adequate

1 protection rule in the PTS.

2 DR. CUNNINGHAM: Yes.

3 DR. APOSTOLAKIS: Well, that's another issue here

4 that was confusing me a little bit, because we have

5 numerical guidance when it comes to goals.

6 DR. KRESS: Yes; so, how do you mix with adequate

7 protection with the safety goals?

8 DR. APOSTOLAKIS: Well, of course, if you had --

9 if the Commission follows our latest recommendation on these

10 things, then, it would be a piece of cake.

11 DR. KRESS: Yes; it would be duck soup.

12 DR. POWERS: And hell freezing over.

13 [Laughter.]

14 DR. KRESS: Yes.

15 DR. CUNNINGHAM: Dr. Kress' comments were a good

16 lead-in to my next slide, which talked about the fact that

17 the backfit rule and the reg analysis guidelines were

18 established in the eighties as well, and at some point,

19 there became a clear differentiation between -- on the

20 subject of when you can use cost-benefit analyses. PTS rule

21 was an adequate protection rule. For those rules today,

22 cost is not a consideration in the establishment of the

23 rule, costs and benefits. Blackout rule and the ATWS rules

24 were cost-beneficial safety enhancements where they were --

25 where costs and benefits were considered. So it

1 differentiates those.

2 The backfit rule today also now has an analysis
3 method for cost-beneficial safety enhancements that uses the
4 safety goals and looks at the potential benefit in terms of
5 a first screen of saying how much core damage frequency
6 would be reduced, and it builds into some consideration of
7 containment performance as well, so there is a -- a piece of
8 the logic is put into place with the safety goals and the
9 backfit rule and the reg analysis guidelines for certain
10 types of backfits.

11 Reg Guide 1.174 came along obviously a few years
12 ago and from a somewhat different direction. We're looking
13 at potential changes to license amendments to perhaps allow
14 a reduction in burden and that sort of thing. So we --
15 obviously, as the committee well knows, we have -- in 1.174,
16 there was a set of principles established on how you would
17 make those changes, allow those changes. It brings into the
18 issues that we've -- one issue we've talked about,
19 defense-in-depth, kind of explicitly into the consideration;
20 safety margins and then how much acceptable -- what the
21 changes in risk would be, what changes in risk would be
22 allowed.

23 All of those have come into play since the rule
24 was established that helped guide us in terms of how we
25 would think about revisiting the probabilistic aspects of

1 the rule.

2 DR. APOSTOLAKIS: So the rule is still viewed as

3 an adequate protection rule?

4 DR. CUNNINGHAM: Yes.

5 DR. APOSTOLAKIS: So 1.174 doesn't help you very

6 much. It's used for background but --

7 DR. CUNNINGHAM: Well, let's talk about the

8 approaches.

9 DR. APOSTOLAKIS: Okay.

10 DR. CUNNINGHAM: Because given all of that, given

11 the rule as it is, given all this difference in guidance,

12 we've talked about, well, what are different ways that you

13 could think about revisiting the rule, and what are some of

14 the characteristics of those? So we came up with, on this

15 slide, anyway, four possible approaches for revisiting the

16 screening criteria. One is leave it the same and just

17 acknowledge that it was based on what it was based on and

18 kind of move forward. The second one was, you know, let's

19 -- you know, ATWS and blackout and PTS are all, in one

20 sense, similar types of challenges. Maybe we should let the

21 core damage frequency for those be similar, so you would, in

22 a sense, allow the acceptable frequency for PTS to float up

23 a little bit to be in line with the others. That's a

24 possibility.

25 DR. UHRIG: A factor of two?

1 DR. CUNNINGHAM: Something like that, yes.

2 Another possibility is that we would use the basic
3 innocence. The principles and the approach that are in
4 1.174 -- that are documented in 1.174 are how you would
5 address changes to rules. They're focused on license
6 amendments, and then, you would -- your potential for
7 applying those same rules to a rule change, so that would
8 be, then, that you would look at the change in this would be
9 driven by consideration of the defense-in-depth safety
10 margins and small changes in CDF and LERF.

11 The third and the fourth approaches here are
12 variance of the same general approach. The third approach
13 would say that you're going to explicitly keep apart the CDF
14 and LERF. The fourth would say we don't have enough
15 information, in effect, to make that differentiation, and
16 therefore, we're going to treat them as the same.

17 DR. APOSTOLAKIS: The fundamental question -- I
18 understand, you know, looking at the principles of 1.174.
19 You're right that, you know, we spend a lot of time thinking
20 about those and so on, but the fourth -- it's not really a
21 principle -- well, it is. The principle that says that the
22 changes should be small.

23 DR. CUNNINGHAM: Yes.

24 DR. APOSTOLAKIS: The question is whether that
25 applies here, because now, you're not talking about goals.

1 You're talking about adequate protection.

2 DR. CUNNINGHAM: Yes.

3 DR. APOSTOLAKIS: Okay? And the fundamental
4 premise of the principle perhaps should be revisited,
5 whether -- when it's an issue of adequate protection, you're
6 allowed to increase the CDF for your convenience. So, I
7 mean, yes, sure, as long as you think about it, then, there
8 may be something -- I don't know what defense-in-depth you
9 have here, by the way. You don't seem to have much. You
10 have margins but not defense-in-depth.

11 DR. CUNNINGHAM: Well, that's one of the key
12 issues when you revisit this of how do you bring
13 defense-in-depth into this.

14 DR. APOSTOLAKIS: Well, you can't. When you talk
15 about the vessel, I mean, it's -- although you might have
16 safety margins for formal defense-in-depth.

17 DR. POWERS: I think -- yes; I think the vessel in
18 itself constitutes an element of the defense-in-depth
19 strategy.

20 DR. APOSTOLAKIS: Right; but if that element
21 fails, you see that a lot of your other defense-in-depth
22 measures follow suit.

23 DR. POWERS: The flaw is in order to be an element
24 of defense-in-depth, you've got to have -- you can't have
25 failure of the vessel ipso facto lead to failure of the

1 containment, the next element of defense-in-depth.

2 DR. APOSTOLAKIS: Well, that's what I was saying

3 here.

4 DR. POWERS: And that's what the fourth one says.

5 It's not obvious to me that's the case, but that's what the

6 fourth one says. And I don't know why they would say that.

7 DR. APOSTOLAKIS: Because the uncertainties are

8 very large in it.

9 DR. KRESS: And the way you invoke

10 defense-in-depth principles there is you look at the

11 uncertainty in developing the vessel failure, and you

12 recognize that in -- there is also a potential for it to

13 lead to containment failure, so it's a thing that impacts

14 both CDF and LERF. Therefore, you -- in my principles that

15 I outlined at one time, you make your acceptance criteria at

16 a very high confidence level on that particular one.

17 DR. APOSTOLAKIS: And lower.

18 DR. KRESS: And lower.

19 DR. APOSTOLAKIS: Yes, sure.

20 DR. KRESS: So you start with an overall

21 acceptance criteria; in my mind, that would have to be an

22 acceptance criteria that would be equivalent to something

23 called adequate protection, not to safety goals. And you're

24 going to allocate a portion of that to this particular set

25 of sequences, but since this particular set of sequences

1 impacts both containment and CDF --

2 DR. APOSTOLAKIS: Right.

3 DR. KRESS: -- you make the allocation of that

4 part of it much lower and yet a higher confidence level.

5 Now, those are qualitative principles.

6 DR. APOSTOLAKIS: Yes.

7 DR. KRESS: How you convert those into quantities,

8 I don't know -- I'm not quite sure yet.

9 DR. APOSTOLAKIS: Right.

10 DR. KRESS: But that would be the way I would

11 approach this sort of thing.

12 DR. APOSTOLAKIS: And I think that's a reasonable

13 way to approach it, and I think a lot of that is in the new

14 -- not policy; the new work that is coming out of Sandia

15 under your sponsorship.

16 DR. CUNNINGHAM: This is the framework for --

17 DR. APOSTOLAKIS: Yes.

18 DR. CUNNINGHAM: -- how we change Part 50?

19 DR. APOSTOLAKIS: And if you remember, they had

20 the core damage frequency and containment, but then, there

21 was an allowance for situations like earthquakes, for

22 example, where there is such strong coupling there that you

23 really have to look at the sequence separately, because, you

24 know, defense-in-depth measures have been compromised.

25 DR. KRESS: Yes.

1 DR. APOSTOLAKIS: And I think this is a mostly
2 similar --
3 DR. KRESS: This is the case.
4 DR. APOSTOLAKIS: -- sequence like that.
5 DR. CUNNINGHAM: Yes.
6 DR. APOSTOLAKIS: But there are fundamental
7 differences here, which I'm sure Mark now appreciates or
8 even when you walked into the room probably appreciated that
9 we are not talking about goals anymore; we're talking about
10 adequate protection, so, you know, whatever principles you
11 invoke, I mean, 1.174, we will really use the goals, right?
12 DR. CUNNINGHAM: Yes, yes, that's right, exactly.
13 DR. APOSTOLAKIS: And the second one is that the
14 surrogate goals may not be applicable anymore, and the third
15 point, Tom, I think, again, when we use the words
16 defense-in-depth, we're using them too loosely sometimes.
17 DR. KRESS: Sometimes.
18 DR. APOSTOLAKIS: We're talking about
19 defense-in-depth in the context of the big picture,
20 preventing radioactivity from being released, or
21 defense-in-depth regarding the failure of the vessel, right?
22 And I think when it comes to the failure of the vessel, you
23 really don't have many options for defense-in-depth. Now,
24 for the bigger picture, you might still have something that
25 you may be able to do, right? So defense-in-depth really

1 can be interpreted only in a certain context which would
2 make the ATHENA people very happy, right, because context is
3 everything, right, Mark?
4 DR. CUNNINGHAM: Yes, sir.
5 DR. APOSTOLAKIS: No, you were not paying
6 attention so you --
7 DR. CUNNINGHAM: You're getting into a lot of the
8 issues that we're facing, and I'm just -- we recognize that
9 a lot of things, this is kind of uncharted waters for us,
10 and we're taking 1.174, which is for license amendments,
11 safety goal information, and we're trying to -- see, that's
12 probably our best set of guidance in terms of general
13 thinking on how to use risk information and then extending
14 that, if you will, into a different environment.
15 DR. APOSTOLAKIS: Are we going to have a chance to
16 look at the paper you're going to present to the Commission,
17 the final version?
18 DR. CUNNINGHAM: Before we send it to the
19 Commission?
20 DR. APOSTOLAKIS: When do you send it?
21 DR. CUNNINGHAM: It's due to the EDO in about two
22 weeks.
23 DR. APOSTOLAKIS: I guess we will not have a
24 chance, but can I make a suggestion?
25 DR. CUNNINGHAM: Okay.

1 DR. APOSTOLAKIS: That you actually elaborate on
2 these points we just discussed, and it seems to me that as
3 you know, certain stakeholders like the Center for Strategic
4 and International Studies have recommended to the Commission
5 that adequate protection be quantified, okay? And there has
6 been extreme reluctance on the part of just about everyone
7 to do that.
8 I think that reluctance and that recommendation
9 were really made at a high philosophical level, and as is
10 usual, you know, with philosophies and philosophical
11 approaches, engineers tend to be very impatient with those.
12 I think it's time that we start pointing out that there are
13 practical issues that we would have an easier time handling
14 if we had such guidance, such goals, such numbers.
15 DR. KRESS: And this looks like an ideal case.
16 DR. APOSTOLAKIS: And this is really an ideal one,
17 that if you guys had a quantified statement of adequate
18 protection, then, your life would be much easier, but you
19 don't, and that quantified statement, again, I don't want to
20 upset Gary Holahan -- it can't be one number. It's a whole
21 process and blah, blah, blah, but still, there will be a
22 number here just as a goal that's going to be in the context
23 of 1.174, and unless we can see these practical means, you
24 will never get anything, anywhere with a safety goal and
25 adequate protection letters and so on.

1 DR. KRESS: I'll tell you what will happen is that
2 the numbers in 1.174 will become surrogates for adequate
3 protection.
4 DR. APOSTOLAKIS: Exactly, exactly, and the same
5 risk Sandia has when they developed the other work on --
6 what do we call that?
7 DR. CUNNINGHAM: Framework for --
8 DR. APOSTOLAKIS: The framework, yes; see, they
9 have nothing else to go by, so they have to use some
10 numbers, and what is it they use? The goal numbers. And
11 before you know it, those will become adequate protection,
12 which is really not checking out the regulations, right? So
13 that's a second example.
14 DR. CUNNINGHAM: Yes.
15 DR. APOSTOLAKIS: We have two examples.
16 DR. CUNNINGHAM: We see what we're doing here as a
17 test bed for at least a couple of things. One is that we're
18 going to test out the framework that you've been talking
19 about and see how that works in the context of this rule.
20 DR. APOSTOLAKIS: Right.
21 DR. CUNNINGHAM: Because if it works, we've got to
22 find our evidence on this rule, and then, there could be a
23 bunch of other rules that have to go through that same
24 process. So this is a test of that system. But you're
25 right; it's also a test of how do you deal with an adequate

1 protection rule in the context of a lot of other things, a
2 lot of other policies that have been focused somewhat
3 differently.
4 DR. APOSTOLAKIS: So there will be a discussion in
5 the Commission paper on this subject.
6 DR. CUNNINGHAM: I think the intent of the way we
7 see the Commission paper today is to lay out the issues.
8 DR. APOSTOLAKIS: This is a big issue.
9 DR. CUNNINGHAM: Yes, oh, yes.
10 DR. APOSTOLAKIS: Yes.
11 DR. CUNNINGHAM: And you're, of course, skipping
12 ahead, but this is one of the key issues, and we have to
13 tell the Commission that we're not intending to give them
14 the answer today but tell them this is an issue that we're
15 going to have to work out in the -- you know, X amount of
16 time. I'm not sure how soon; and discuss it with the
17 committee and go back and just tell them this is an issue in
18 this PTS --
19 DR. APOSTOLAKIS: Yes.
20 DR. CUNNINGHAM: -- revision.
21 DR. APOSTOLAKIS: I think they should be fully
22 aware of this fact, adequate protection and goals are two
23 different things.
24 DR. CUNNINGHAM: And as you say, this is a place
25 where all of that -- the theory comes together in a

1 practical application to a rule change where those of us on
2 the staff have to decide where do we want to go with this
3 rule change.
4 DR. APOSTOLAKIS: Now, if you look at these for --
5 I know you have discussed each one, but maybe we can do that
6 as a group. Is it fair to say that there are really two
7 sets here: the top two and the bottom two, the top two
8 really dealing with the absolute value of the core damage
9 frequency due to PTS and the bottom two, where you look at
10 it as a change.
11 DR. CUNNINGHAM: Yes.
12 DR. APOSTOLAKIS: And the question is which one is
13 philosophically right? Which one do you think -- do you
14 have any preference at this point?
15 DR. CUNNINGHAM: My personal preference, I think
16 of this in terms of the change.
17 DR. APOSTOLAKIS: So one of the bottom two.
18 DR. CUNNINGHAM: One of the bottom two is --
19 DR. KRESS: My personal preference is the top two.
20 DR. APOSTOLAKIS: Okay; Dr. Bonaca?
21 DR. BONACA: I pointed out really before that
22 there is a fundamental confidence in some of these; I mean,
23 they're offering us options, but if I look at option two and
24 option four, they lead you in different directions.
25 DR. APOSTOLAKIS: Yes.

1 DR. BONACA: One of these is a direction of the
2 basic uncertainty that you have on the containment
3 performance. You have to restrict your CDF criteria to
4 10-6, and that, to me, seems to reflect the whole
5 uncertainty we have on the phenomenon associated with PTS
6 issues. The option two you're proposing out of the blue
7 just for consistency with other rules, which makes no sense
8 -- it's 10-5, which is not a different reaction. And so, I
9 don't understand why you make differences in the
10 understanding of the PTS in theory essentially -- are the
11 basis of this initiative will lead you towards option two.
12 I just don't understand it.
13 And I'm only saying this for the purpose of saying
14 do you really want to present number four as an option to
15 the Commission? I don't think --
16 DR. CUNNINGHAM: Again, to back up, one of the
17 things we've changed in the context of the paper or will be
18 changing in the context of the paper is not to lay ideas out
19 as options for the Commission to consider. These, based on
20 what's happened over the last 10 or 15 years, here are
21 possible ways that you can -- or pieces of guidance that you
22 could use to adapt it and to consider this rule change. So,
23 I'm not going to argue that the second one is a very strong
24 argument; it's just historically, in other circumstances,
25 the Commission has said that sequences -- core damage

1 frequencies on the order of 10-5 are acceptable.

2 There are a lot of down sides to this, and

3 containment performance is one of them. And the

4 uncertainties and our understanding of the uncertainties on

5 these accidents is different. And all of that is arguments

6 not to take that approach.

7 DR. APOSTOLAKIS: In other words, if you don't

8 present these as distinct options, you may say, well, here

9 are some ideas, and one can pick, you know, something from

10 four and combine it with two. In other words, I can't have

11 in my thinking the fact that, you know, there were

12 frequencies discussed for ATWS and station blackout, but I

13 also worry about the fact that CDF and LERF here are really

14 the same thing, right?

15 DR. CUNNINGHAM: Yes.

16 DR. APOSTOLAKIS: I mean, I can -- so if you

17 present it that way, then I think Dr. Bonaca's concern is

18 mitigated.

19 DR. BONACA: Yes, it is; you know, again, and

20 Professor Seale made a comment that I thought was

21 interesting. They're different animals, too. In ATWS and

22 station blackout, you really probably have differences

23 between the CDF and LERF. For this, the PTS, I really need

24 to be more and more convinced that it is very high. Even if

25 you went to option C, it would be very hard to demonstrate,

1 to demonstrate, you know, within a certainty a difference
2 between CDF and LERF. So that makes a big distinction
3 between ATWS and station blackouts.
4 DR. APOSTOLAKIS: And the staff says, you know, we
5 recognize it and we'll look at it. We don't have to be
6 making a choice now.
7 DR. KRESS: The point of bullet two to me is that
8 you are allocating an overall criteria to a set of
9 sequences. It's an allocation process. And I'm saying --
10 when I say that's an appropriate thing to think about, how
11 do you allocate, and you need to consider that, things like
12 what you're talking about: what's the uncertainty in these?
13 What's the uncertainty in the other? Does it impact both
14 CDF and LERF and how much? Those are things you ought to
15 think about.
16 I think this is one of the big issues here is how
17 do you allocate your risk acceptance among the sets of
18 sequences? That's one of the big issues.
19 DR. CUNNINGHAM: Yes, and that's, in the context
20 of the blackout rules and things, it's just a straight
21 allocation on core damage frequency is overly simplistic --
22 DR. KRESS: Yes.
23 DR. CUNNINGHAM: -- because of the differences in
24 the uncertainties, including the differences in our
25 understanding of what containment performance would be.

1 It's in differences in the initiator frequencies. The
2 blackout starts with an event, a series of failures. You
3 can think of a PTS thing as it happens, and you've failed
4 the vessel, and you've melted the core. So the frequency of
5 the challenge is different. For all those reasons, it's an
6 overly simplistic approach to take, I think, and again,
7 we're not arguing to go there, but historically, we have
8 done things like that in the eighties. We have done some
9 sort of an allocation of core damage frequency, in effect.
10 It's happened piecemeal and things like that, but it's
11 happened. So it's something to think about.
12 DR. KRESS: What you need is an overarching
13 principle on how to deal with it.
14 DR. WALLIS: Another idea -- say you're looking at
15 the screening criteria. Rather than just looking at
16 options, I think you ought to explain why the changes to the
17 core, for what reason or on what basis. Because if
18 something is wrong with what we have now --
19 DR. KRESS: Yes.
20 DR. WALLIS: -- then, we would have a solution to
21 that. That should be clear before you launch into picking
22 one of these options.
23 DR. APOSTOLAKIS: So it seems to me you can jump
24 to 20 or 21.
25 DR. CUNNINGHAM: Yes, sure.

1 DR. BONACA: But certainly, if you could
2 understand what will be released, CDF and LERF can be
3 equated --
4 DR. CUNNINGHAM: Yes.
5 DR. BONACA: -- for this. It will provide -- shed
6 light on which approach to take.
7 DR. CUNNINGHAM: Yes; we're taking you to slide
8 20, where we think we have today where we want to go with
9 this paper. We can basically tell the Commission that we
10 think we need to take the principles -- several ways to
11 think about it. One is to take the principles that are laid
12 out in 1.174 and try to use them as a basis to develop the
13 process we would use and make the decision on the PTS rule
14 change.
15 DR. APOSTOLAKIS: Or, if possible, a new set of
16 principles.
17 DR. CUNNINGHAM: Or a new set of principles;
18 that's right.
19 DR. APOSTOLAKIS: Because this is an adequate
20 protection.
21 DR. CUNNINGHAM: That's right. So, one way to
22 think about it is an extension of 1.174. Another way to
23 think about it is this is using the framework that's in
24 option three and applying and testing that framework to see
25 how it works. It has the common element of its background

1 is safety goal oriented, and this is an adequate protection
2 rule, and we're not quite sure how that all falls out. We
3 think we want to go in that general direction, but I think
4 we need to -- we're going to plan to tell the Commission
5 about the two issues that we'll lay out.
6 One is this issue of containment, and I think we
7 need to provide a better description of the issues there and
8 try to address them at least to some degree in the staff.
9 They're very complex issues. At this point, I guess I'm not
10 convinced that handing it over and saying just equate the
11 two is okay. I think we need to do some more analysis
12 ourselves and think about this some more.
13 DR. POWERS: Can I get a better idea of why you
14 think there is a potential for early release of PTS
15 accident? I think when you say that, you're saying that
16 rupture of the vessel leading to a factor of corruption of
17 the containment.
18 DR. HACKETT: We'll be looking for the slide. One
19 of the things we talked about with the combined subcommittee
20 is the fact that if you assume -- we're making the
21 assumption that it's a large flaw on the side of the vessel
22 and then, you know, the huge dynamic impact that goes along
23 with that. At least this is the way I would construct it
24 just in an engineering sense that that will physically move
25 the vessel some amount and again, a very plant-specific, I

1 guess, response depending on how the vessel is supported and
2 so on, but then, obviously, everything associated with the
3 vessel is moving also.
4 I would be just thinking from an engineering or
5 materials perspective that a very high probability of
6 ripping loose some containment penetration as a result of
7 that sequence.
8 DR. POWERS: It seems to me I'm getting out of my
9 league here a little bit. It seems to me that we have other
10 accidents that result in vessel failures at high pressure in
11 severe accident space, and there has not been an assumption
12 that vessel failure in those ipso facto leads to a
13 containment failure; quite the opposite. My recollection is
14 some analyses done for Surrey and a few of those things,
15 quite the opposite conclusion was reached. They both felt
16 containment, just because you fail a pressurized vessel in a
17 good deal more hazardous configuration than this would be.
18 DR. CUNNINGHAM: To go back to an earlier slide
19 where we were talking about the general characteristics of a
20 PTS accident, we laid out a number of issues that are in the
21 context of containment performance. Ed was just talking
22 about some of the dynamic aspects of it. If you start it,
23 you're going to somehow move this vessel to some degree if
24 and when this large opening were to occur. That's going to
25 have some impact on penetrations and that sort of thing. So

1 you offer the potential for penetration failures. You have
2 the fact that something is going to happen to the fuel when
3 this blowdown, and the people are talking about the idea
4 that it's going to -- does it stay intact or not? What
5 happens to it?
6 You also have the issues of what's the blowdown
7 loads themselves. Running counter to that, then, is the
8 fact that, again, this is a water-generated accident, if you
9 will; if you've got a lot of water coming out of the reactor
10 coolant system; you've got a lot of water around the
11 containment; you have containment ESS.
12 DR. WALLIS: You're listing all these things. Are
13 these not candidates for analysis or --
14 DR. CUNNINGHAM: No, I think they're candidates
15 for analysis is where we want to --
16 DR. WALLIS: Because I get the feeling from all of
17 this, the feeling that some people feel that containment is
18 terribly at risk; therefore, we should assume that it fails.
19 That's a very superficial way to make a decision.
20 DR. CUNNINGHAM: That's why we have to do some
21 more analysis before we get to that decision.
22 DR. WALLIS: I don't think you should jump to one
23 decision before you know what the analysis shows you.
24 DR. CUNNINGHAM: Yes, and that's where we sit.
25 DR. HACKETT: I think that's a really good point,

1 and I think where we were coming from -- and Mark mentioned
2 it earlier -- is that if a large uncertainty would accrue to
3 address each one of these or potentially large at any rate,
4 it's not something -- certainly, it's not something that's
5 been addressed beforehand for PTS, and we'd be, as Mark
6 mentioned earlier, kind of carving out some new ground to be
7 delving into this.
8 DR. KRESS: Dana, this looked like a planned
9 sequence for a regression to me. So our regression -- it's
10 a lot of bloating in the containment.
11 DR. WALLIS: And now, we're talking about -- this
12 seems to be talking about CDF and LERF and risk-informing
13 it. We should be certain that when we talk about
14 risk-informing, you don't use it as a way of avoiding
15 tackling difficult clinical questions. I hope that's not
16 happening to this one.
17 DR. CUNNINGHAM: The third approach and the fourth
18 approach, the difference between them, in a sense, is, on
19 the third approach, you go in and do some more technical
20 analysis and see what it tells you. The fourth one says
21 right now, I'm going to deal with it as a policy matter and
22 say unacceptable, and I'm going to go right to the next one.
23 That's the differentiation we've got on the two options.
24 To come back to Dr. Powers' point, I think at the
25 subcommittee, we talked about -- my sense is we kind of

1 alluded to the direct containment heating accidents. I read
2 into what you said direct containment heating accidents.
3 It's hard for me to imagine that this is a more severe
4 challenge to a containment than a direct containment heating
5 accident.
6 DR. POWERS: I certainly don't come to that
7 conclusion, but I will accede that I'm unfamiliar with the
8 water rejection portion of this.
9 DR. CUNNINGHAM: So there are differences, and
10 there are things like that, but the DCH is a tremendous
11 challenge to these containments, and I'm not sure this is in
12 that league, if you will. But at any rate --
13 DR. APOSTOLAKIS: So we're going to see you again
14 in September, August, something like that?
15 DR. CUNNINGHAM: Yes; whenever the next
16 subcommittee meeting -- I think we need to go forward with
17 the paper telling them in general where we're going with
18 this.
19 DR. APOSTOLAKIS: Yes.
20 DR. CUNNINGHAM: I think we tell them that we have
21 to talk about the issues that have just been discussed here
22 and say in my mind, we have to provide more analysis,
23 technical analysis, technical work before we're at the point
24 where we're going to say that we're just going to make a
25 policy decision.

1 DR. POWERS: Dr. Kress raised a point that I think
2 deserves consideration as long as you're considering these
3 good technical issues. He said gee, if you had a rupture
4 and blew the vessel down, wouldn't you get air on the fuel?
5 Your LERF criteria right now are based on a source term that
6 doesn't consider air on the fuel. In another context, Dr.
7 Kress has suggested that it would be important to go back
8 and re-evaluate that LERF limit that you have in 1.174 when
9 your source term changes dramatically.
10 DR. CUNNINGHAM: Absolutely.
11 DR. POWERS: And you may have to consider that.
12 DR. CUNNINGHAM: I should have had that on the
13 slide as well. That's another technical issue embedded here
14 is the source term behavior in an air environment. If we
15 want to go forward with the paper and that issue and tell
16 them that we need to work that issue some more, and then,
17 the second issue is this -- the other one we're talking
18 about is we've got an adequate protection rule, and we're
19 trying, to some degree, to apply safety goal type guidance
20 to it, and how does that all work itself out? So we have to
21 work that issue as well.
22 At this point, this will be an information paper
23 to the Commission to say we've got to deal with these
24 issues, and this is what we're doing with them, and we're
25 going to go on with it.

1 DR. KRESS: Mark, you've got some really fun
2 things to think about.
3 DR. CUNNINGHAM: Yes; that's right.
4 DR. APOSTOLAKIS: Okay; anything else?
5 DR. CUNNINGHAM: I think we've covered everything,
6 and we'll come back at the next subcommittee and try to give
7 you an update on where we are on these issues.
8 DR. APOSTOLAKIS: Very good; thank you very much.
9 DR. POWERS: Are there any other presentations?
10 [No response.]
11 DR. POWERS: Then, I'm going to recess us until
12 12:45.
13 DR. SEALE: Mr. Chairman?
14 DR. POWERS: Yes.
15 DR. SEALE: Dr. Kress and I suffered -- and I do
16 mean suffered -- through three days of the CSUP meeting down
17 at the hotel on chairs of questionable orthopedic design --
18 [Laughter.]
19 DR. SEALE: And I think we should just all revel
20 in the comfort --
21 [Laughter.]
22 DR. SEALE: -- of our present ambience.
23 Would you agree, Kyle?
24 DR. KRESS: No, you're revealing your age. I'm
25 not that old.

1 [Laughter.]

2 DR. POWERS: If you're looking for some sympathy

3 on the committee, I assure you you have none.

4 [Whereupon, at 11:45 a.m., the meeting was

5 recessed, to reconvene at 12:45 p.m., this same day.]

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

2 [12:45 p.m.]

3 DR. POWERS: Let's come back into session.

4 Members will note the fact that some thought that Dr. Shack

5 may have been kidnapped by rebels in Sierra Leone -- he is,

6 in fact, back and alive and well.

7 We'll turn now to proposed revision to the

8 Regulatory Guide 1.174, to see if a single word can be

9 adjusted in that sacrosanct document: an approach for using

10 probabilistic risk assessment and risk-informed decisions on

11 plant-specific changes in the licensing basis.

12 Professor Apostolakis, I think you're going to

13 take the committee through this.

14 DR. APOSTOLAKIS: We did discuss this issue at the

15 subcommittee meeting some time ago.

16 DR. POWERS: Would you explain to people when they

17 give us back the notes with draft stamped across them?

18 DR. APOSTOLAKIS: So who is doing the review

19 today? Gary?

20 MR. BARRETT: Bob Palla of the staff will make a

21 presentation.

22 DR. APOSTOLAKIS: No more accident management?

23 We know how to manage it.

24 DR. PALLA: Let's hope it's not in the

25 implementation stage.

1 [Pause.]

2 DR. PALLA: Shall we start?

3 DR. POWERS: Please.

4 DR. PALLA: I'll move right ahead.

5 My name is Bob Palla. I'm with the probabilistic
6 safety assessment branch, Office of Nuclear Reactor
7 Regulation. The purpose of my presentation today is to
8 discuss the proposed guidance on the use of the staff's --
9 guidance on staff's use of risk information in the review of
10 non risk-informed license amendment requests. This guidance
11 is intended to clarify responsibilities to consider risk in
12 regulatory decision making; the staff authority to question
13 risk implications of proposed changes and the staff's
14 authority to potentially reject the proposed changes based
15 on risk considerations.

16 The need for this guidance was identified as
17 policy issue four in SECY 98-300. The issue came to light
18 again in the review of electrosleeving for the Calloway
19 plant. It pointed out that this guidance would in fact be
20 needed and helpful; lay it on the table and make the
21 industry clear on how the staff would intend to use risk
22 information.

23 We did discuss this with the ACRS subcommittee in
24 September of last year, and at the time, we were working
25 from a draft version of SECY 99-246, essentially the same

1 document as what we forwarded up to the Commission about a
2 week or so after the committee and we had met. So we --
3 okay; let me just proceed here with the first slide.
4 This is in the way of background, and I'll walk
5 through this background quickly, and we can get to the heart
6 of things. The PRA policy statement encourages the use of
7 PRA in regulatory activities. However, licensees are not
8 required to consider or submit risk information. As a
9 result, the existing regulatory guidance that we've
10 developed is geared toward situations in which the licensee
11 voluntarily submits this risk information as part of a
12 risk-informed license amendment request.
13 Commission policy implies it's the staff's
14 responsibility to consider the change in risk as well as
15 compliance with the regulations when we review license
16 amendment requests. And these responsibilities are pretty
17 clear when the submittal is risk-informed, but when you have
18 a submittal that is not, then, how one takes risk into
19 account is not clear, and accordingly, in SECY 98-300, we
20 identified as a policy issue the need to develop such
21 guidance.
22 DR. APOSTOLAKIS: Now, I see here a statement that
23 is very interesting. The proposed license action satisfies
24 the existing design and licensing basis but introduces
25 significantly unanticipated risks. What happened to the

1 presumption of no undue risk to public health and safety if
2 the regulations are met?
3 DR. PALLA: Well, there still is the presumption
4 that -- I mean, it is a presumption that meeting the
5 regulations is -- provides adequate protection, no undue
6 risk. What we're talking about here is a situation that
7 defies that, really, calls into question this presumption.
8 DR. APOSTOLAKIS: Is it possible to meet the
9 regulations and still have undue risk?
10 DR. PALLA: Yes.
11 DR. POWERS: It seems to me that the language says
12 it's a presumption, okay? Here, he's talking about a
13 situation in which staff, in looking at it, says that
14 presumption may not be accurate in this case, because
15 there's something very unusual about this.
16 DR. APOSTOLAKIS: But it would also tell me that
17 the use of risk information should be mandatory if that's
18 the case.
19 DR. PALLA: Well, our thinking is that by and
20 large, this presumption is valid, and that the situations --
21 well, if one complies with the regulations, the situations
22 in which you actually do have undue risk are very rare, and
23 that's been our experience, that we did a search of various
24 license amendment requests, and it looks like very few of
25 those would come close to calling this presumption into

1 question. So our thinking is that again, it's better to not
2 ask for risk information in every submittal, but we think we
3 need to have some kind of ground rules for when we should
4 cross over and do ask for it.
5 DR. APOSTOLAKIS: But perhaps among technical
6 people, this is not a big issue, but I wonder if a member of
7 the public sees this, and I was expecting Dr. Wallis to
8 actually raise that issue. What kind of message does this
9 send, that if you can satisfy existing design and licensing
10 basis and yet introduce significant and unanticipated risks;
11 that doesn't sound too good.
12 DR. PALLA: We're not saying that's okay. We're
13 saying that's what we're worried about here. So we're
14 looking for those situations. We think they're rare, but
15 that's what we're specifically targeting here. And we're
16 stopping short of risking for risk information.
17 DR. POWERS: George, I know several instances in
18 which they have found that the regulations that existed at
19 the time did not cover the mark.
20 DR. APOSTOLAKIS: I know.
21 DR. POWERS: And then, they went to say -- where
22 they were reminded that prior applications had produced very
23 significant challenge to the plant and the evidence of the
24 regulations. Okay? So, I mean the fact that one might find
25 a situation out there for a particular plant in particular

1 circumstances where the rules simply weren't enough is not
2 within the bounds of credibility here.
3 On the other hand, equally true is that in 99
4 percent of the cases, existing regulations are enough. I
5 mean, I think that's what Bob said.
6 DR. PALLA: That's the concept.
7 DR. SEALE: Well, and the way in which it is
8 stated puts the onus on staff to come up with specifics as
9 to why it doesn't meet the adequate protection requirements
10 rather than requiring that kind of proof up front from the
11 licensee. That would be a considerable burden which they've
12 managed to avoid.
13 DR. APOSTOLAKIS: I think the whole thing comes
14 from the fact that they're constrained, I guess, by legal
15 considerations. It seems to me we have this new technology
16 that gives us new knowledge and all of that, and now, we are
17 questioning whether we should request this kind of
18 information, and this sentence there tells me that we
19 should. If there is a remote possibility, we should.
20 DR. WALLIS: As we get wiser, it's foolish to deny
21 that we know something more than we knew before.
22 DR. APOSTOLAKIS: Exactly; thank you very much,
23 Graham.
24 Let's go on.
25 DR. PALLA: Well, I just wanted to point a few

1 things out here. As I mentioned, we start the second paper
2 up. After meeting with the committee -- we did receive a
3 favorable staff requirements memorandum from the Commission.
4 The Commission basically said that the staff should develop
5 final guidance that clearly articulates what constitutes a
6 special circumstance in a clear and objective manner. It
7 indicated that we should engage the stakeholders and while
8 we -- you know, in that process and indicated support for
9 the use of the guidance that we had in SECY 99-246 on an
10 interim basis while we finalized the documents.
11 So we, as a result, issued a regulatory issues
12 summary 2000-07, which in essence summarizes the content of
13 SECY 99-246. It was transmitted to all utilities. It does
14 have one change from the guidance that I'll discuss with you
15 today, and basically, the flow chart has been changed to
16 reflect this; the Commission requested that in the interim,
17 if we run across a situation that we would consider meets
18 the special circumstance criteria that we would inform of
19 that. So the basic process that we included in the
20 regulatory issue summary is essentially the same one that
21 I'll be talking to you about today except it has that
22 additional step of notifying the Commission should we run
23 across any, and we have not so far since that.
24 Finally, we've issued the modified guidance
25 documents, and we forwarded them to ACRS and CRGR for

1 information. At the same time, we've put them in the
2 Federal Register. We plan to have a workshop next week to
3 discuss that with stakeholders.
4 I just want to briefly summarize the process that
5 was in SECY 99-246, and the reason I'm just going to repeat
6 what's in 246 is because that's essentially what is in the
7 modified documents, and in essence, we have created this
8 concept that there could be exceptions to the -- our
9 standard presumption of adequate protection, compliance
10 equals adequate protection. There could be some special
11 circumstances under which that presumption is not valid.
12 DR. APOSTOLAKIS: This raises a question that
13 bothers me a little bit. Also, I read the selected changes
14 in the text of Regulatory Guide 1.174. And I must say I'm a
15 little bit confused as to why an issue that seems to be
16 related to adequate protection appears in 1.174, which does
17 not deal with adequate protection. For example, in the
18 introduction, you are saying that the basis on which new
19 information reveals an unforeseen hazard for a substantially
20 greater potential for a known hazard to occur, in such
21 circumstances, the NRC has the statutory authority to
22 require licensee action beyond existing regulations to
23 demonstrate that the level of protection necessary to avoid
24 undue risk to public health and safety; that is adequate
25 protection.

1 Why is this in a document like 1.174?

2 DR. PALLA: Well, I would say it's in 1.174

3 because 1.174 gives guidance to the staff on how to use

4 risk. Now, we do, in this case, cross the risk information

5 with the concept of adequate protection. We don't equate

6 it, but we, in essence, in the appendix to the SRP that I'll

7 be focusing on, we use the Reg Guide 1.174 criterion

8 guidance in our review, and we then go further if that

9 criterion is not met to ultimately make a decision about the

10 acceptability of the amendment.

11 It seems like a logical place to put it. If there

12 was a better place, I guess we could put it there.

13 DR. APOSTOLAKIS: No, I mean, the five principles

14 of 1.174 include a very important one, which is principle

15 number four, that the changes in CDF and LERF should be

16 small.

17 DR. PALLA: Yes.

18 DR. APOSTOLAKIS: And I don't see how that

19 principle has anything to do with what we're talking about

20 here. If it's an issue of adequate protection, what does

21 small change mean, and would you allow any change?

22 DR. PALLA: One way to think of this is that this

23 is kind of a one-way test. The reg guide provides a basis

24 for saying that something would provide adequate protection,

25 but when that guidance is not met -- it's not the same, and

1 you can't categorically conclude that you have inadequate
2 protection, but it opens the door. We refer to it as a
3 trigger, that if you don't meet the 1.174 criteria, then, it
4 raises questions, and these questions have to be carefully
5 considered, and ultimately, one has to make a decision on
6 the acceptability of that.
7 Now, we refer in that, in the case that it's
8 unacceptable, we're saying that the underlying decision
9 would be that the protection is inadequate.
10 DR. APOSTOLAKIS: Now, again, that's not about
11 that particular principle that the changes should be small.
12 A licensee may submit a request that if it was submitted
13 under 1.174 would result in CDF saying that that's greater
14 than -- it would say -- that the licensee's core damage
15 frequency is down to 10-6. So it violates the principle
16 that the changes should be small, but it really doesn't
17 raise an issue about adequate protection.
18 So it's this blending of adequate protection
19 arguments with 1.174 that confuses me and I suspect is going
20 to confuse the licensees too. Is this a way of catching
21 those? In other words, a plant is not going the
22 risk-informed way, and he's asking me for something that's
23 too much? That may be fine; you don't want them to do that.
24 But don't invoke adequate protection to do that.
25 DR. PALLA: Well, the thinking here is that -- I

1 think you're concerned about just marginally not meeting the
2 criteria, the numerical guidance in the reg guide, and I
3 guess that it could appear to be a concern, but we were
4 trying to focus not only on numerics but on the other safety
5 principles collectively to make a decision that when one
6 looks at that integrated decision making process, those
7 safety principles are essentially the same kinds of
8 considerations that go into the judgment about adequate
9 protection.
10 So the numbers are a piece of it, but the other
11 considerations are other factors.
12 DR. APOSTOLAKIS: Yes; that brings me to my next
13 question, which is very much related. Let's say that we are
14 estimating the change, and you find that it's 4x10-5 for
15 CDF, which is about what the 1.174 allows, at which point,
16 you would say five or six or seven; when do you decide,
17 since you don't have any numerical guidance regarding
18 adequate protection, that now, you have a problem with
19 adequate protection?
20 MR. HOLAHAN: This is Gary Holahan.
21 George, I think we're going back a couple of years
22 to -- the questions you're raising are basic questions about
23 how Reg Guide 1.174 works in the regulatory process.
24 DR. APOSTOLAKIS: No, the question I'm raising is
25 whether 1.174 is relevant to what we're addressing here.

1 There's a clear statement.

2 DR. POWERS: I guess I'm confused on where we're
3 going. I'm still hung up on how you get into this process
4 before how you're going to react to what you find in the
5 process. Right now, I'm still hung -- hanging onto the you
6 come on, and you've declared this special circumstance, and
7 that's the part I don't understand. Now, once they've done
8 that, presumably, we'll go and find out what they really --
9 that's how they get into that.

10 DR. APOSTOLAKIS: I'm questioning handling the
11 special circumstances using principles from 1.174. I don't
12 think they apply, because the special circumstances,
13 according to the document, deal with undue risk. That is
14 adequate protection. So I don't see how you can use 1.174
15 to conclude that you have a special circumstance.

16 MR. HOLAHAN: George, remember, 1.174 is guidance
17 on how to do license amendments.

18 DR. APOSTOLAKIS: Yes.

19 MR. HOLAHAN: And the test to license amendments
20 is no undue risk. It is -- in fact, every license amendment
21 decision we make is effectively an adequate protection
22 decision.

23 DR. BONACA: It's interesting how you could go to
24 the same exercise thinking about with Calloway; they've
25 proposed this amendment, and they want 1.174. Think of it

1 that way. 1.174 never denied the amendment if they find
2 themselves in the region that they cannot justify this
3 change. And I believe that this allows the NRC to have the
4 symmetrical approach where they can implement the same
5 process and perform what Calloway should have done.
6 MR. HOLAHAN: With respect to Calloway, I think
7 the point is not necessarily that it would have been denied.
8 The point is that the rules of the game of how the amendment
9 was treated would have been much clearer. It would have
10 been much clearer if we had this guidance two years ago as
11 to what the expectations on the part of the licensee and on
12 the part of the staff were. It was still a difficult issue
13 with technical matters that will be argued over as to
14 whether they would have passed or failed the criteria. But
15 at least we would have had a clearer understanding of what
16 the expectations were.
17 MR. BARRETT: This is Rich Barrett with the staff.
18 I'd like to take a shot at that question. I think that the
19 concept of special circumstances is important here, because
20 I don't think that we want to say that a -- that you have --
21 that there are criteria in Reg Guide 1.174, and if you're
22 below those criteria, you get something approved, and iv
23 you're slightly above them, you cannot. What we're trying
24 to say here is that we only want to look at situations that
25 have -- I'll go so far as to say deterministic circumstances

1 which make the situation worth looking at from a
2 probabilistic or a risk perspective.
3 In the case of electrosleeves, it was the
4 introduction of an entirely new type of material into the
5 steam generator, the material having certain characteristics
6 which the staff, if we were doing this today, might call
7 that a special circumstance which would raise the question
8 of whether we should be looking at the criteria and the
9 guidelines of 1.174; and as Bob pointed out not only the
10 numerical guidelines but questions related to
11 defense-in-depth margins and the ability to monitor
12 performance and all of the other criteria in Reg Guide
13 1.174.
14 So what we're trying to say here is that there's
15 more than just a risk test, a numerical risk test. We're
16 basically saying that there is going to have to be a
17 threshold here that the staff is going to have to cross in
18 terms of something qualitative that raises this to the level
19 of a possible special circumstance.
20 DR. WALLIS: While we're on this general slide
21 here, wouldn't it be true that if there were an adequate
22 protection meter, then most of the problems would go away,
23 and for some reason, in the entire history of the agency,
24 having inadequate protection is somehow taboo?
25 DR. PALLA: Well, if you had an adequate

1 protection meter that sufficiently addressed all of the
2 facets of what goes into them through an adequate protection
3 procedure, that would be true. I think the challenge would
4 be to come up with such a meter, because it isn't just -- if
5 we had ideal PRAs, I don't think it would be numerical
6 still.
7 DR. WALLIS: Only the priesthood can decide. You
8 don't have the measure which the layman can understand which
9 says whether it's adequate protection or not.
10 DR. APOSTOLAKIS: Bob, nobody is arguing that it
11 should be a numerical criterion alone, but one could
12 envision the five principles of 1.174 with the fourth
13 principle replaced by other numbers as being applicable to
14 adequate protection questions. That would be a cleaner way
15 of doing it. Which brings me to my last point: you also
16 say here in the change that the staff -- if a licensee does
17 not choose to address this, the reviewers should not issue
18 the requested amendment until they have assessed the risk
19 implications sufficiently to determine that there is
20 reasonable assurance that the public health and safety will
21 be adequately protected.
22 Now how on earth are they going to do this without
23 numerical guidance? How does a reviewer decide that the
24 risk change is not great enough so that there is reasonable
25 assurance?

1 DR. PALLA: Okay; at that point, you're part way
2 through a process. You would have already had an amendment
3 request come in. It would be forwarded to the risk branch
4 for a look. The risk person would look at it; says, well,
5 even though it meets the requirements, there is some element
6 of what's being requested here that causes me concern for
7 some sequences that are significant to the risk profile for
8 this plant. So this is all, perhaps, qualitative judgments;
9 it would be.
10 If it wasn't a risk-informed amendment, it would
11 be coming in without that risk information, so the reviewer
12 would have to be making these judgments based on qualitative
13 considerations. And upon being convinced that there is a
14 concern here, one of the steps -- and there's a flow chart
15 in -- I think it's the next page in your package there --
16 that basically says management informed of potential risk
17 concerns. We've put in this process a step by which the
18 individual reviewer would not unilaterally make some
19 decision about an issue being a special circumstance. There
20 would be some iteration, some, you know, convincing done at
21 the staff -- you know, with their management to basically
22 reach some agreement that, yes, this does look like it's a
23 risk-significant consideration.
24 That could rise to the level that we might argue
25 that it's inadequate protection. And then, you'd go and

1 you'd ask for the risk information. Now, the point that I
2 think you were postulating was what if, after you asked for
3 it, you don't get it? And what we say in our guidance is if
4 the licensee chooses to not submit this, then, we basically
5 would need to convince ourselves that this issue that we got
6 ourselves all spun up about is, in fact, not an issue. So
7 we do put a burden on ourselves, number one, to convince
8 ourselves that it is a special circumstance, and then, once
9 we've done that, if we don't get enough information, I don't
10 think it's appropriate to turn around and say we got no
11 licensee response; the thing that we thought was a special
12 circumstance is okay.
13 You know, you can't do that. I don't think it
14 would be legitimate to do that. I think you then have to
15 establish a basis for concluding that it's acceptable, and
16 if you can't do that, then, I think you have a problem
17 approving the amendment request. And so that is kind of a
18 dilemma that's created if a licensee does not submit the
19 information that's necessary.
20 DR. POWERS: Let me ask a question, because I'm
21 not sure there's -- this is all this unusual. Suppose a
22 licensee proposes something; it comes to the appropriate
23 person on the staff. The appropriate person on the staff
24 says oh, gosh, these guys haven't looked at intermetallic
25 reactions. I'm pulling that out of the air.

1 DR. PALLA: Okay.

2 DR. POWERS: And so, he writes a request for
3 additional information; sends it off to the licensee and
4 says what about intermetallic reactions? The licensee comes
5 back and says never heard of such thing; don't have any
6 answers; don't know what you're talking about. I mean, the
7 guy has the same problem, right?

8 DR. PALLA: Yes.

9 DR. POWERS: And he has handled that as he's
10 handled it for years and years and years now. He either
11 convinces himself that his concern over intermetallic
12 reactions was misplaced, and there isn't a problem here, in
13 which case, he approves the amendment request, or he
14 persuades himself that, indeed, he was justified in worrying
15 about and he denies it, right?

16 DR. PALLA: Well, I don't think he denies it right
17 up -- I think he elevates it --

18 DR. POWERS: Oh.

19 DR. PALLA: -- and basically goes to the next step
20 to try to articulate what is it about this issue that --

21 DR. POWERS: Well, yes, he has to persuade
22 somebody, himself or maybe his boss or somebody else.

23 DR. PALLA: Right.

24 DR. POWERS: Yes.

25 DR. PALLA: And then, ultimately, if you can get

1 the information from the licensee, it makes the job easier
2 to make the judgment.
3 DR. POWERS: But if he doesn't --
4 DR. PALLA: If you don't, well, then, the staff
5 has to be -- I mean, our -- the purpose of our review is to
6 conclude that there is adequate protection. If you can't
7 get that information that's needed to do that, then, I don't
8 think you could reach the appropriate finding.
9 DR. POWERS: And I think that's been going on for
10 a long time, hasn't it?
11 MR. HOLAHAN: It goes on all the time, but in
12 making that judgment, the staff needs to articulate what is
13 it about this issue that makes it unacceptable, and in most
14 cases, and, in fact, the easiest path to saying no, this is
15 not acceptable is to say that this phenomenon, this issue,
16 this lack of information, this, you know, negative
17 information shows me that there's a piece of the regulation
18 that isn't being met, okay?
19 So the regulation may say something about the
20 extremely low likelihood of the vessel failing or something
21 like that.
22 DR. POWERS: And here, we've already posed that it
23 meets all regulations.
24 MR. HOLAHAN: Yes; that's right.
25 DR. POWERS: But there's still something there.

1 MR. HOLAHAN: That's right; that's right. And so,
2 this sort of issue, in which you're struggling with, you
3 know, how much do I know and is it good enough, say, some of
4 those are issues about am I meeting the regulation, and some
5 of those are, well, I think I meet the regulation, but I
6 still have residual concerns usually because the regulation
7 wasn't constructed originally to deal with these particular
8 types of cases or materials or issues or whatever.
9 DR. POWERS: I mean, you must be very
10 hypothetical, because I think I can take -- find something
11 in the general design criteria that's applicable to
12 everything in an absolutely sense.
13 MR. HOLAHAN: But in some cases, you may find that
14 the general design criteria or the regulation is specific on
15 a point, but under the particular circumstances, it gives
16 you the wrong answer.
17 DR. POWERS: I see; okay.
18 DR. APOSTOLAKIS: Speaking of hypothetical
19 situations, let's say that you are doing your risk
20 assessment, okay, either with the help of the licensee or
21 not, and you find that the change in CDF is 3x10-5, but
22 their CDF is already 10-6. Now, you have a problem. I
23 don't think you can really make a case of adequate
24 protection. On the other hand, the guy has violated the
25 fourth principle of 1.174. So does he get away with it just

1 because he did not submit risk information, or what do you
2 do?
3 DR. PALLA: Well, that's one of five, and you've
4 got to say, well, what about the other four? Does he have
5 any, you know, margins, defense-in-depth? Is this -- what
6 exactly is the situation in these other areas? And if he
7 fell down in numerous other areas, then, you might think of
8 elevating that.
9 DR. KRESS: I think George has a really good point
10 here, and the point is that in this process of dealing with
11 requested changes and whether they should be approved or
12 not, we're mixing in the concept of adequate protection when
13 we really don't know what adequate protection is, and we're
14 trying to equate it somehow with a change in CDF or a change
15 in something, and the two are just not related to each
16 other, and that confuses everybody.
17 What you ought to have is a rule that says we will
18 not allow a change in CDF or LERF more than this amount and
19 not try to confuse it with adequate protection. That is the
20 rule. That's the criterion, and whether they have a CDF of
21 this much or this much, we're not going to allow any change
22 any bigger than this, and it's an absolute, and you don't
23 confuse it with adequate protection; you don't even try to
24 throw it in that way. And I think that's the problem.
25 DR. APOSTOLAKIS: To tell you my personal view is

1 that the staff really -- and, of course, they're here; they
2 can correct me -- the staff really does not want to approve
3 changes that violate 1.174.
4 DR. KRESS: And that ought to be the rule. That
5 ought to be the criteria.
6 DR. APOSTOLAKIS: And if it was up to them, they
7 would do that.
8 DR. KRESS: Yes.
9 DR. APOSTOLAKIS: The problem is that legally,
10 they cannot publish it that way. They have to invoke
11 adequate protection.
12 DR. PALLA: Are you talking about just the
13 numerical criteria?
14 DR. APOSTOLAKIS: All of it; five, all five
15 principles.
16 DR. PALLA: It's very hard to judge those other
17 principles, though, but the numerical one is probably the
18 easiest one. These other factors are kind of diffuse so --
19 DR. APOSTOLAKIS: Right.
20 DR. PALLA: So I think that judgment is just very
21 clouded so --
22 DR. APOSTOLAKIS: It is very clouded, but at least
23 the only principle there that's not as much clouded is the
24 fourth principle, and there is a possibility that a proposed
25 change violates that principle without really disturbing the

1 others too much, and I -- if it's an issue of adequate
2 protection, I don't see how you can deny it. And yet,
3 Regulatory Guide 1.174 is violated.
4 So, in other words, by choosing not to submit risk
5 information, I have avoided one of the constraints there.
6 DR. PALLA: In fact, what the process we're
7 suggesting --
8 DR. APOSTOLAKIS: It's not your fault, by the way.
9 I'm not blaming you guys. I know your predicament.
10 MR. HOLAHAN: It seems to me that what we're
11 suggesting is that when there are circumstances that make a
12 particular license amendment look like it deserves
13 additional attention, it is, in fact, pulled in and given
14 the same treatment as though it were submitted under a
15 risk-informed application.
16 DR. APOSTOLAKIS: So it's going now down to 1.174.
17 MR. HOLAHAN: Yes, yes, and --
18 DR. APOSTOLAKIS: And I would agree with Dr.
19 Kress, then. Drop the words adequate protection. I mean,
20 that is a very noble thing to do, to apply 1.174.
21 DR. KRESS: I think it's a perfectly reasonable
22 process.
23 MR. HOLAHAN: I find that I can get through the
24 entire day without mentioning adequate protection by just
25 thinking about whether decisions are the right safety

1 decisions or not.

2 DR. APOSTOLAKIS: But would the Office of General

3 Counsel concur? That's really the question.

4 DR. PALLA: Well, I don't think they would,

5 because I think the basis for rejection has to be adequate

6 protection, and I think that --

7 MR. HOLAHAN: And the truth is the basis on which

8 all license amendments are approved, 1,500 every single

9 year, is adequate protection.

10 DR. APOSTOLAKIS: But, then, you don't invoke

11 1.174 in those decisions, Gary.

12 DR. PALLA: Well, you could.

13 MR. HOLAHAN: In fact, we do.

14 DR. PALLA: If you meet it, you do.

15 DR. POWERS: George, how do we get out of your

16 dilemma?

17 DR. PALLA: Go to the next slide.

18 [Laughter.]

19 DR. APOSTOLAKIS: No, there are two ways. One is

20 to drop references to adequate protection, and the other is

21 to drop the opposition to the three-region approach that

22 this committee has recommended.

23 MR. HOLAHAN: Well, okay, I think that's an

24 important point, which is the subject we're talking about

25 today and the relationship between risk-informed insights

1 and adequate protection is no different now, and it's not
2 being changed with respect to what 1.174 established with
3 this committee's enthusiastic endorsement just a few years
4 ago.
5 DR. APOSTOLAKIS: I agree with the latter part.
6 See, my point, Gary, is this: that you have the
7 CSIS; you have this committee coming to the Commission and
8 saying we need some numerical guidance regarding adequate
9 protection. The Commission looks at this and says why on
10 earth are they telling us this? This is philosophy. Why do
11 we need this? We don't need this.
12 Until the Commission sees practical problems that
13 arise because of the lack of that numerical guidance, they
14 will never change their mind. And if you show this to them,
15 they're not going to see it right away, and it seems to me
16 that this is your problem here, that you don't have any
17 numerical guidance regarding what is adequate protection.
18 MR. HOLAHAN: Clearly, what we are doing here is
19 we are defining a process that works in the context of the
20 existing regulations, existing case law, you know, the
21 existing guidance that we're using, okay? So, you know, by
22 definition, it is dealing with difficult cases within the
23 current regulatory context, okay?
24 And we need to do that because it's the only
25 regulatory process we have right now. And I think I'd like

1 to separate these two thoughts. One is I think the
2 committee has expressed a number of times that it would like
3 to see a different regulatory process with a different way
4 of addressing adequate protection and using risk information
5 and, you know, that seems to me that's an ongoing thought;
6 it's very interesting.
7 But in the meantime, we have to make the existing
8 regulatory process work. We need it to be as, you know,
9 clear and efficient for all the stakeholders as possible.
10 And so, you know, we're not trying to avoid those other
11 issues, but we need to deal, you know, with the existing
12 process at that point in time.
13 DR. APOSTOLAKIS: One last point, and then, that's
14 it. I don't see how the existing regulatory process guides
15 you to decide that the risk implications have been
16 sufficiently assessed to determine whether there is
17 reasonable assurance that the public health and safety will
18 be adequately protected. I just don't see the current
19 regulations doing that.
20 MR. HOLAHAN: Okay.
21 DR. APOSTOLAKIS: Okay; let's go on.
22 MR. HOLAHAN: I think I need to say that not only
23 do I see it, but I see it happening 1,500 times a year.
24 DR. APOSTOLAKIS: With numerical risk estimates.
25 MR. HOLAHAN: Well, maybe a few dozen times a year

1 with risk estimates.

2 DR. POWERS: I'm anxious to go through this slide.

3 MR. HOLAHAN: Well this, I think, is basically

4 what we've already talked about. Let me just explain

5 something up front about this, though, because license

6 amendments, when they come in, are processed in division of

7 projects, and the project manager would generally be looking

8 at these submittals and trying to determine what branches

9 need to have a role in this review.

10 We did put out some guidance. It's in office

11 letter 803. It was revised last December to include I'll

12 say the beginnings of some further guidance on how risk, you

13 know, considerations should be brought into that screening

14 process. But in special circumstances is one of the pieces

15 that's flagged in the office letter as being a reason to go

16 and consult with the PRA branch. We need to come back to

17 that office letter once we've fleshed this animal out some

18 more and updated and, you know, fill it out, but at this

19 point, there is a mechanism in place that an incoming

20 amendment would be screened; would be forwarded to the PRA

21 branch at least for consultation.

22 This isn't to say that it's automatically, you

23 know, assumed that it's going to be an in-depth PRA review,

24 but it will be forwarded to the branch to look at these

25 exact kinds of considerations, because this could be a

1 non-risk-informed amendment that comes to us, and we would
2 look at it to say is there something unique about this
3 request that we need to look at it for some reason and
4 possibly go into risk implications.
5 DR. POWERS: It's this unique situation criteria
6 on the very first box that causes me pause, because I can
7 argue that every single one of 1,500 licensing amendments a
8 year is unique. I'd have no trouble in defending that.
9 DR. KRESS: I think you what? Go in and make a
10 qualitative judgment that that change is likely to have some
11 influence on risk.
12 DR. PALLA: Well, it would generally be something
13 that's extreme.
14 DR. KRESS: Yes.
15 DR. PALLA: I mean, if you're looking at, let's
16 say, power up rates, and you come in with a couple percent,
17 5 percent, no big deal. If someone comes in for 20 percent,
18 you'd say hey, that maybe something that, you know, it's
19 unique in the sense that no one else has done anything close
20 to that before so --
21 DR. POWERS: I know that if you were doing it that
22 it would have that reasonable approach, but I also know that
23 as time goes on, different people do it, and they may have a
24 different threshold than you have in mind as you set this
25 chart up. And they will say ah, this one is unique.

1 DR. PALLA: Well, unique should really be thought
2 of as you believe it's potentially special circumstances.
3 That's what really is intended there. There's something
4 about the request that undermines or does not -- it includes
5 considerations that may not have been part of the
6 regulations. There's a hint that perhaps if this came in as
7 a risk-informed request that this would be a problem for
8 some reason or another. So you've got to carry a lot of
9 knowledge into that first box there. You have to have some
10 educated, you know, understanding about what the concern is,
11 why the existing regulations don't seem to cover it
12 adequately. It's not just unique, because there are a lot
13 of things that are unique.
14 DR. POWERS: I mean, everything is going to be
15 unique. I'll find something; this bolt on the lower
16 left-hand corner of this fixture is different than any other
17 bolt I've ever seen.
18 DR. SHACK: Unique is definitely the wrong word.
19 Either everything is unique, or nothing is unique.
20 DR. POWERS: That's right.
21 DR. PALLA: It's got to fit in the box, too.
22 DR. POWERS: What I'm trying to do or what I'm
23 concerned about is it seems to me that going through this
24 process ought to be a very rare circumstance, and it ought
25 not be used as an excuse for demanding that things be

1 risk-informed, all submittals being risk-informed or
2 threaten that all submittals need to be risk-informed.
3 That's where I'm concerned.
4 DR. PALLA: Well that's -- when you're in that
5 first box, you should be looking at what is it about the
6 regulations that -- for whatever reason I meet them, they
7 don't give me the intended level of safety that I would have
8 expected. That all goes on in the first box, you know; it's
9 more than unique; it's unique, plus you look at, you know,
10 you're looking at this situation and determining essentially
11 that you believe it's a special circumstance, that if you
12 approve this, there would be some significant increase in
13 risk and possibly rising to the level that you would say
14 it's inadequate and unacceptable.
15 So that's all that that box is intended to do, and
16 unique is not the best word, obviously.
17 DR. WALLIS: It's a pretty important box, because
18 if the answer is no, then, off it goes to the right and
19 disappears.
20 DR. PALLA: Yes; and this is where the burden
21 falls squarely on the staff's shoulders, because they're
22 making this judgment in the absence of the risk information.
23 They're trying to read into -- I've got a slide a couple
24 slides back here. There's really only a couple sentences in
25 the proposed modification to the guidance that we have that

1 tries to articulate a little bit more about what that is,
2 but it's an important part of the step.
3 And then, you go to the next -- you have to
4 structure all your arguments as to why this thing is a
5 safety concern up here. And then, once you've convinced
6 yourself, you take it, and you get the management buy-in on
7 this.
8 DR. WALLIS: I guess what I'm concerned about is
9 the reluctance to do this, because it's supposed to be a
10 special case. And then, here go these 1,500 applications
11 by. Suddenly, someone discovers at the end of the year,
12 gee, whiz, the net effect of all these things we've approved
13 is that we've violated 1.174. We've compromised the
14 principles without knowing it. We've let everything go to
15 another side, and then, gee, whiz, look.
16 DR. PALLA: Well, it's unclear you'd ever know
17 that, because these would be non-risk-informed. You
18 wouldn't have that risk information. You wouldn't know that
19 you would have exceeded it unless you know to ask. You're
20 kind of -- this is just a screening process. You try to
21 determine -- we're setting a threshold here for when we're
22 going to ask the risk questions.
23 DR. WALLIS: Well, there's no penalty for letting
24 it go to the box.
25 DR. PALLA: To the no, unacceptable box?

1 DR. WALLIS: At the end, the one there --
2 DR. PALLA: Oh.
3 DR. WALLIS: The one there on the right.
4 DR. POWERS: You have a really peculiar -- when
5 the answer is no, the application is yes.
6 [Laughter.]
7 DR. POWERS: It's a peculiar fault tree.
8 DR. PALLA: Well, yes, it is.
9 MR. HOLAHAN: In my mind, what's important to
10 recognize in this -- I really hate coming to the committee
11 and being such a pragmatist; it's much easier when I'm back
12 in my office. But the point is we're not inventing, you
13 know, these circumstances. I mean, license amendments come
14 in. They've been coming in for years. And the question is,
15 you know, as a pragmatic approach, should we try harder to
16 catch these unusual cases? If we don't do this, then they
17 automatically go --
18 DR. WALLIS: That's not the only question. The
19 question is when you've done this for a year, you look back
20 at it, and have you done it right? And you may need to
21 review the whole process of your 1,500 in a year and say
22 when we did all that, did we in some way violate the RG
23 1.174 safety principles and allowed them to be compromised.
24 MR. HOLAHAN: Well, let me say something about
25 that because we had a contract, and the contractor looked

1 through about six months worth of license amendment
2 requests. We had 700. And they looked at, you know, these
3 were risk-savvy people. They screened them carefully and
4 tried to determine, you know, what types of amendments
5 really warranted a quick look, a detailed look and basically
6 found that, you know, something kind of on the order of
7 maybe a tenth of them needed to have some -- a high level
8 look at risk and then a small fraction of -- they really
9 didn't find anything that they would have -- we consulted
10 and asked them about special circumstances; did it look like
11 any of these 700 would have risen to the level that they
12 would have, you know, invoked this special circumstances
13 thinking, and basically, the answer was no.
14 There is a lot of them that you would want to look
15 at the risk implications, but there weren't any in that
16 sample that would rise to the level that you'd reject this
17 thing because of risk considerations, and there were things
18 like that we didn't have any Calloways in this group but --
19 DR. WALLIS: That's reassuring; the whole purpose
20 of this is to make sure that you don't, in processing all of
21 these applications, some way allow you to violate the safety
22 principles.
23 DR. PALLA: But that was a sample. Now, that's
24 not to say we're going to always do that, but based on that
25 sample, we concluded that the instances that you'd have to

1 go drilling deeply for risk information are rare.

2 DR. WALLIS: You'd have to make sure that you're

3 doing whatever process like this you set up to make sure

4 you're doing it right. You have to keep on reviewing over

5 the year or in some way the feedback to see if you're

6 catching things right at box one, because that's the lead

7 box.

8 MR. HOLAHAN: It's a good suggestion. We need to

9 find an effective and efficient way of testing that, kind of

10 a reality check on the whole process, look at it

11 periodically after the fact, see how it's working.

12 DR. PALLA: Well, let me just move through this

13 thing a little bit more. There's a management buy-in step

14 here that's a checks and balances kind of thing to make sure

15 that the decision is not unilateral on the part of the

16 reviewer. Once the decision of a special circumstance, some

17 kind of a consensus is formed, decisions may -- let's try to

18 get the risk information we need to make a determination on

19 what does this amendment mean to us in terms of risk.

20 DR. KRESS: When you say management, is there some

21 sort of a -- going to be some sort of an upper-level review

22 group established that you take these things to or is it --

23 I don't know exactly what you mean by management.

24 DR. PALLA: The truthful answer at this point is

25 that I don't know exactly what that could involve, but I was

1 thinking at a minimum, it would be a branch level
2 involvement, branch chief, but it could possibly be --
3 DR. KRESS: Could possibly be a review from higher
4 management.
5 DR. PALLA: It could be; I don't know if Farouk
6 would be an appropriate thing. If they're rare enough, I
7 don't think it should be an impediment. I mean, it may be
8 high visibility.
9 MR. HOLAHAN: My guess is that there will be no
10 lack of management attention. My recollection, for example,
11 of a case that got enough attention, like the Calloway
12 circumstances; I believe it had every level of management
13 including the Commissioners.
14 DR. PALLA: That was an exceptional exception.
15 If we move forward; we ask for the information --
16 MR. HOLAHAN: And, in fact, if you recall, just --
17 let me interrupt -- remember: the Commission has asked to
18 be informed about these cases, okay, and that pretty much
19 assures that about five levels of management are going to
20 have to understand what it is in order to get it up there.
21 DR. PALLA: That's in the interim, the Commission
22 has asked to be informed. We've removed that step in this.
23 The expectation is we'd have a reasonable level of
24 management, and these things would be pretty rare, and you'd
25 get enough attention on it.

1 If we ask for the risk information, we get the
2 risk information, and it indicates that the reg guide safety
3 principles, numerical criteria, whatever, in whatever
4 combination is not met, it's not an automatic rejection.
5 It's basically a trigger has been met; you go to the next
6 step; look more carefully at exactly what made this thing --
7 why do we think this is special circumstances? How is it
8 that the existing requirements are not providing us what we
9 need? Are there other extenuating circumstances? Are there
10 some compensatory measures? Is it temporary?
11 We've reached the threshold at this point, and
12 then, we basically have to -- I'd say this thing gets
13 elevated up through the organization when it's clear that
14 there's a lot of fuzzy judgments need to be made about
15 whether this thing is adequate or not, and that's basically
16 the last box, to say do we or don't we think that the --
17 when one looks at all these considerations, is it adequate
18 protection or not?
19 DR. WALLIS: These fuzzy judgments is not a
20 reassuring expression.
21 DR. KRESS: I would be perfectly happy with this
22 process if the words adequate protection didn't appear in it
23 anywhere.
24 DR. APOSTOLAKIS: Drop adequate protection and --
25 DR. KRESS: They would be very nice for the

1 process.

2 DR. APOSTOLAKIS: As we said earlier, you've come
3 to this box -- you don't need to put it in this box, but if
4 you come to this box, and you see that 1.174 criteria are
5 violated, you say sorry; you have to go back and redo this.

6 MR. HOLAHAN: You understand whether it says so on
7 the chart or not, the basis for accepting and rejecting
8 license amendments is called adequate protection. That's in
9 the rules.

10 DR. APOSTOLAKIS: Everything is adequate
11 protection? We call everything license protection; you're
12 at the mercy of the reviewer. I thought we were trying to
13 get away from that.

14 DR. PALLA: Well, in this case, it's more than the
15 reviewer. You've ruled this thing all the way up the chain
16 so --

17 DR. APOSTOLAKIS: You don't have to call it
18 adequate protection; go through cost-benefit calculations.

19 MR. HOLAHAN: Not for licensing matters.

20 DR. APOSTOLAKIS: But, I mean, the argument is if
21 I say so, it's adequate protection. I mean, there's
22 something wrong with it.

23 MR. BARRETT: Well, these judgments are made in
24 the context of a lot of regulatory guidance.

25 DR. APOSTOLAKIS: Because you have nothing else to

1 go by, Rich.

2 MR. BARRETT: No, as we said, in 99 percent of the
3 cases, we have regulatory guidance; we have existing design
4 basis; we have, in some cases, prescriptive rules. This is
5 the exception. But the hurdle you have to cross is still
6 the same. It's a finding of reasonable assurance of
7 adequate protection. And that's one of the ground rules
8 that we have to work with in developing this guidance.

9 DR. APOSTOLAKIS: So what you are saying is that
10 in that box, question raised, what you're saying is that if
11 you violate 1.174, you don't approve.

12 DR. PALLA: No, I did not say that. I said that
13 you could potentially disapprove it at that point, but you'd
14 have to go to the next step, to relook at everything that --
15 every extenuating circumstance that applies. But this was a
16 case like in Calloway steam generators. We've deliberated
17 this at the office director level whether this is acceptable
18 or not. So you've got a lot of considerations go into that;
19 the uncertainties in these estimates; it's not just the
20 numerics. It's whether you've got margins, you know, what
21 the levels of risk are.

22 DR. APOSTOLAKIS: My question is this: if a
23 licensee voluntarily has submitted risk information, you
24 would be using 1.174, and granted, there are uncertainties
25 in everything, everything, everything. You would have

1 rejected it on the basis of 1.174, including the
2 uncertainties. Is it possible that the same request would
3 be approved if it goes this way? It should be, because
4 you're talking about the different --
5 DR. PALLA: I think the process is the same. I
6 think if it was risk-informed, I think you would jump into
7 this process without going through the first few steps.
8 MR. HOLAHAN: Right.
9 DR. PALLA: You just jump in there and --
10 DR. BONACA: It seems to me ultimately, if you
11 have an application, you make a judgment. And here, you're
12 trying to break the barriers with risk information as one
13 more thing to make a judgment. And I don't see -- I
14 understand about the issue -- what I don't see is how it's
15 divergent with what the staff is doing on every application.
16 It's simply some additional information. But this itself is
17 not -- it has the ability to render a judgment on an
18 application.
19 MR. BARRETT: You know, a lot of times, when we
20 get a risk-informed licensing action, it's submitted that
21 way because a licensee has made a judgment that it will not
22 be approved any other way. So Reg Guide 1.174 gives you an
23 opportunity, it gives you a mechanism for making a finding
24 of reasonable assurance of adequate protection and therefore
25 approving a license amendment. So we're already in adequate

1 protection space with 1.174. What we're saying here is that
2 this is a double-edged sword.
3 DR. PALLA: Can I proceed?
4 DR. APOSTOLAKIS: If you approve that, you would
5 approve it under this criteria; but you would have rejected
6 it under 1.174.
7 DR. PALLA: It's conceivable, but you should be
8 using the same guidance, though. It's possible if you send
9 it to two different reviewers that you'd come up with
10 different answers.
11 DR. APOSTOLAKIS: But aren't we depending on the
12 intelligence of the licensee to avoid risk information in
13 most cases, in other words, avoid 1.174?
14 MR. HOLAHAN: No, I think not; in fact, what this
15 does is it puts the licensee on notice that if this is an
16 unusual or controversial case, if you don't provide the risk
17 information, we're going to deal with it anyway, and if you
18 want this reviewed in an efficient manner, you ought to do
19 your homework up front to bring it to us with the complete
20 story.
21 DR. APOSTOLAKIS: I have no problem with that.
22 MR. HOLAHAN: I'd like to go back to another
23 point, which this issue of adequate protection and all that;
24 very often, what we find out is the issue is not whether you
25 have adequate protection or not. The issue is what is the

1 role of a regulatory guide? All regulatory guides are
2 definitions of at least one way of meeting the regulations.
3 They tell you what's safe enough. None of them tell you
4 what is unsafe. None of them draw that line to say this
5 would be unacceptable, okay? And we keep coming back to
6 that among all the regulatory guides, this is the only one
7 for which we set that expectation. Not only should it tell
8 you that something is acceptable, but this should have such
9 a clear regulatory role that it can also define what is
10 unacceptable.
11 DR. APOSTOLAKIS: This particular guide.
12 MR. HOLAHAN: This particular guide; we keep
13 coming back to having that expectation on this guide. And I
14 would say this guide is, in a legal sense, no different from
15 the other guides. It simply says if you do things this way,
16 the staff will accept them, okay? When you don't do things
17 this way, they're not automatically unacceptable, but it
18 becomes very difficult and in this sort of undefined
19 territory. Now, on what basis am I going to accept this?
20 And I think that's the nature of the regulatory process we
21 have. We don't have a clear line between acceptable and not
22 acceptable in the guidance documents.
23 DR. PALLA: That's right.
24 MR. HOLAHAN: And that's not a funny
25 characteristic of 1.174. That's a characteristic of all the

1 regulatory guides.

2 DR. APOSTOLAKIS: But there is a unique aspect of
3 1.174 that the defined numbers for core damage frequency
4 have global metrics, and I think we should be very sensitive
5 not to interpret those numbers as representing adequate
6 protection. And because they are the only numbers that are
7 out there, people are stuck in whatever they are doing to
8 recognize this is not adequate protection, but I'll use the
9 numbers anyway.

10 MR. HOLAHAN: And just like all the other guidance
11 documents, if there's one on an engineering matter, and it
12 says we should expect a factor of two in some engineering
13 margin; if the licensee says, well, I don't have a factor of
14 two in this case; I have a factor of 1.8, then, on what
15 basis do you say, well, I can't automatically say it's
16 acceptable; it's not the way we normally do things? Is it
17 automatically unacceptable? Or does it go to a more
18 judgmental situation where there is management attention and
19 other considerations, and we argue about is this a good
20 safety decision?

21 And the name we put on that safety decision after
22 it's done is called adequate protection. But putting the
23 name on it doesn't make the decision any harder or any
24 easier. It's just a tag we put on it after we decide.

25 DR. POWERS: And speaking of tags, I understand

1 from this flow chart special circumstance is a label that
2 you put on things and not a checklist of things; that that
3 checklist really exists on the first box, and it's an
4 amendment checklist; it's not a rule checklist. You come
5 out, and you say there's something special about this that
6 raises risk considerations.
7 DR. PALLA: Right.
8 DR. POWERS: Proceed.
9 DR. PALLA: Actually, all of what we have
10 discussed is essentially what we've embodied in the
11 regulatory guidance, and let me just explain how we decided
12 to structure this guidance. We had deliberated on whether
13 this belonged in the reg guide; whether this belonged in the
14 standard review plan. Initially, we were thinking there
15 should be information, appendices, new appendices to both.
16 We decided, well, let's put this in a self-standing
17 appendix, but it really belongs in the standard review plan.
18 It's not really -- it's really guidance to the staff more
19 than it is guidance to the industry, and so, we've put this
20 as a self-standing appendix to SRP Chapter 19.
21 We've made some minor modifications to the text of
22 the SRP and also to the text of Reg Guide 1.174, and those
23 minor modifications essentially indicate that there's a
24 potential for such special circumstances to exist, and it
25 makes reference to the new appendix in the SRP.

1 I indicated on the office letter 803, it made some
2 revisions in December of last year; that was the first step
3 towards incorporating some risk information in this document
4 to help managers screen amendment requests to determine
5 which ones should be looked at by the PRA branch. We want
6 to come back to that, and after we've gone through these
7 deliberations on special circumstances and this process, and
8 we will be updating that in the same time frame as we'll be
9 finalizing the other guidance documents.
10 Within the new appendix to the SRP, we took the
11 path of least resistance. We basically -- because we laid
12 these principles out in SECY 99-246; we had quite a bit of
13 deliberation; a lot of input from OGC on the process and the
14 league of principles involved. What we've done in the SRP
15 is tried to consolidate the basic process and rationale into
16 a concise summary description of how the staff should use
17 risk; you know, wanting to ask questions about risk; what to
18 do with the responses; what to do if you don't have
19 responses; how do you ultimately make a decision; trying to
20 embody all of that.
21 So we didn't try to get creative and do anything
22 new above and beyond the original SECY, except that we did
23 try to further articulate what are the special
24 circumstances, and we threw some examples in there that we
25 intended to clarify, and I expect to have some comments

1 about those.

2 DR. POWERS: Let me say that the first dash or the
3 second bullet really helps me a lot. These situations not
4 identified or addressed in the development regulations are
5 important enough to warrant a new regulation encountered on
6 a widespread --

7 DR. PALLA: These are -- in the attempt to try to
8 be more clear and objective, really, these are the two key
9 statements that we've added to what was in the SECY, so,
10 yes, if we didn't see it before, and if we saw enough of
11 them, we would think about moving towards a new regulation.
12 So that kind of establishes a threshold, if you will, of how
13 severe does this have to be.

14 DR. POWERS: Yes; that's a very useful thing.

15 DR. PALLA: And in the other one, the reviewer has
16 knowledge that the risk impact is not reflected by the
17 licensing basis accident, but you have reason to believe
18 that risk would be an impact and that you would have an
19 issue if it came in as a risk-informed application; this
20 kind of speaks to the Calloway issue and, you know, an
21 electrosleeving type of thing that if you'll look just
22 simply within design basis accident space, you know,
23 everything looks great. But then, you know, once you've got
24 steam generator tube ruptures or, you know, anything induced
25 by a high pressure core melt, this is a whole different

1 matter.

2 It's outside of the design basis and sends a flag
3 up, and if it, in fact, had come in as a risk-informed
4 request, we would have an issue there. So that's the second
5 piece to try to be more clear and objective.

6 We threw some bullets -- examples of situations in
7 the form of bullets. The bullets are on the middle of page
8 three, not of slide three but on page three of the guidance
9 document that you all have, and I don't know that I need to
10 go through them unless you have particular questions about
11 them.

12 DR. POWERS: I think it would be good if you would
13 spend some time thinking about your flow chart and see if
14 you can't get some of these ideas from this slide showing up
15 in that flow chart as questions that you ask.

16 DR. PALLA: You're saying in the future --

17 DR. POWERS: Yes.

18 DR. PALLA: -- try to embody those concepts within
19 the process chart?

20 DR. POWERS: Right now, you have this unique
21 circumstance or unique situation there which is really just
22 too nebulous --

23 DR. PALLA: Yes.

24 DR. POWERS: -- to really grasp, whereas, you have
25 some very specific criteria.

1 DR. PALLA: But those two concepts really are what
2 can be put in that box space there.
3 DR. POWERS: You need to get that kind of flavor
4 across in your flow chart, because that helped me a
5 tremendous amount.
6 DR. PALLA: Okay.
7 MR. HOLAHAN: Although perhaps references in those
8 boxes to the sections that talk more specifically about the
9 examples and --
10 DR. POWERS: That might be better than using words
11 that are too mushy to grab a hold of in some way because
12 those --
13 MR. HOLAHAN: Okay.
14 DR. POWERS: -- the first one clearly identifies
15 the kind of threshold you're looking for, and the second one
16 gives me something quantitative to grab a hold of, some
17 knowledge that I need to bring to bear on this subject that
18 allows me to say yes, this is something to worry about.
19 MR. HOLAHAN: Okay.
20 DR. APOSTOLAKIS: I notice that we have copies of
21 something from NEI. How much time will you need, Biff? Is
22 Biff here?
23 DR. BRADLEY: Fifteen minutes.
24 DR. APOSTOLAKIS: Fifteen minutes? So you should
25 wrap it up soon.

1 DR. PALLA: I'm almost at the end here.

2 DR. APOSTOLAKIS: Okay.

3 DR. PALLA: So why don't I just kind of throw a

4 couple up here?

5 DR. APOSTOLAKIS: Okay.

6 DR. PALLA: As I mentioned before, the

7 modifications to the case of the SRP and the reg guide are

8 kind of superficial. They just refer back to the appendix.

9 They make reference to the idea that even though amendment

10 requests meet the regulations, there could be a special

11 situation in which risk is increased, and the staff might be

12 requesting information, risk information in making the

13 decision. It makes reference to the appendix, which we

14 decided to place only in the SRP.

15 And finally, on the issue of the office letter, as

16 I mentioned, we've put some additional guidance in December

17 in the update, and it has some screening questions for

18 things other than special circumstances, but it does include

19 special circumstances as one of several. It does not

20 describe it because at the time, we had basically excerpted

21 information from SECY 99-246. It wasn't approved by the

22 Commission yet, and we didn't really have any further

23 guidance. So we do need to come back to that when we're

24 done here and bring the office letter up to snuff.

25 And this, the only other thing I want to say is

1 give a schedule for where we're going from here. We issued
2 the regulatory issue summary; it basically informed the
3 industry that this is the interim guidance that will be
4 used, and it will stay interim until we finalize this
5 process. We forwarded the draft mods to CRGR. We'll be
6 having a public meeting on this next week. We do intend to
7 take the feedback from the committee from the stakeholder
8 meeting; NEI, if they have any constructive criticism, roll
9 that into a revision of this document.
10 We'll be back here to discuss it, unless you don't
11 want us to come back.
12 DR. APOSTOLAKIS: You'll be back here in August?
13 DR. PALLA: Yes; is that too soon?
14 DR. APOSTOLAKIS: Are the members going to be here
15 in August?
16 DR. PALLA: Yes.
17 MR. MARKLEY: We do not have an early August
18 meeting. We have a late August, first of September meeting.
19 DR. PALLA: It's the end of the month, very end.
20 DR. POWERS: I think we need the conclusion of
21 NEI's presentation, and I hope you'll stay here so we can
22 discuss a little bit.
23 DR. PALLA: Okay.
24 DR. POWERS: This quite frankly smacks of a
25 management and a process issue with marginal technical

1 content that I'd like to discuss whether there really is any
2 input you can get from ACRS rather than grammatically and
3 lexicography.
4 DR. PALLA: And the end bullet there, September is
5 our date to try to wrap this thing up and have final
6 guidance to the Commission. That's it.
7 DR. APOSTOLAKIS: Okay.
8 [Pause.]
9 DR. BRADLEY: I'm Biff Bradley of the NEI staff.
10 We have with us today Alan Passwater from Union Electric who
11 is the licensing manager for Calloway. He's also on our
12 risk-informed regulation working group and has probably had
13 more direct involvement and participation in how this issue
14 plays out in application than most of us, if not all, and
15 some of you on the staff were probably involved as well.
16 And Al was going to make a few introductory remarks, and
17 then, I'll briefly go over the industry's positions on the
18 proposal.
19 MR. PASSWATER: Good afternoon. I want to thank
20 you for allowing us some time to talk about this issue. I'm
21 not here to relive the Calloway experience; once was enough,
22 and I think Gary and others would agree with that. But what
23 we did want to comment on today was what's being proposed in
24 the Federal Register notice that was issued recently, and a
25 lot of the things I know that we're going to talk about,

1 you've already hit on, so I don't think we'll dwell on those
2 issues.
3 But -- and I appreciate having the opportunity to
4 give the industry input. I'm on the NEI risk-informed
5 regulation working group, and we've formed a small subgroup
6 of that to address this issue, and since I do represent
7 Amron, UE and Calloway, I won the honor of taking the lead
8 on this issue as far as the non-risk-informed submittals to
9 the staff that the staff feels ought to address risk issues.
10 I think the industry in general, as you know,
11 acknowledges that the progress made by the staff is great in
12 utilizing risk insights where they're necessary and where
13 they provide additional information, and certainly, those
14 things are now available to the NRC, to the staff, to the
15 public, and it's not possible to stand up and say we just
16 need to ignore those where they exist.
17 I think that most of the concerns or the comments
18 that we have are more related to the process, and that's a
19 lot of what you've already discussed today. I think the
20 major one I want to hit on just briefly here is the fact --
21 it was in the first box that's in the flow diagram, and it's
22 a little vague as to exactly who is going to make this
23 judgment about whether or not unique circumstances exist and
24 then, from my viewpoint, just reviewing what was published,
25 it's a little hard to tell exactly what unique circumstances

1 are.

2 It kind of leaves the feeling that -- send it in,
3 and we'll know it when we see it, and from a practical
4 viewpoint, as a licensing manager, that whole thing comes at
5 the end of the process, the licensing process, and so, if I
6 have submitted an amendment that I have no idea needs to be
7 risk-informed --

8 DR. APOSTOLAKIS: Now, you're confusing me even
9 more. I thought I heard Gary Holahan say that 1,500
10 decisions are made that way, and now, you want more specific
11 guidance? I thought you were a veteran of these judgments.

12 MR. PASSWATER: No, I'm saying based on what was
13 published in the Federal Register --

14 DR. APOSTOLAKIS: Yes, but you know we don't
15 always go with the letter on these.

16 MR. PASSWATER: Okay; I recognize it's early in
17 the process.

18 DR. APOSTOLAKIS: Gary invoked the existing
19 process as working very well. We are doing 1,500 of these a
20 year; we know what it is; we recognize it when we see it.
21 And now, you complain that you don't like that.

22 MR. PASSWATER: I don't disagree with the way the
23 process has worked to this point, so what I'm commenting on
24 is what the suggested changes are to the process.

25 DR. APOSTOLAKIS: You're afraid of the

1 extrapolation.

2 MR. PASSWATER: Yes; okay.

3 DR. APOSTOLAKIS: On the one hand, it works; on

4 the other hand, it doesn't work. That's my personal

5 problem, not yours.

6 MR. PASSWATER: Okay.

7 DR. APOSTOLAKIS: I'm sorry.

8 MR. PASSWATER: Well, I think the way it's left

9 right now -- and I certainly agree that these ought to be

10 the unique situation, quote, ought to be a very rare

11 occurrence, and I think that's the intent. I'm not sure

12 that it's captured --

13 DR. POWERS: Well, you saw the second two -- I

14 mean, the two dashed bullets --

15 MR. PASSWATER: Yes.

16 DR. POWERS: -- under Bob's previous graph. Those

17 struck me as clarifying things so that it looked like it

18 would be rare. I mean, it would have to be something big

19 enough that if it were pervasive, it could be a new rule. I

20 mean, that's a nontrivial thing. It's a Brown's Ferry fire

21 or something like that.

22 And the second one is that they had to have

23 something that thought that this really got into a

24 risk-dominant accident sequence like rupture of a steam

25 generator tube, induced rupture of steam generator tubes;

1 you know, you had to have some risk information of some
2 sort, intuition or what not, that made you think that you
3 excited a risk-dominant sequence. That's helped me a lot
4 more than unique, because everything is unique.
5 MR. PASSWATER: Right; that is helpful, to give
6 specifics. And in the notice there were some examples
7 listed, too, which are somewhat helpful, but one of the
8 comments we've had earlier is that maybe they didn't go
9 quite far enough, and I'm kind of getting into what Biff is
10 going to talk about here in a minute, but that really kind
11 of wraps up what I see as, in general, our comments are and
12 the fact that they're more process-related than
13 substance-related as far as what's intended, but again,
14 having lived with, for many years now, how the SRPs are used
15 in evaluating license amendment applications, this one is
16 very unique to what I've seen in SRPs in the past, and it's
17 very broad. There's nothing it doesn't apply to. It
18 applies to any possibility I send in, with this judgment up
19 front that there either is or is not some kind of unique
20 circumstance.
21 So that's the front end of the process that I
22 wanted to comment on, and I will now turn it over to Biff to
23 talk about some of the specific comments.
24 DR. POWERS: I guess the take-home lesson is that
25 this unique situation clause at the first of the box

1 introduces some uncertainty in your mind on whether you've
2 done an adequate job in preparing your submission. That's
3 really the bottom line that you're coming out with.
4 MR. PASSWATER: That's on the front end of the
5 process. It's for something that to me is very clearly --
6 should not have to address risk issues; meets the design
7 basis, and that is adequate. But then, there's another
8 judgment added on to the end of that process at the start of
9 the NRC staff process that may change that.
10 DR. SHACK: But you agree that -- you know, I
11 mean, it's hard to enumerate special circumstances, since
12 they are expected to be unusual. I mean, it would seem to
13 me that the two general criteria that they've outlined that
14 are basically those bullets go a long way towards at least
15 telling you that, you know, I'm not sure I could look for an
16 enumeration of special circumstances. That's unreasonable.
17 MR. PASSWATER: No, and again, I'm stealing Biff's
18 thunder a little bit here, but I think it's more -- it's
19 definitional more than trying to enumerate all of them. I
20 agree; we couldn't. That's impossible to do.
21 DR. SEALE: It does give you room to hunt, though.
22 MR. PASSWATER: Yes.
23 DR. SIEBER: I presume the penalty to a licensee,
24 whether the declaration of a special circumstance is
25 legitimate or not, is additional time to process the license

1 amendment and the cost of it; is that correct?

2 MR. PASSWATER: Yes, and from a practical

3 viewpoint, to address the specific issues, the probabilistic

4 questions and the risk issues for someone which I think is

5 -- and I think this is pretty well representative of the

6 industry, has not had a complete review done of their PRA,

7 you know, basically, would require going back and submitting

8 the PRA, because it's very hard for anyone, including the

9 staff, to isolate on a specific issue requesting the

10 amendment, the risk associated with that without knowing

11 what's the foundation for that in the entire PRA.

12 DR. SIEBER: So that means a lot of --

13 MR. PASSWATER: Additional time.

14 DR. SIEBER: -- transmittals --

15 MR. PASSWATER: Right.

16 DR. SIEBER: -- RAIs --

17 MR. PASSWATER: Time cost and, you know, really

18 may affect the judgment as to whether or not the original

19 license amendment is cost-beneficial.

20 DR. SIEBER: Or the PSA is of good enough quality.

21 MR. PASSWATER: That would come into play, too.

22 DR. SIEBER: Thank you.

23 DR. BRADLEY: Thanks, Al.

24 I will be brief, because practically every point

25 I'm going to make has been brought up by the committee

1 already.

2 DR. POWERS: And I thought our reviews were

3 flawed.

4 DR. BRADLEY: As a matter of fact, you guys are

5 tougher than we are on the staff.

6 DR. APOSTOLAKIS: You are such a nice guy, Biff.

7 [Laughter.]

8 MR. PASSWATER: It's the new haircut he's got, the

9 personality.

10 DR. BRADLEY: As has been stated repeatedly --

11 DR. APOSTOLAKIS: Very diplomatic.

12 [Laughter.]

13 DR. APOSTOLAKIS: Keep going.

14 DR. BRADLEY: We concur; I wanted to start off

15 with a positive word, concur is one of them in my bullet

16 there that in rare instances, as discussed by the staff,

17 there are situations where you are going to need to address

18 risk issues. If we look at the history of this, they've

19 certainly been rare previous to this proposal for this

20 policy, so I think if we can capture what we've been doing

21 informally without the benefit of this and move forward on a

22 consistent basis, then, we will have succeeded in --

23 DR. WALLIS: We've seen this rare several times.

24 It bothers me. It's not a criterion. It's the way it ought

25 to be, and this shouldn't happen very often.

1 DR. BRADLEY: Right.

2 DR. WALLIS: But it's not a criterion that it must
3 not happen very often. If you guys start submitting things
4 which are on the borderline of what's acceptable, it's going
5 to happen more often. It's not something which must always
6 be rare. It ought to be expected.

7 DR. BRADLEY: Well, one assumes that the body of
8 regulations today is close to providing adequate protection.
9 I would presume this would continue to be rare.

10 DR. APOSTOLAKIS: This brings it back to a
11 question I've had for a long time: why is the industry so
12 sensitive to doing risk assessments and using risk guidance?
13 Is because the infrastructure is not there for a lot of the
14 licensees? They don't have the -- I mean, they've done now
15 the IPEs, and you see this sensitivity any time -- there
16 must be a reason why we should submit this. Oh, but then,
17 you're actually picking up the regulations if you ask us to
18 do this. Why? I'm trying to understand that.

19 MR. PASSWATER: I'll give you my opinion. I think
20 it's the unknown quantity. I think it's because it's new
21 and because, you know, I don't know how many times in the
22 last two years I've heard the metaphor about the two-edged
23 sword. And we know what one edge is; we don't know what the
24 other edge is, and I think there is a lot of uncertainty.
25 There have been some very good submittals made to the staff

1 and some very good reviews done by the staff on
2 risk-informed information, and some of those have been very
3 isolated on specific cases, and those are easy to get a
4 grasp on and easy to understand what goes along with what
5 the side effects are of those kind of submittals.
6 On the ones that are fuzzy, vague, as far as what
7 the requirements are, I think it's just the unknown quantity
8 of what's in the next round of questions associated with it,
9 and in some cases, I think it is also what each licensee has
10 done as far as the completeness of the PRA and how that
11 relates to the standards that are being developed as far as
12 PRA quality, et cetera, that go along with this.
13 DR. APOSTOLAKIS: So what you're saying is that
14 the industry is not convinced that its interactions with the
15 staff will be facilitated by the submission of risk
16 information.
17 DR. BRADLEY: I think we're in an evolution.
18 DR. APOSTOLAKIS: Yes, I understand that.
19 DR. BRADLEY: We're evolving, and there's a long
20 history of meeting the deterministic licensing basis and the
21 huge infrastructure, and it goes back into how that's done
22 and down to a very small level of detail, and I think the
23 general concern on the part of the industry is that you end
24 up having to do both, and as we grow more comfortable with
25 the use of risk arguments, and we work both sides of the

1 sword, I think those things will -- those -- that anxiety
2 will diminish. I know you raise that question a lot,
3 George.
4 DR. APOSTOLAKIS: I'm still trying to understand
5 it. I got a reasonable answer, I think.
6 DR. WALLIS: I don't think you should call it a
7 sword. I think you might think of it as a wrench, one end
8 of which is open-ended and one which is a loop, and they
9 both have their function in turning the nut.
10 [Laughter.]
11 DR. BRADLEY: New metaphor.
12 We had some, I think, some practical suggestions.
13 As Alan indicated, we basically view that it is a process
14 issue and making sure that the process that's laid out is
15 very clear; it's scrutable, repeatable, all those verbs we
16 always use and is stable. One of the issues -- and this is
17 another one of these words you guys always ask a lot of
18 questions about, but we want the understanding that evolves
19 here to hold the test of time, and we have had some
20 instances where regulations and policies do evolve
21 interpretations over time, and that's -- we don't want that
22 to happen here.
23 One element we think would be useful would be to
24 continue the interim policy of Commission notification.
25 Given that these are rare instances, given that in my view,

1 the Commission would want to be aware of situations where
2 the existing body of regulations is not providing adequate
3 protection, we don't see that there would be any harm or
4 burden to continue that policy going forward. So that's our
5 first firm recommendation.
6 DR. BONACA: At what stage? I mean, at the moment
7 of requesting information?
8 DR. BRADLEY: No; that's a very good process,
9 where in the process. I think it wouldn't be there, and I
10 don't think it would necessarily be at the absolute tail end
11 either, where you reject the request, but somewhere, you
12 know, at an appropriate stage in the process.
13 I acknowledge the efforts of the staff to try to
14 flesh out the definition and the examples and provide more
15 information on what is a significant and unanticipated risk.
16 However, we believe there is further work to be done to make
17 that definition clear. Some of the examples, I guess,
18 actually in my mind raised new issues to me. I think the
19 harder ones are not the things that are quantifiable. It's
20 the things that aren't quantifiable. I mean, you know, in
21 the extreme, one could suggest that changing your
22 organization chart in the tech specs is doing this, and
23 those are the things that are harder to deal with.
24 DR. POWERS: Yes; I think you raise a good point
25 there. I can look at something; a hypothetical submission

1 in which there is no risk information associated, but I
2 happen to know that at this particular utility, they've
3 changed their management structure and what not, and it
4 interfered with safety culture. And that's something that's
5 not in the PRA, but in most American PRAs, we don't really
6 deal with safety culture. However, I happen to know that in
7 Great Britain, for example, well, they did deal with safety
8 culture on that.
9 And so, I have some knowledge, then, that safety
10 culture might be important for risk. That seems like a
11 really tough issue to deal with, yet it seems like a -- I
12 hadn't triggered the first one, but I had triggered the
13 second one.
14 MR. HOLAHAN: I have to say I think that would be
15 unlikely. However, I can imagine, say, removing 90 percent
16 of the boxes on the chart might get your attention. It
17 would have to be something rather extreme.
18 DR. POWERS: Yes; you know, the organizational
19 structure is on the --
20 MR. HOLAHAN: I don't think that would trigger our
21 attention.
22 DR. BRADLEY: I'm not suggesting that that would
23 normally trigger it. It's just an example that we need for
24 a clearer definition, as clear as we can get.
25 Another point: I know NRC notes that the burden

1 is on them to identify situations. Just -- there is also a
2 burden, though; it's clear that there's a burden involved in
3 responding to these types of issues when they come up and
4 that the only way that burden is clearly going to be on the
5 licensee, particularly if it involves having to expand or
6 modify or enhance their PRA in order to provide enough
7 resolution of the risk impact to counter the arguments the
8 staff may make that may, in fact, be based on, say, a SPAR
9 model or a model of, you know, a similar facility where they
10 are having to infer maybe a similar impact.
11 And there's really no simple answer to this. I
12 recognize that the staff can't be expected to meet some, you
13 know, PRA quality standard or something before they can do
14 this, but there is a practical issue there that there is a
15 potential burden that would go back to the industry as well
16 as -- even though the staff maintains the burden of raising
17 this.
18 Finally, this is something I think -- per your
19 discussion this morning is exactly the same point that in
20 reading 1.174, there is a considerable text in there
21 discussing the fact that it was designed with a margin
22 beyond adequate protection and that the very small, the
23 small change guidelines could have been made more generous
24 and still preserved adequate protection, and I guess -- and
25 I don't know if this is one of the sections of the reg guide

1 that will be modified as a part of this, but I think this
2 received an adequate discussion this morning.
3 One, it's not clear in the SRP whether it's the
4 very small change or the small change guideline that comes
5 into play here, and the way the reg guide works is if you
6 get up between this very small and the small change, then,
7 you're generally requested to demonstrate complete baseline
8 CDF including, you know, shutdown and other things that most
9 plants don't have to quantify. So it's really not clear to
10 me exactly how 1.174 will be invoked here, and even if it
11 were that the guidelines of 1.174 are the right guidelines.
12 They may be the right guidelines for the trigger, and I
13 think the SRP discusses, you know, here's how we're going to
14 do the trigger. There's less definition in the SRP of once
15 we've triggered this, here's how we make the decision on
16 whether you're meeting adequate protection.
17 And I'd be the first to acknowledge that that's
18 not a trivial or simple thing to --
19 DR. APOSTOLAKIS: The staff says that someone will
20 determine that.
21 DR. BRADLEY: Right.
22 DR. APOSTOLAKIS: On page three, they say that
23 somebody will determine that. It seems that I'm the only
24 one puzzled by that.
25 DR. BONACA: We also heard that it's going to be

1 one of the inputs to the decision which is typical of the
2 decisions on amendments.
3 DR. APOSTOLAKIS: With risk information. That's
4 not typical at all.
5 DR. BONACA: No, no. There is information coming;
6 and that will be an issue, and it can be of any type of
7 engineering insight that will lead you to grant or not grant
8 an amendment.
9 Now, here, there is no information. A new type is
10 coming out from an application of risk information. It's
11 available to us as a community. And certainly, we want to
12 have, you know, have it right -- the situation at Calloway,
13 where you -- it's a legitimate question that's being
14 addressed, and risk information is helpful to make a
15 judgment. And I think in the context where you are not
16 using PRA information in and of itself to get the call, I
17 just consider that --
18 DR. APOSTOLAKIS: Either way, the first subbullet
19 there, I mean, where it says small change versus significant
20 risk information; that leads you to a problem. Either you
21 accept changes that violate 1.174, in which case, that's not
22 really desirable, or you are leaving it up to people to
23 decide, you know, what's a significant risk impact. It's a
24 fuzzy notion.
25 MR. MARKLEY: Almost all SERs have concluded that

1 -- almost all SERs that you'll pick up will have a statement
2 at the end and a conclusion that there was no undue risk to
3 public health and safety. That's the bottom line of all of
4 them whether they're deterministic or risk-informed.
5 DR. BONACA: They must do them in the most
6 expedient way to bring about information to bear on the
7 decision process using the guidelines in 1.174. It may not
8 be the most perfect, but I want to say that the fact that
9 you just -- make a good decision on a particular amendment,
10 then --
11 DR. APOSTOLAKIS: If I submitted the request using
12 risk information, would they grant me this in 1.174? Yes;
13 you violate the small change, but what the hell?
14 DR. POWERS: George, that's always been my
15 understanding.
16 DR. APOSTOLAKIS: That they would do that?
17 DR. POWERS: That if I sent in a risk-informed
18 application that had something larger than a small change in
19 CDF or LERF that that didn't automatically get kicked out of
20 the system. It simply elicited what was graciously
21 called increased management attention. But there was
22 nothing in that that said I absolutely could not have any
23 delta-CDF over some --
24 DR. APOSTOLAKIS: The increased management
25 attention is where you have sheds of -- shades of gray --

1 [Laughter.]

2 DR. APOSTOLAKIS: Grades of shave, too.

3 [Laughter.]

4 DR. APOSTOLAKIS: Approaching it really from below
5 and maybe a little bit above, but when I look at the figure,
6 and I see black, don't tell me that is increased management
7 attention. That's a clear message: don't even come. So I
8 think we have a little bit of a conflict here, but at least
9 Biff recommends it.

10 DR. BRADLEY: I think those were the major points
11 we wanted to make. I was interested in seeing the staff's
12 material today, and we were talking about those two
13 supplements and the one that said situations that would
14 warrant a new regulation if encountered on a widespread
15 basis; I thought that was interesting, because that would
16 imply that you would have to meet a backfit test, even
17 though for a CLB change request, you wouldn't. But it seems
18 to me that there's an implicit message in that bullet that
19 there is a backfit type of issue here.

20 DR. POWERS: I don't think so; if it's an adequate
21 protection issue, they don't have to meet a backfit
22 requirement.

23 DR. BRADLEY: Well, if it was going to warrant a
24 new regulation then -- okay, you're saying you would have to
25 exercise that provision of the backfit rule that says you

1 weight it as an adequate protection.

2 DR. POWERS: Weigh it as an adequate protection

3 issue.

4 DR. BRADLEY: Okay.

5 DR. POWERS: But, I mean, your point is still

6 valid. That gives you an idea of the magnitude of the thing

7 that you're talking about.

8 DR. BRADLEY: Yes; and in the second sub-bullet

9 that would warrant denial if it were evaluated as a

10 risk-informed application, I guess I think at the point, we

11 were just talking about where the guidelines of 1.174 don't

12 necessarily tell you what's a denial. They do talk about

13 enhanced management review, but I think that is -- this

14 issue of adequate protection versus 1.174 is basically the

15 heart of what we're having to deal with here.

16 Thank you.

17 DR. APOSTOLAKIS: I must say I'm very happy

18 hearing Biff speak that way, and thank you very much.

19 DR. BRADLEY: Thank you.

20 DR. POWERS: I still have this question: it's a

21 very process or management oriented issue. And I'm

22 struggling to say what is the technical content of that? I

23 think it's very interesting. I'm glad that you brought it

24 to us. It's always nice to see a modification of 1.174, but

25 I'm questioning whether there's anything we can contribute,

1 anything, to this modification.

2 MR. HOLAHAN: I think there is. I think the
3 committee made a valuable contribution to the way 1.174
4 looks, you know, in its original form, and that goes well
5 beyond just the numerical values or the charts on core
6 damage frequency and large early release, and if you think
7 about it, that's only a small part of 1.174. You can call
8 the rest of it all, you know, process if you like, but it
9 seems to me that process is the regulatory decision making
10 process, and I think that is a, you know, valuable and
11 legitimate role that this committee can address.

12 Now, I don't call it a policy matter that in the
13 current regulatory framework, regulatory decisions are made
14 by process. A policy decision is we're going to have
15 risk-informed regulation, and it looks more or less like
16 this. I think the committee views are valuable. I don't
17 agree with everything I hear at these meetings, but the fact
18 that they're argued out, I think, is valuable. You know, I
19 think that we want to follow up with it, and I think that
20 we'll be delighted to come back to the committee and report
21 on what we got in public comment and workshops and that sort
22 of thing.

23 DR. POWERS: Well, I think we would be intrigued
24 to hear it.

25 At that point, I will recess until 20 of the hour.

1 [Recess.]

2 DR. POWERS: Let's go back into session, and we're
3 going to examine a topic that would surprise me if it
4 elicited a strong comment: the proposed regulatory guide
5 and standard review plan section associated with NRC code
6 reviews.

7 Professor Wallis, is this an area that you think
8 you can lead us through with clarity and precision?

9 DR. WALLIS: If you're asking me to do so, I will
10 be pleased to do so. I wouldn't comment on my own.

11 DR. POWERS: All right.

12 DR. WALLIS: The staff has been working on a
13 review of analytical computer codes used in safety analysis,
14 and I don't need to tell this committee, but I'd like to
15 tell the record that this is a very important area; that we
16 don't have full-scale experiments on nuclear reactors, and
17 so, all of the predictions on what happens in accidents that
18 go into making the decisions are really based on computer
19 models, so they are, for obvious reasons, important.

20 To start, the industry and the public have faith
21 in what comes out of these codes. The letter that sent us
22 these documents did not make a distinction between the old
23 codes, those of the appendix K type, which are more
24 conservative than the newer codes, which are best estimate
25 or realistic, and maybe the staff will tell us a bit about

1 that. I think that the new documents are more directed
2 towards assessment activities. And that makes a difference,
3 because how you estimate these depends on what you want to
4 do with it, and as you get closer and closer, you may find
5 -- the staff will find the requirements on these codes make
6 it tougher, and there needs to be less uncertainty involved
7 in the process. This needs to come true somehow.
8 I don't want to make a speech, but I do need to
9 point out that over 10 years ago, the NRC spent 13 man-years
10 on the CSAU, the code-scale applicability and uncertainty
11 applicability and methodology process. This work has been
12 around for some time, but it's very rarely applied in its
13 full detail to codes, so I think we need to hear from the
14 staff about how what they propose is related to that study.
15 We have codes in the process of review, and others
16 are coming, so this is very topical for us, and it seems
17 very appropriate that the staff should be producing a
18 standard review plan which spells out clearly what
19 requirements these codes must meet and also a reg guide
20 which provides guidance about how applicants can go about
21 meeting those requirements. This isn't just the process for
22 -- these documents are well-prepared. The whole process is
23 going far more efficiently with far fewer doubts in the
24 minds of everybody about what's required; we don't need the
25 long process of RAIs and replies and re-replies and

1 requestioning and around and around about what is it you
2 really want, and you didn't say and so on, because this is
3 all going to be clear.
4 The staff has made three presentations to the
5 subcommittee, and even the last time, we still had questions
6 about parts of these documents, so we have suggestions for
7 improvements. And the question was should they -- was it
8 timely for them to come before the full committee; we went
9 around that a few times and eventually decided that it would
10 be worthwhile for the whole committee to be informed about
11 what's going on to decide what to do, and so, the staff are
12 here, and I would ask George Staudenmeier to get us going.
13 DR. POWERS: Just an item of clarification. The
14 titles sometimes have the word thermohydraulics in the code
15 reviews and they sometimes didn't. Is it understood that
16 this is referring to thermohydraulics codes, or is there
17 some generic applicability of this review plan?
18 MR. STAUDENMEIER: I think there is generic
19 applicability, and even within our branch, we deal with fuel
20 modeling codes. I think we obviously think it's applicable
21 to that, meaning the essence it's more and more directed at
22 our branch and most of all, our branch deals with these
23 thermohydraulics codes, so I guess I didn't intentionally
24 mean to limit it to thermohydraulics codes, although that's
25 mostly what we review.

1 DR. POWERS: Okay.

2 DR. WALLIS: It used to be clear, but there's a
3 letter that came from Gary Holahan talking about codes.

4 MR. STAUDENMEIER: We'll have to, I guess,
5 redefine the scope on that.

6 MR. LAUBEN: Excuse me; Norm Lauben. I think in
7 the standard review plan section and in the regulatory
8 guide, we talk about the concept of evaluation models being
9 all the computational engines and things that are required
10 to analyze those transients and accidents required by 50.34
11 and standard review plan chapter 15. So it isn't -- most of
12 the time, it's a thermohydraulic code engine that is the
13 basic part of this, but there are indeed other things that
14 are necessary to do an entire analysis to show compliance
15 with those things.

16 DR. POWERS: I guess my thinking on this is it's
17 going to be sufficiently challenging to come up with a good
18 standard review plan for the thermohydraulics codes, but
19 trying to add a generic character to it might pose even
20 additional challenges.

21 DR. WALLIS: I think, though, Mr. Chairman, if you
22 read the SRP that a great deal of it would apply to almost
23 any kind of code.

24 DR. POWERS: I'm sure some of it will. Maybe we
25 should be clear about what will be applicable.

1 MR. STAUDENMEIER: Okay; this is going to be
2 pretty much an abbreviated version of a presentation I gave
3 to the thermohydraulics subcommittee recently, and I think
4 it must have been well-received by everyone based on all of
5 the I love you email I got afterwards.
6 [Laughter.]
7 DR. SEALE: It's nice to know they're thinking of
8 you.
9 DR. WALLIS: Too bad we didn't get any in return.
10 [Laughter.]
11 MR. STAUDENMEIER: So, this whole effort was
12 started as a result of Maine Yankee ISAT and an NRR review
13 of the Maine Yankee problems and some points that were
14 brought up by the ACRS in other reviews that pointed to
15 generic problems in our code review process and also in the
16 documentation that's submitted by the industry for having
17 codes reviewed, so we are trying to put corrective actions
18 into place to try to correct these perceived generic
19 deficiencies in the process, and we want to deal with
20 adequacy of code documentation; of code assessment and
21 inconsistencies in the staff review process.
22 And the next slide is, I think, what a lot of
23 people perceive the development process to be for a lot of
24 the codes we get in here to review, and I'm sure we could
25 point to examples of many of these in a lot of the things we

1 review.

2 DR. POWERS: I particular appreciate the

3 management direct response.

4 [Laughter.]

5 MR. STAUDENMEIER: I'm sure you can construct a

6 diagram of the staff review process.

7 [Laughter.]

8 DR. APOSTOLAKIS: This can help with the flow

9 chart.

10 [Laughter.]

11 MR. STAUDENMEIER: I said you don't think it's

12 consistent with the findings?

13 [Laughter.]

14 DR. WALLIS: Let's move on, shall we, before

15 George asks a question?

16 [Laughter.]

17 MR. STAUDENMEIER: Okay; to address these

18 perceived problems, we're developing a standard review plan

19 to document the code review process and give guidance to the

20 staff for code reviews and model reviews and develop a reg

21 guide and a standard format and content guide to provide

22 guidance from the industry on what we think they need to

23 submit when they submit an evaluation model.

24 These are the topics we've tried to cover in the

25 standard review plan, leading off with the documentation,

1 which really is a definition and description of the whole
2 evaluation model, and as part of this documentation, we
3 think there needs to be something that defines the accident
4 scenario, defines what physical processes and physical
5 components need to be modeled to evaluate the accident.
6 There needs to be a section on the equations that you're
7 using for your mathematical model in order to evaluate the
8 accident; assessment of your mathematical model to show that
9 it's actually good at making predictions for what you're
10 trying to model.
11 DR. APOSTOLAKIS: Why isn't there a statement here
12 that your primary review is also an assessment of the
13 uncertainties in the predictions? Why should their
14 assessments be good?
15 MR. STAUDENMEIER: I think that's actually
16 discussed in the standard review plan. There is --
17 DR. APOSTOLAKIS: It's not important?
18 MR. STAUDENMEIER: No, I believe it is important
19 in assessment, as part of the assessment process and
20 determining what the uncertainties are and also in
21 quantifying your overall uncertainty of the calculation, and
22 I think that has to be less than what your safety margin is
23 in the calculation.
24 DR. WALLIS: Code uncertainty is one of your
25 headings along with these headings in the SRP, and you have

1 here some headings which are not headings in the SRP, so how
2 do you propose to bring that into line? The code
3 uncertainty isn't just the same as code assessment and code
4 theory in the actual process. But I think some other things
5 like analysis doesn't come out as a heading. So it's there
6 somewhere, but it's not organized the same way. It would
7 help if -- I think you need to be clear on what should be
8 headings, because eventually, they're going to check this.
9 MR. STAUDENMEIER: Okay; quality assurance is just
10 a process that needs to be in place to -- as a check process
11 to confirm that the development of the code and maintaining
12 of the code is done under a process where the quality is
13 actually controlled and that there is review of what is
14 being done in order to ensure a better product. Sometimes,
15 we do confirmatory analysis in order to do an independent
16 check on the code. There's a section covering that, since
17 that's -- it is often part of our review process.
18 We think we need to make some statements about
19 revisions to previously approved models, because a lot of
20 what we get in isn't a fresh code from scratch; it's a base
21 code with maybe some new model added to it, some new
22 modeling capability or some error corrections that have been
23 made in the code, and in the future, we're planning on
24 adding appendices for specific accident classes and types
25 that deal with modeling requirements and specific code

1 assessment for developing a code for certain type 10 and
2 certain classes of accidents.
3 Organization is a standard SRP organization; if
4 you want to look through the SRP, SRP sections generally
5 follow this type of organization. It covers areas of review
6 which describes the scope of review for whatever the section
7 is on. Acceptance criteria for the whatever you're doing;
8 the review procedures; the evaluation findings and
9 references that go along with the chapter.
10 We've gotten some informal comments from the
11 subcommittee that we're going to address before we release
12 it for public comment. We also have to go to the CRGR for
13 review before we put it out for public comment. Then, we
14 plan on putting both the SRP and the reg guide that Norm
15 Lauben is going to talk about that's a companion to this out
16 for public comment. The proposed public comment period is
17 going to be 75 days. It could be made longer. That's the
18 minimum you can have; if there's any desire to have it out
19 for longer than that, that could be changed.
20 And hopefully, our original schedule is to try to
21 release final versions of the standard review plan and reg
22 guide by the end of the calendar year. That will determine
23 how difficult the comments we get are to resolve. And then,
24 in the future, develop these appendices for specific
25 transient or accident classes that would cover specific

1 modeling requirements or assessment requirements for
2 specific accidents.
3 DR. WALLIS: I have to ask a question on the best
4 estimate versus conservative and so on. Are you addressing
5 best estimate codes here or --
6 MR. STAUDENMEIER: I think any code in general,
7 because, see, appendix K even has parts of it that are
8 really best estimate types of models, and if you read the
9 requirements for blowdown and heat transfer, I think it
10 specifically says -- it describes what you would probably
11 consider a best estimate model except for the grandfathered
12 case of allowing a Dougal-Rosenauer correlation, but I think
13 everybody -- I don't think there's a vendor left that has
14 the Dougal-Rosenauer correlation.
15 DR. WALLIS: It seems to me the real message is
16 it's got to be an adequate estimate, and for appendix K,
17 certain types of estimates are adequate, and best is really
18 the wrong thing; adequate for whatever purpose the submittal
19 is made. If it's made for some preparation of something
20 that gets you awfully close to a margin, then you're going
21 to examine it much more carefully. It's got to be a better
22 estimate. I wonder if that comes through or not. It's not
23 -- you're using some requirements for all codes. It depends
24 on the use and how carefully you scrutinize a particular
25 application.

1 MR. STAUDENMEIER: I guess in the case of appendix
2 K, there's no requirement for an uncertainty analysis; it's
3 perceived that some of the prescribed requirements in there
4 are good enough to keep conservatism in the overall model.
5 Many models are best estimate that are in appendix K,
6 though. Blowdown and -- models are pretty close to best
7 estimate.
8 DR. APOSTOLAKIS: The draft regulatory guide says,
9 in section 2.2, that there are three elements to this CSA
10 methodology, the third one being sensitivity and uncertainty
11 analysis that have been recast here that address sensitivity
12 and uncertainty which is under evaluation more than adequacy
13 assessment.
14 But then, when I go there, I try finding what
15 sensitivity and uncertainty analyses are expected.
16 DR. WALLIS: Are you asking a question about the
17 reg guide?
18 DR. APOSTOLAKIS: Yes.
19 DR. WALLIS: We're going to hear about that later.
20 Maybe it's best to raise the question that I think Norm --
21 the SRP is a separate document. I think the view of the
22 subcommittee was that the SRP and I guess our interpretation
23 is -- the purpose is to lay out very clearly what the staff
24 is going to look for in terms of documentation and code and
25 what they're looking for in performance, et cetera. The

1 guide is then going to make it more explicit about how one
2 might go about meeting those criteria. SRPs are quite
3 sparse; it's a high-level document.
4 MR. ELTAWILA: Can I make a -- this is Farouk
5 Eltawila. The SRP is guidance to the staff on the conduct
6 of the review. It does not institute requirements on
7 applicant or licensee performance and thus is a distinction
8 between requirement and guidance.
9 DR. WALLIS: But what are the requirements, then?
10 DR. APOSTOLAKIS: That's the problem.
11 DR. WALLIS: Are the requirements so vague that
12 it's all up to someone's guess or requirement?
13 MR. LAUBEN: Excuse me; Norm Lauben again.
14 Requirements -- are they going to address it?
15 MR. ELTAWILA: Yes.
16 MR. VERMEIL: The requirements, Dr. Wallis, are
17 specifically in 10 CFR 50.46 and appendix K and the
18 associated 50.44 and the associated parts of 10 CFR Part 50.
19 The guidance for how to implement those requirements is what
20 is provided in a regulatory guide such is the one that
21 research is developing and Norm will be talking about.
22 It is just that: it's guidance. It's not "a
23 requirement." The requirement is only in the rule.
24 DR. WALLIS: I understand the guidance part, but
25 the SRP essentially lays out a plan for the staff. The

1 staff is going to look for certain things.

2 MR. VERMEIL: That is correct; you are --

3 DR. WALLIS: So maybe I'm in error not to go back

4 to some earlier source, but I'm assuming that the SRP is

5 taken seriously, and if it says that --

6 MR. VERMEIL: Very.

7 DR. WALLIS: -- for the field equations should be

8 based on the natural laws of physics and not violate some --

9 that's actually a meaningful statement. That's not just

10 something that can be -- but it isn't in 10 CFR.

11 MR. VERMEIL: I'm not trying to say that that's

12 not a meaningful statement. It very much is. What I'm

13 trying to say, though, is there may be other ways than a

14 particular prescriptive manner of satisfying what the SRP

15 says the reviewer ought to be looking for.

16 DR. WALLIS: I understand that, but the fact that

17 the SRP asks for, say, a scaling analysis doesn't mean to

18 say that you can then not do it.

19 MR. VERMEIL: No, no, that's absolutely correct.

20 What it says is if there is to be one, then, that is what

21 the reviewer looks for. That's absolutely correct.

22 DR. APOSTOLAKIS: Actually, the SRP is just -- is

23 more specific regarding acceptance. So the reg is -- by

24 that specific advising.

25 DR. WALLIS: I see the SRP as something that a

1 professor might give to the students and say look, when you
2 submit your thesis, we're going to look for these kinds of
3 things.
4 MR. VERMEIL: That's exactly right.
5 DR. APOSTOLAKIS: I think you should also issue
6 another statement to the students as to what is acceptable.
7 MR. STAUDENMEIER: Okay; if you have any other
8 questions --
9 DR. APOSTOLAKIS: It just occurred to me: I don't
10 recall an instance where there weren't ACRS comments were
11 not used immediately with CRGR review. Are we sister
12 organizations? The staff comes here; immediately, CRGR
13 review follows ACRS comments.
14 MR. STAUDENMEIER: We're required to go through
15 both.
16 MR. VERMEIL: Yes; the process, Dr. Apostolakis,
17 requires -- I'll use that word -- that the staff go through
18 ACRS and CRGR before issuing documents of this kind for
19 public comment.
20 MR. STAUDENMEIER: And they often come with
21 conflicting requirements.
22 MR. VERMEIL: Yes, they do.
23 MR. STAUDENMEIER: Conflicting comments that you
24 can't satisfy both.
25 VOICE: That's to help you.

1 [Laughter.]

2 DR. WALLIS: Let me ask you about the CSAU. CSAU
3 was a major effort, 13 man-years of study, which was then
4 going to sort of answer the question how is the agency going
5 to handle this best estimate code type of thing coming
6 along. I can see how that might not play such a prominent
7 role in your stuff, because you're sort of saying these are
8 the requirements, and CSAU more addresses how to actually
9 satisfy them, but it's a great edifice in the past. There's
10 nothing since then, so you can't ignore it. And it may be
11 well of us to say what is it that you do that incorporates
12 it or replaces it or something, because it was the big
13 effort that even got people like me to sign off on it.

14 So, it's an authoritative document put out at that
15 time; how does it relate to this?

16 MR. LAUBEN: Let me just say that every activity
17 that we engage in usually has a specific purpose for which
18 it was done, and the CSAU was done in order to demonstrate a
19 method of how you evaluate code uncertainties in order to do
20 best estimate calculations. In order to get to that spot,
21 there are certain principles that you had to adhere to. But
22 most of those principles were not necessarily things that --
23 for which a lot of time and effort was spent on in CSAU.

24 However, when it comes to code development and
25 assessment, there are more things up front that you need to

1 spend time on, and we needed to do a little bit more
2 original work such as were reflected in a number of your
3 comments that would allow you to do this. Therefore, even
4 though those things are mentioned in principle, a very small
5 amount of the CSAU effort was spent on a lot of the up front
6 principles. So what we need to do in this document and what
7 we had to do, for instance, in the code development and
8 assessment work that we've done for AP600 was to spend a
9 little bit more time on the process up front.
10 Now, what -- specifically let me say that CSAU
11 assumed certain things to be true before the process was
12 even begun. It assumed that the code was complete, which
13 means that it wasn't necessarily going to be an extensive
14 review of the structure of the code. It assumed that all of
15 the assessment was complete. It assumed that the code was
16 frozen, and it assumed that all of the documentation was
17 complete and correct which -- now, many of these assumptions
18 may not be true; however, CSAU assumed that before they did
19 this, it had to be true.
20 So that's one thing that had to be emphasized a
21 little bit more in this kind of work. When we got to the
22 AP600 assessment, it assumed once again that much of the up
23 front work was done, and nobody was going to question the
24 code particularly, but rather, they were going to now
25 evaluate the code's ability to do AP600 analysis. So once

1 again, there was a lack of being able -- a lack of stating,
2 I think, as clearly as needed to be the principles that were
3 required up front.
4 So I'm just saying every time is a slightly
5 different purpose. SASM is the same way. SASM was trying
6 to look at experimental work. It didn't have much to do
7 with code -- with code development. So even though the
8 structure of these things may look similar in all three
9 instances, in all three instances, they had a slightly
10 different purpose for which they were done, and it's
11 important, I think, that we need to look at this is this is
12 something about a code development and assessment practices
13 that are required for a variety -- a variety of chapter 15
14 events, not just loca, for instance.
15 So, to a large degree, we have to make sure that
16 we get the basic principles, if you will, the high level
17 principles stated correctly and applicably for all of the
18 things we're trying to do.
19 DR. WALLIS: You've helped me a great deal,
20 because I think you have clarified for me one of my problems
21 with your document is that you say that CSAU, a lot comes
22 before CSAU. There's a lot of stuff before CSAU. CSAU
23 addresses how do you do scaling and uncertainty and
24 applicability.
25 MR. LAUBEN: Right.

1 DR. WALLIS: Yet, the reg guide does it the other
2 way around. It brings in CSAU at the beginning. I mean, we
3 should be talking about generalities like getting the
4 equations right and the principles. But later on, it
5 abandons it just when it's talking about uncertainty and
6 scaling.
7 MR. LAUBEN: I think sometimes, when fresh eyes
8 look at something, and you're used to being in the middle of
9 something, it helps to restructure your own thoughts as to
10 how you really want to order these things. I don't think it
11 necessarily means that there's an enormous amount of work
12 that needs to be done, but rather, you need to find all of
13 the principles and structure them in the right way that it's
14 a scrutable way to go about doing it.
15 DR. WALLIS: Are there questions for Joe? He's
16 really on the spot first?
17 [No response.]
18 DR. WALLIS: All right; shall we move on to Ron
19 Lauben, please? We move to the subject of the reg guide
20 that goes with this SRP.
21 MR. LAUBEN: Okay; I guess I won't put the first
22 slide up. It just says who I am and what I'm going to talk
23 about, and the purpose has already been discussed: to
24 present the background and content of draft guide 10-96, a
25 reg guide for transient and accident analysis methods used

1 to analyze events required in 10 CFR 34 and defined in SRP
2 chapter 15. When I talk about SRP chapter 15, I mean those
3 parts of chapter 15 that already exist to discuss about --
4 that describe specific transients in accidents.
5 Joe's subchapter of chapter 15 is going to discuss
6 the code requirements that would go to all those transients
7 and accidents that are specifically spelled out in chapter
8 15, the rest of chapter 15, chapter 15, once again, being
9 subservient to 10 CFR 34, 50.34, which says -- and appendix
10 A, which states that you need to do these transient and
11 accident analyses.
12 DR. WALLIS: Now, one approach here would be to
13 say here's the SRP; here are the listed things that it asks
14 for --
15 MR. LAUBEN: Yes.
16 DR. WALLIS: -- and then, here is some guidance
17 about how you meet them. So your structure would follow his
18 structure.
19 MR. LAUBEN: Well, I think that's a good point. I
20 think that is kind of the way it is usually done, although I
21 must say that in some cases, there may be -- in fact, this
22 has generally been the case over the years -- there are SRP
23 chapters for which there are no reg guides at all, and
24 that's usually the case, but, in fact, loca and rod ejection
25 are the only two exceptions to the 31 events in chapter 15.

1 DR. WALLIS: But the reg guides exist probably
2 because there have been difficulties --
3 MR. LAUBEN: That is correct.
4 DR. WALLIS: -- in interpreting, and therefore,
5 guidance is necessary.
6 MR. LAUBEN: Reg guides in the past, those two
7 events, the rod ejection and the loca, have been two of the
8 more difficult ones, so that it required some more guidance
9 on those two.
10 DR. WALLIS: Then it should be based a bit on
11 history.
12 MR. LAUBEN: Okay.
13 DR. WALLIS: If it turns out that there's a
14 requirement, that, say, the code should have equations based
15 on fundamental principles and approximation should be
16 explained and so on, then, maybe the guide should address --
17 should say something helpful to avoid mistakes being made in
18 the future of the same type.
19 MR. LAUBEN: I think the more I'm listening, the
20 more I realize that this has to be a fairly high level
21 document, and it has to be scrutable, and I think that to
22 worry about a great number of details might make it less
23 understandable to the people that need to understand it.
24 Okay; basically, what I planned to talk about
25 briefly was background and need for the reg guide; why do we

1 need it; the contents of the draft guide; your comments that
2 we got before the last meeting and status and summary. And
3 the thing that really started this was the Maine Yankee
4 independent assessment team that looked at -- actually
5 looked at non-loca transient and accident analysis methods
6 at Maine Yankee. It started with loca, but that was a
7 separate team; I think Joe was on that team that looked at
8 the Maine Yankee loca methods, but our charter with the ISAT
9 was to look at non-loca, and what we found out was hey,
10 there were some things about -- no surprise -- how they were
11 using the RETRAN code that caused us to have certain
12 questions.
13 And we decided then that what was really needed
14 was something to ensure sufficiency and consistency in the
15 level of documentation and validation. Now, this is not a
16 whole process by any means, but it says these were two
17 things that we identified at Maine Yankee; have a documented
18 process in place to identify and rank key phenomena for
19 relevant events, which is then used in code development and
20 assessment process. Once again, this is not necessarily
21 starting at the top, but these are simply the things that
22 were identified there.
23 And then, to implement this, the NRR Maine Yankee
24 task group recommended that a standard review plan section
25 be developed and a regulatory guide. Now, I put this last

1 bullet in because it's just what I said, is that the items
2 identified by ISAT by themselves do not constitute all the
3 parts needed for a description of transient and accident
4 analysis methods. Additional items, such as determination
5 of basic code capabilities, are being added to the draft
6 guide. So the draft guide, once again, wasn't -- excuse me;
7 the lessons learned from Maine Yankee were the lessons
8 learned from Maine Yankee. They weren't necessarily a
9 comprehensive set that would be needed to write a draft
10 guide.
11 DR. WALLIS: When you work on a problem, and
12 you're devising a solution, the reg guide is a solution to a
13 problem here, you need to set up the needs, and I wonder how
14 you determined what kinds of needs the reader of this guide
15 has.
16 MR. LAUBEN: Okay; the -- okay; that's -- I think
17 someone -- I think it was Dana --
18 DR. WALLIS: I can see with the SRP; I read it
19 through, and I can see obviously, the staff is addressing
20 its needs in reviewing.
21 MR. LAUBEN: Yes.
22 DR. WALLIS: But I have more trouble with the reg
23 guide. I mean, I'm trying to think: now, I'm an applicant
24 trying to write some stuff that I'm going to submit to the
25 staff looking for guidance, and I need -- it's not so clear

1 that the way it's structured helps me, so I wondered how you
2 found out what's the need out there that you're meeting.
3 MR. LAUBEN: I suppose the need that -- the one
4 that I identified most closely was the fact that when we
5 went up and looked at their message at Maine Yankee, we said
6 ah, this immediately stands out. You don't have assessment
7 that applies to the cases that you're doing, so you need
8 some guidance on assessment. And like I say, this sort of
9 ends up -- you're injecting yourself into the middle of the
10 process. Nowhere did we say -- well, in fact, I shouldn't
11 say nowhere did we -- we did not say in the report; however,
12 part of the review team did look at some of the fundamental
13 equations and had questions that, in some of the very, you
14 know, very simple codes that they used that their
15 fundamental equations and models probably did not model the
16 things that they needed to model to.
17 We didn't take that away as a serious enough
18 lesson from that review, but I think what I'm saying is the
19 way I came to it was what were the lessons learned from
20 Maine Yankee? And that isn't necessarily comprehensive
21 enough.
22 DR. WALLIS: See, if I can just speak for myself,
23 when I look at these codes, I think the first thing I'm
24 looking for is do the people running this stuff understand
25 what they're doing? Do they have a sort of professional

1 competence which shows that they understand the equations
2 they're using and the problems they're using them for that
3 they're appropriate and so on? That's the first sort of
4 impression I look for, and that message has got to get
5 across to whoever writes the documentation, besides QA and
6 all that, has to establish that you really believe this
7 person is doing a good job. That message has got to get
8 across first.
9 MR. LAUBEN: What I hope is that when I get to my
10 new road map, it will help a little.
11 DR. WALLIS: Okay; thank you.
12 MR. LAUBEN: Okay?
13 I think most of the things on this slide were
14 talked about by Joe a little bit that, you know, in fact,
15 you mentioned them, Dr. Wallis, that we came to the ACRS
16 three times and had three drafts; tried to factor in the
17 committee comments from the 11/17/99 meeting, and we're now
18 going to try to address some of your comments from this last
19 meeting as well.
20 And just so that people have an idea of what the
21 draft guide 10-96 has in it, we proposed, and once again,
22 these are proposals based on the Maine Yankee and I think
23 also the Siemens reviews, that we address analysis methods
24 for all chapter 15 events on a generic basis, stressing
25 verification, validation, documentation and quality

1 assurance; that we describe application of the evaluation
2 model concept, which includes all computer codes and
3 analysis methods and everything else not included in the
4 computer programs to show compliance with the analysis
5 required by 10 CFR 50-34; in other words, it may not just be
6 a single computer code that you need to show compliance with
7 those things. It may be a series of computer codes, other
8 analytical features, a lot of input and so forth.
9 Now, I thought that -- we thought that it would
10 probably be a good idea to stress some of the key principles
11 here of evaluation model development and assessment, and the
12 reason to do this is to show that this -- well, that these
13 are the things that are going to be featured in the guide
14 first of all. And one of the first things is determining
15 requirements of the evaluation model and the importance of
16 the key systems, components, processes and phenomena and to
17 note that a process like the hierarchical system
18 decomposition should be to assure -- should be used to
19 assure that all levels of the evaluation model development,
20 including are the equations the right equations, are
21 properly considered, and I think that's --
22 DR. WALLIS: What do you mean by hierarchical --
23 MR. LAUBEN: Well, this was the thing that if you
24 look in the SASM report decomposes all of the things that
25 are needed in the code including what phases, what, you

1 know, what is it that you really need to do with the code
2 that you're going to use, including appropriate phasing
3 equations and so forth.
4 DR. WALLIS: Does this say something about what
5 comes first? And I, again, in reading your reg guide, I
6 read this whole thing --
7 MR. LAUBEN: Yes.
8 DR. WALLIS: -- and I find that top down is sort
9 of long away, deep down at the end of it.
10 MR. LAUBEN: Right; it is.
11 DR. WALLIS: You don't put it first; if you don't
12 have --
13 MR. LAUBEN: Right.
14 DR. WALLIS: -- good equations; if you don't show
15 that you understand them, then forget the rest of it.
16 MR. LAUBEN: Yes; I think --
17 DR. WALLIS: That's the first thing you do. Then,
18 you go on to something else.
19 MR. LAUBEN: I almost made a copy of what it was.
20 DR. WALLIS: Yes.
21 MR. LAUBEN: But it's in there very early in the
22 SASM document, and it says --
23 DR. WALLIS: See, I didn't get from your reg
24 guide --
25 MR. LAUBEN: No.

1 DR. WALLIS: -- this -- it goes right into other
2 stuff.
3 MR. LAUBEN: Right.
4 DR. WALLIS: Before saying --
5 MR. LAUBEN: It does.
6 DR. WALLIS: -- you've got to establish --
7 MR. LAUBEN: It does.
8 DR. WALLIS: -- a base for this thing first.
9 MR. LAUBEN: Exactly; I hope when I get to the
10 road map, we'll say a little bit more about that.
11 DR. WALLIS: Hierarchical implies that there's
12 some sort of priority about --
13 MR. LAUBEN: Yes.
14 DR. WALLIS: -- going about this.
15 MR. LAUBEN: And when you decompose things
16 hierarchically, you have to make sure you've got the right
17 equations and the right way to do them and the right
18 numerics and so forth at first. So that's in there.
19 Second is once you know what you need, then, you
20 develop an evaluation model that meets those requirements.
21 Secondly, you develop an assessment base appropriate to the
22 requirements; and now, you're down to part of the CSAU part,
23 but you need to do those first things first and then assess
24 the adequacy once you've done your experiments and your
25 assessment base, and that's the new part. So here, we're

1 introducing the concept of uncertainties here.

2 DR. APOSTOLAKIS: So this is not in the draft

3 guide? I'm having difficulty finding it.

4 MR. LAUBEN: Not very clearly, and we are --

5 DR. APOSTOLAKIS: It's not at all.

6 MR. LAUBEN: Excuse me?

7 DR. APOSTOLAKIS: I can't find it at all.

8 MR. LAUBEN: Okay; I think that if you -- here's

9 the part that bothered me about uncertainties when I was

10 writing the draft guide, and that is how you consider them

11 for each transient or accident may be a little bit

12 different, and that is one of the main reasons why we were

13 going to write appendices, and I think we address

14 uncertainties in that appendix on loca, but what -- I think

15 there may be some more general ways that uncertainties

16 should be addressed, and I hope -- I'll show those to you in

17 the next slide, but I agree with you: until you read the

18 appendix, you probably don't see very much if anything about

19 uncertainties in the draft guide.

20 DR. APOSTOLAKIS: Now, what's the distinction

21 between -- SA stands for sensitivity analysis?

22 MR. LAUBEN: No, no, SA is scaling and

23 applicability, scaling and applicability. In other words,

24 when you're developing the experiments that you need to use,

25 you need to consider scaling, and you need to consider the

1 applicability of those experiments. So that's the SA part.
2 DR. WALLIS: This is in answer to the question
3 that I had, that you said at the beginning of your document
4 there are some principles, but I couldn't find the
5 principles.
6 MR. LAUBEN: Right.
7 DR. WALLIS: You're saying you're now going to say
8 what they are.
9 MR. LAUBEN: Here they are, right.
10 DR. WALLIS: And the rest of the document is going
11 to reflect those principles.
12 MR. LAUBEN: Well, in fact, I hope that the stress
13 and the revised document is going to be on the principles
14 and, you know, structurally how you --
15 DR. WALLIS: Well, it's a teaching tool, isn't it?
16 MR. LAUBEN: Well, yes, in a way.
17 DR. APOSTOLAKIS: But let me come back to this
18 uncertainty issue. On section 2.2 to 2.3.4, adequacy
19 decision, there is a statement that the process continues
20 until the assessments indicate that all important phenomena
21 are acceptably predicted. I don't know what that means when
22 you do an uncertainty analysis.
23 MR. LAUBEN: Okay.
24 DR. APOSTOLAKIS: The uncertainties are small
25 enough, you mean?

1 MR. LAUBEN: I'll tell you what: I think the
2 trouble with this is that people a lot wiser than me have
3 been struggling with this for years, and I don't -- other
4 than the discussion that we have in here on words like
5 excellent, adequate and so forth, which were indeed in
6 themselves a struggle for people to come up with, I don't
7 know -- and if somebody else wants to raise their hand and
8 talk about this difficult subject, I'll let them do it.
9 DR. APOSTOLAKIS: To make my point clear --
10 MR. LAUBEN: Yes, okay.
11 DR. APOSTOLAKIS: -- I don't think that this
12 statement makes sense if you have already asked them to
13 quantify the uncertainty. You have to be a little bit more
14 specific.
15 MR. DEMARTS: Can I interject?
16 DR. APOSTOLAKIS: Yes, go ahead.
17 MR. DEMARTS: This is Mario Demarts of research.
18 Basically, you have a set of tests, experimental tests,
19 which have some uncertainty. You can't repeat the test
20 twice and see if you get the same thing. So you have an
21 uncertainty on the database that you're going to use to
22 check your code against. On the other hand, you have your
23 code, and the code is essentially a mandatory condition
24 which can be ranged a little bit.
25 And so, at the end of that, depending on what

1 you're doing there, in the code, you have a certain range of
2 answers. In other words, in the CSAU methodology,
3 basically, you are looking at the key parameters that
4 controls your answer. You range them over the range that
5 you think this parameter has, and you see how they influence
6 the surface of responses. Therefore, you get an error back,
7 if you wish, on the answer of the code. You have also an
8 error back of the experiments.
9 Now, within that set, if you can say that you are
10 consistent, then, you say this is okay.
11 DR. APOSTOLAKIS: Yes; and my comment to that is
12 that this is the view of uncertainty that a deterministic
13 guide would have. If I were to quantify the uncertainty in
14 a particular code, I would develop a distribution using the
15 results of experiments, and the key element there, because
16 I've tried to do it, and you will have a hell of a problem
17 deciding or distinguishing between the sources of
18 uncertainty; in other words, is this deviating from a code
19 prediction because of some systematic issue? I have not
20 modeled it very well? Or they used another boundary
21 condition of which I'm not aware? Or is it just the
22 standard, you know, random variability that you expect when
23 you do measurements like that?
24 But in any case, I would develop a distribution,
25 and then, I would make a judgment as to the adequacy of the

1 prediction based on the distribution, because it may be very
2 broad but still acceptable depending on what I'm trying to
3 do. So I would not try to do sensitivity studies and change
4 key parameters and look at the range of answers from the
5 code and say, well, gee, if this is what I get here, and
6 this is what I have from the results, they look reasonably
7 similar. That's my view.
8 MR. DEMARTS: I can address that; in transients,
9 there are basically -- you have to look at transients in
10 that basis. In other words, a transient is very
11 deterministic in one phase, when it reaches a situation
12 where there is a bifurcation possibility. At that point, it
13 bifurcates one way or another, so if you wish to consider
14 that as a standard of uncertainty, basically, it will be all
15 over the place, okay?
16 So, in a portion of the transient, where, say,
17 nothing really extraordinary happens, what I just talked
18 about is suitable. In a portion of the transient where,
19 say, something happens if you reach that level; let's say a
20 level drop to a certain level of activation in an ADS system
21 stats, something of that kind, you've got to be very careful
22 in the definition that I just provided if you trigger that
23 or not. That is the kind of things that you have to look at
24 very, very carefully on this.
25 DR. APOSTOLAKIS: I suspect that I will have to

1 understand the issue much better. I can express a view
2 anyway. It seems to me that this is clearly an uncertainty,
3 but Dr. Wallis talked to us some time ago about various
4 assumptions, some of which are completely wrong in some of
5 the codes, but it seems to me that you have to do some
6 assumptions in approximate models, and these introduce
7 systematic deviations. And I'm talking about the modeling
8 uncertainty, in other words, not the physical thing when is
9 ATWS -- I mean, ATWS, auxiliary feeding water system is
10 going to come in and all that.
11 This is of a different kind, and in fact, this
12 raises a question: why isn't there a clear discussion of
13 these various kinds of uncertainties in this?
14 DR. WALLIS: I think the point that needs to be
15 raised here is the difference between the words acceptable
16 and adequate. An acceptable code, I think you have to spell
17 out, has to do enough so that the uncertainties can in some
18 way be estimated, in both modeling and other kinds of
19 uncertainties. A requirement in the code is that the
20 uncertainties should be assessable, measurable and expressed
21 in some form.
22 Whether this is adequate or not for some transient
23 is a different decision altogether.
24 DR. APOSTOLAKIS: Yes, yes.
25 DR. WALLIS: You cannot say, as you seem to say in

1 the reg guide, that it's adequate if it's acceptable.
2 They're different ideas altogether. It's -- a code is not
3 acceptable unless it can assess and tell you how uncertain
4 the predictions are.
5 Now, given that it makes predictions with a
6 certain uncertainty, it still may not be adequate, or it may
7 be adequate depending on what you want to do with this.
8 You've got to make that distinction.
9 DR. APOSTOLAKIS: But I also think, coming back to
10 my earlier comment, that a good discussion of the various
11 kinds of uncertainties that you are encountering with this
12 would be very helpful, and it shouldn't be hard to do. I
13 mean, there is a group working on pressurized thermal shock
14 that did that in their context, and they did a very good
15 job. Maybe you can talk to those guys.
16 MR. ELTAWILA: That's the same group that's
17 working on the thermohydraulic uncertainty. That's
18 Professor Magares.
19 DR. WALLIS: George, if you look at CSAU, there's
20 a whole box in the CSAU diagram that tells the different
21 kinds of uncertainties, right up front. The U in CSAU is
22 uncertainty. There's a lot in there already about
23 uncertainty.
24 DR. APOSTOLAKIS: I don't see it here.
25 DR. WALLIS: No, okay.

1 DR. APOSTOLAKIS: I'm sure there are documents
2 somewhere there.
3 DR. WALLIS: Ten years ago, but here, investigated
4 very thoroughly, and then, in light of great developments
5 and understanding of uncertainty since then, I'm sure it can
6 be improved.
7 DR. APOSTOLAKIS: And I would like to see a better
8 blend of the CSAU which really comes from the
9 thermohydraulics community and what the PRA types have done
10 in that form, and I think the PTS is a good example of that
11 blending, identifying the parameters; which ones are
12 epistemic, blah, blah, blah, that will help a lot. But
13 right now, I just don't see anything.
14 Anyway.
15 MR. LAUBEN: Like I said; to the degree that
16 differences in how it's going to be handled in different
17 accidents, we thought that this might be transient-specific.
18 DR. APOSTOLAKIS: Yes, it is.
19 MR. LAUBEN: Okay; and let me just continue on.
20 These first four principles that we've discussed have to do
21 with the process. The last two have to do with just good
22 engineering practices; in other words, when you do this,
23 establish an appropriate quality assurance protocol during
24 evaluation of the development and assessment process and
25 secondly provide comprehensive, accurate, up-to-date

1 documentation. And I don't -- I hesitated to say much more
2 than that, because every step of the process has to be
3 informed by these two principles.
4 DR. WALLIS: You talked about peer review in the
5 beginning of your document.
6 MR. LAUBEN: Yes.
7 DR. WALLIS: And then, you don't sort of reinforce
8 it later on about when it should be used. And by quality
9 assurance, you mean using peer review?
10 MR. LAUBEN: Yes; I do mean, and I think I said it
11 in here --
12 DR. WALLIS: It is included.
13 MR. LAUBEN: But it's going to be put in a
14 separate section; the quality assurance thing is going to be
15 a separate section by itself, and it's not going to be
16 looked upon like an appendix to this.
17 DR. WALLIS: The last thing you guys need is to go
18 through all this stuff and come to the ACRS, and the ACRS is
19 your first peer review.
20 MR. LAUBEN: Yes, okay.
21 DR. POWERS: Let me ask some questions about the
22 quality assurance here.
23 MR. LAUBEN: Yes.
24 DR. POWERS: I would assume that you meant NQA II.
25 MR. LAUBEN: Well, I mean, by it abiding by the

1 applicable parts of appendix A, and when it comes to code
2 development and design --
3 DR. POWERS: Are there certain code design
4 criteria?
5 MR. LAUBEN: Appendix B; I'm sorry, appendix B.
6 There are certain things that are talked about in there that
7 have to do with design reviews, and I discuss them in a
8 paragraph or two in the reg guide, and if there is something
9 additionally that should be emphasized, that would be --
10 DR. POWERS: I think I'd -- in NQA II, that people
11 repeatedly try to look at -- which is essentially appendix
12 B, the code quality assurance, and it's just never -- it
13 just really wasn't --
14 MR. LAUBEN: That's right; I think that's probably
15 true, and that's why we had to add the words about peer
16 review. Because I think that's -- it's more than just a
17 management check; it's a peer review.
18 DR. POWERS: I think the problem should be
19 configuration control and things like that.
20 MR. LAUBEN: Yes.
21 DR. POWERS: There are other standards to appeal
22 to.
23 MR. LAUBEN: Yes.
24 DR. POWERS: And I think they work better. I
25 mean, I almost hesitate to bring it up. There are certain

1 fairly onerous undertakings, but quite frankly, the quality
2 assurance on these codes is a very onerous undertaking. I
3 think I would appeal to something besides appendix B as
4 guidance on this.
5 MR. LAUBEN: Well, I do have to -- okay, that's
6 fine, except I just want to say I do have to tie most of
7 these things to the regulations.
8 DR. POWERS: I understand why; I understand.
9 MR. LAUBEN: All right.
10 DR. POWERS: I mean, what they tried to do in NQA
11 II was to take what's in NQA I, which is essentially
12 appendix B, and say okay, here's how you apply these things
13 to codes, because people were having so much difficulty
14 taking the words out of what was basically a hardware
15 quality assurance document and applying it to codes.
16 DR. SEALE: That's always a problem.
17 DR. POWERS: And let me ask you about the last
18 one: provide comprehensive --
19 MR. LAUBEN: Yes.
20 DR. POWERS: -- and accurate up-to-date
21 documentation. It's the comprehensive.
22 MR. LAUBEN: Well, I think that if you don't have
23 comprehensive documentation, there's no hope for any peer
24 review group to know what the heck is going on. So I think
25 that's what -- also, up-to-date. If it's -- accurate is

1 obvious. Up-to-date means -- and we could see that when the
2 original CSAU was done, the people complained that the
3 documentation for the code was not up-to-date, and
4 therefore, how can the peer reviewers, the CSAU people, do
5 this if they do not have comprehensive or up-to-date
6 documentation?
7 DR. POWERS: Yes, if it's not up-to-date; the only
8 reason you're worried about it not being up-to-date is it's
9 not accurate.
10 MR. LAUBEN: Okay; the next slide is to show what
11 we consider to be a reasonable perception of a road map. It
12 identifies four overall parts, and these sections are not
13 too unfamiliar.
14 DR. WALLIS: This is new, now, isn't it?
15 MR. LAUBEN: This is new.
16 DR. WALLIS: This is also new.
17 MR. LAUBEN: This is a new road map, and it's
18 meant to be higher level. If you will, the diagram that you
19 saw in the previous reg guide spends most of its time here
20 and a little bit of its time in one and not much of its time
21 in --
22 DR. WALLIS: So the purpose of this is to guide
23 the person who's sitting down --
24 MR. LAUBEN: Yes.
25 DR. WALLIS: -- to write documentation to submit

1 to the NRC.

2 MR. LAUBEN: Yes.

3 DR. WALLIS: To think about it first of all.

4 MR. LAUBEN: And to think about it in this way as
5 he's thinking about how he's going to do his development
6 work. That's correct; not just how he's going to document
7 it but how he's going to go through it to do the work that
8 he has to do to produce the product at the end. And a lot
9 of this was obviously informed by CSAU, and it was obviously
10 also informed by some of the process that we went through in
11 AP600 as well.

12 DR. WALLIS: This is helpful, because it gives a
13 structure to thinking; it also gives us a check list in a
14 way.

15 MR. LAUBEN: Yes; now, let me say what is -- you
16 can see some of the -- well, let me just go through, and let
17 me start by Roman numeral I, item one: identifies transient
18 power plant and figures of merit. I added figures of merit
19 because I think just because you know what plant you're
20 going to analyze and just because you know what transients
21 you're going to analyze, if you're going to do it for
22 different purposes or different -- you had a different
23 figure of merit --

24 DR. WALLIS: It might be uncertainty, for
25 instance.

1 MR. LAUBEN: It might be uncertainty; it might be,
2 if you're doing this for the PRA purpose of knowing success
3 criteria rather than a peak cladding temperature. So you
4 need to get your fingers of merit clear in the first place.
5 Secondly, I think number two: identify systems
6 component processes -- phases and fields that must be
7 modeled; in other words, let's not -- you know, everything
8 is not a correlation. You need to know -- you need to get
9 the basic engine right to begin with. So you need to know
10 what things you need to model here in your evaluation model.
11 And then, as a third thing, you can identify and rank
12 phenomena and processes.
13 DR. WALLIS: So, for example, two might say for
14 components, we're not going to model just straight pipes;
15 we're going to model all this and --
16 MR. LAUBEN: Oh, yes.
17 DR. WALLIS: And that will teach us -- and
18 therefore --
19 MR. LAUBEN: Pressurizers.
20 DR. WALLIS: And it doesn't make any sense for our
21 model in two to only have a straight pipe in it.
22 MR. LAUBEN: That's exactly right, right.
23 And number two is, then, knowing what your
24 requirements need to be, Roman numeral two. Then, you
25 select and or modify the system codes and other

1 calculational instruments and procedures that go to make up
2 this whole process. And the conditions that are required
3 for these things and their relationships; so if you need to
4 know how the whole thing gets put together, and that has to
5 be done.
6 And then, number two is determine the pedigree
7 applicability of the numerics governing equations for the
8 codes and calculational instruments. Then, while you're
9 doing this or after you start, perhaps, you go over to Roman
10 numeral III and ask yourself do I have an adequate
11 assessment base? And if -- from the assessment base that
12 you had, you may select certain experiments. If you don't,
13 then, you may need to perform experiments, and they may
14 indeed be, depending on the transient and these things that
15 you've established in number one, they may be separate
16 effects or integral effects tests, and then, you need to
17 make sure that between the database that you have to perform
18 standard analysis of the entire experimental database to see
19 how this applies.
20 And then, number III is, okay, appropriate
21 available plant transient data. This is especially true of
22 non-loca transients, where you may actually have some plant
23 transient data that you can use to assess the probit. Now,
24 you've got your base; you've got the evaluation model.
25 Then, you can go through the assessment part that we -- that

1 was the subject of most of the chart in the previous reg
2 guide.
3 DR. KRESS: Where in those boxes will I find the
4 uncertainty calculation?
5 MR. LAUBEN: Okay; I think what I said is right
6 here. Let me see; let's see. No, no, I had -- I did have
7 it there. Now, where is it? It says -- no, I had
8 uncertainty.
9 MR. ELTAWILA: It jumps out from your view graphs.
10 MR. LAUBEN: No, I had it in there. I don't see
11 where I use the --
12 DR. WALLIS: Well, you can do that when it comes
13 up. In several places --
14 MR. LAUBEN: Yes, but mostly --
15 DR. WALLIS: In the assessment phase as well as in
16 the model.
17 If you were to take CSAU figure one --
18 MR. LAUBEN: Oh, I know. I have it on this
19 previous paragraph, but I don't have it here, and it should
20 indeed be in this box here, right.
21 DR. WALLIS: It may be elsewhere as well.
22 MR. LAUBEN: Yes.
23 DR. WALLIS: If you took the CSAU figure one,
24 their road map.
25 MR. LAUBEN: Yes.

1 DR. WALLIS: And then sort of said where would it
2 map on here? Is it only in box four or --
3 MR. LAUBEN: Well, I'll tell you what: if you
4 look at CSAU, most of what's -- CSAU did not -- CSAU had a
5 Roman numeral I, II and III, and Roman numeral I, II and III
6 here, most of those things, would fit in Roman numeral I of
7 the original CSAU.
8 DR. WALLIS: This is in the CSAU.
9 MR. LAUBEN: Yes; but I mean also is developing --
10 documenting the code, which, you see there, was already
11 done. So that's --
12 DR. WALLIS: There are maps all over this thing.
13 MR. LAUBEN: What I'm saying is CSAU Roman numeral
14 I encompasses I, II and III here. And then, if you will,
15 and I've forgotten uncertainty, II and III of CSAU would be
16 in box four.
17 DR. WALLIS: I think my suggestion would be since
18 CSAU is such a monument, 13 man-years of work; they really
19 put a lot of thought into this; you ought to then tell the
20 reader how this relates to that.
21 MR. LAUBEN: Okay.
22 DR. WALLIS: You know, and the reader should be
23 able to start with this and then refer to CSAU for pieces of
24 it or what?
25 MR. LAUBEN: As a matter of fact, my druthers is

1 going to be that when I write this, I am going to
2 specifically reference specific parts of CSAU rather than
3 include them in the reg guide, in fact, and say this -- to
4 learn more about this, go see CSAU section da da da da da
5 da, and that would be the preferable way to do it. That
6 doesn't clutter up the high level structure that we want to
7 maintain in this document.
8 DR. WALLIS: I think that's great.
9 MR. LAUBEN: Okay.
10 DR. WALLIS: You've got to make the linkage.
11 You've got to put one in the perspective of the other.
12 MR. LAUBEN: Yes, yes, okay.
13 DR. WALLIS: I'm going through a redesign process
14 now.
15 MR. LAUBEN: Well, I'm hoping it's not too
16 significant.
17 DR. WALLIS: Well, I think it's a very
18 significant --
19 MR. LAUBEN: Very extensive is what I mean. I'm
20 saying I hope it's not going to be real --
21 MR. ELTAWILA: This is Farouk Eltawila again.
22 Really, I know that your enthusiasm about CSAU and things
23 like that, but I really think it could inhibit creative
24 ideas from coming in if we try to be so specific to mandate
25 CSAU, and that's not the intent of the reg guide. It's to

1 provide high level guidance about what does the staff
2 expect; that's all what's important. If we force CSAU on
3 them, I think it will be counterproductive for what the
4 staff is trying to accomplish.
5 DR. POWERS: We've encountered enough examples
6 where CSAU has proved difficult to understand to have it
7 apply that -- that's what the group says there that I think
8 many of the concepts behind CSAU are very valuable; some of
9 the purpose may have been peculiar to the issue they were
10 addressing at the time.
11 DR. WALLIS: I agree with everything that's been
12 said. This was the monumental study, so all of the
13 technical community bought into it. This was going to
14 change the way the codes were done in the future. I
15 remember all this from the time.
16 MR. ELTAWILA: Since then, there have been a lot
17 of developments all over the world.
18 DR. WALLIS: I respect that. I'm not saying it's
19 the way to do it, but you cannot -- you've got to reference
20 it in some way.
21 MR. LAUBEN: I will reference it more
22 specifically, and that will be fairly easy to do, I think.
23 DR. WALLIS: If you think some parts of it have a
24 really good message, say so.
25 MR. LAUBEN: Because I think in some places, I

1 literally plagiarized CSAU, so that's going to be easy to do
2 that.
3 DR. WALLIS: I'm amazed that you're doing this reg
4 guide presumably virtually yourself, and yet, this other one
5 took 13 man-years, so you have --
6 MR. LAUBEN: Well, of course, I didn't do -- well,
7 then, you're exactly right. I really didn't do it by
8 myself, did I?
9 Okay; I just wanted to say that once you get
10 through the assessment process in the existing reg guide,
11 there is an adequacy question, and in truth, the adequacy
12 questions need to be asked all the time. They aren't really
13 asked just here, but you have to ask it here in the end.
14 Once you've gone through this, are there any significant
15 inadequacies?
16 DR. WALLIS: It's like at the beginning: is it
17 adequate for the particular --
18 MR. LAUBEN: You're really asking where we stuck;
19 is it adequate? And then, if it's not, then, you go back
20 and you fix what's not adequate. But and, in fact, you may
21 find out that the plant isn't adequate, and you may even
22 have to go back and redo the plant. We found that out, for
23 instance, in AP600C. You know, you didn't have enough
24 capacity in your ADS4, so you had to actually go back and
25 change the plant.

1 DR. WALLIS: Adequate is the key question. You've
2 helped me a great deal again here. Through all of this, you
3 ask it; is each one of these adequate?
4 MR. LAUBEN: Exactly.
5 DR. WALLIS: You should help the reader with
6 what's the measure of adequacy going to be.
7 MR. LAUBEN: And I'm just saying I couldn't put
8 this question everywhere.
9 DR. WALLIS: See, that's the thing.
10 MR. LAUBEN: Okay.
11 DR. WALLIS: It could probably be about the
12 original reg guide draft; it's adequate versus acceptable.
13 MR. LAUBEN: I can always use help on that,
14 because I think that's one of the hardest things, in my
15 mind, at least, to define is adequacy and sufficiency and so
16 forth.
17 DR. WALLIS: The writer is going to be asking him
18 or herself all the time; is what I'm doing here adequate?
19 And you've got to have some way of measuring that or
20 estimating it.
21 MR. ELTAWILA: Norm, I think you're understating
22 the work that we have done for AP600. We defined what the
23 measure of adequacy, and we are going to use the same
24 standard that we --
25 DR. WALLIS: You're going to use AP600?

1 MR. LAUBEN: No, no, no, no, no.

2 MR. ELTAWILA: The principle; we're talking about
3 the principle.

4 MR. LAUBEN: There are some documents we're going
5 to try to make nonproprietary that we did, and I think we --
6 there was a lot of effort, as Farouk says, that was spent on
7 trying to find these things, and I understand some would say
8 that -- you and Dr. Apostolakis said --

9 DR. WALLIS: I think that I'd like to go back to
10 the purpose of all this. The purpose of all this is to come
11 up with a reg guide which really helps the future, so that
12 it's less work and better work and everything in the future.
13 And we're all working towards that end.

14 DR. KRESS: The adequacy determination in AP600
15 had almost -- wholly related to the predictions versus the
16 data.

17 MR. LAUBEN: Yes.

18 DR. KRESS: I think that's a risky way to go.

19 MR. LAUBEN: It is, and that's why we've included
20 these first few steps; I agree.

21 DR. KRESS: I think your adequacy cannot be that
22 completely. I think you've got to think of some other --

23 MR. LAUBEN: You've got to do steps one, two and
24 three, and you count there adequacy as well; that is
25 correct. I think we're acknowledging that.

1 DR. WALLIS: We all know the there are adequate
2 ways to fit data which have nothing to do with adequacy of
3 the --
4 MR. LAUBEN: But a lot of times, your adequacy
5 answer isn't good, better, best. Sometimes, your adequacy
6 answer is yes or no, you know, are these the right
7 equations? Yes or no?
8 DR. WALLIS: Or can it even model --
9 MR. LAUBEN: That's a yes or no answer.
10 DR. WALLIS: Right.
11 MR. LAUBEN: Okay; I just -- I don't know if this
12 is -- I counted your comments, Graham, and there were 31,
13 and I decided that 12 of these had to do with structure of
14 the guide, improper balance, lack of clear road map and
15 focus beginning with the overall code structure based on
16 fundamental equations, and I think -- I hope that what we've
17 shown here is that we are going -- we believe that we can
18 address these.
19 DR. WALLIS: These 31 are culled from about 100
20 that I had.
21 MR. LAUBEN: Okay; and there are 16 that I judged
22 to be easily accommodated, like numbering questions and
23 things like that, and there are three that I don't think
24 we're going to -- so it really looks like 28 to 3 here,
25 right?

1 [Laughter.]

2 DR. WALLIS: That's not too bad. Is that

3 adequate?

4 MR. LAUBEN: I don't know.

5 DR. WALLIS: Ninety-fifth percentile.

6 DR. POWERS: You get about a 90 on this. That's

7 pretty good. That's a good B+, isn't it?

8 MR. LAUBEN: Here's the three that I think we

9 believe that probably won't result in a change: add more

10 specificity about peer review, when it should be done. I

11 don't think that the degree of specificity would be

12 consistent with office letter 3A on reg guide development.

13 They specifically tell us not to be too specific about some

14 of these things, not necessarily this but --

15 DR. WALLIS: What you already do is make the

16 general statement that peer review should be used at various

17 stages in the process.

18 MR. LAUBEN: Sure.

19 DR. WALLIS: You're not explicit about where.

20 MR. LAUBEN: I may talk about some of the general

21 headings.

22 DR. WALLIS: What is the message somehow.

23 MR. LAUBEN: That's right; okay.

24 Number two, effect of changing regulations; I

25 don't know what to say about that. Regulations change

1 slowly.

2 DR. WALLIS: The message there was what I've said

3 here several times today.

4 MR. LAUBEN: Okay.

5 DR. WALLIS: That you cannot talk about adequacy

6 without saying what you're going to use the code for.

7 MR. LAUBEN: Well, okay.

8 DR. WALLIS: And as the regulations get

9 risk-informed, you're going to use the code in different

10 ways.

11 MR. LAUBEN: Well, they will. I agree with that.

12 I was also thinking about examples that I've had to

13 encounter in the last few months, and what I have

14 encountered is that the same questions we --

15 MR. ELTAWILA: Norm, if you look at box one --

16 MR. LAUBEN: Yes.

17 MR. ELTAWILA: -- one, identify transient power

18 plants and figure of merit.

19 MR. LAUBEN: Right.

20 MR. ELTAWILA: Figure of merit is the one that's

21 going to answer your question.

22 MR. LAUBEN: Good point. That's really what --

23 DR. WALLIS: Maybe you ought to put not just

24 figure of merit but requirements of the regulations or

25 something up at that level in the box.

1 MR. LAUBEN: Well, that implies that but okay,
2 sure, okay.
3 And then, number three, I think that there is a
4 very specific purpose for implementation. I think we meet
5 that.
6 DR. WALLIS: You meant something other than what I
7 thought you meant.
8 MR. LAUBEN: I think that's right, right.
9 Okay; so, that is it. The status and summary is
10 that DG10-96 on accident and transient analysis as it is
11 addresses the findings of Maine Yankee panel and other
12 review groups; timely inclusion of current ACRS comments is
13 the next step in the process of eventually releasing DG10-96
14 and SRP subchapter 15-01 for public comment. After
15 incorporation of ACRS comments, DG10-96 and the subchapter
16 and the regulatory analysis will be sent to OGC and CRGR for
17 review and after appropriate OGC and CRGR consent, the
18 documents will be released for public comment.
19 DR. WALLIS: Now, let's see; where are we here?
20 You had some comments from me; there were some comments from
21 the consultants and other members of the committee we can
22 share with you. I've shared some with NRR. The question I
23 have is whether it would help -- and this is a question we
24 had at the subcommittee meeting -- for you to have a letter
25 from the ACRS. I mean, you seem to be doing a good job of

1 modifying the document in light of comments that you
2 receive. Do you want a letter? Is it useful to have a
3 letter at this stage from the full committee, or should we
4 wait until you've --
5 MR. ELTAWILA: I think we don't want a letter at
6 this time. I think we would like to modify the document.
7 We'll send it to you concurrently with the -- we'll send it
8 to CRGR and OGC, and after we incorporate the public
9 comments, we'll come back to the ACRS, and then, at that
10 time, we'd like a letter.
11 DR. WALLIS: So you want a letter now?
12 MR. ELTAWILA: No, we don't want a letter now.
13 DR. WALLIS: You don't want a letter now?
14 MR. ELTAWILA: We don't want a letter.
15 DR. WALLIS: Because if you did get a letter, it
16 would have to be based on the document that we've seen, not
17 the document that we have a vision of today.
18 MR. ELTAWILA: Yes.
19 DR. WALLIS: So what does the committee think
20 about this?
21 DR. APOSTOLAKIS: So you are going to circulate it
22 for public comment with the --
23 DR. WALLIS: You were persuaded to bring it to the
24 committee. The subcommittee's feeling was that the reg
25 guide was not really ready for public comment. And what

1 we've seen today is a completely new vision of parts of the
2 reg guide so what --
3 DR. APOSTOLAKIS: But are they going for public
4 comment using the existing document that we have seen?
5 MR. LAUBEN: No.
6 DR. WALLIS: So you're taking our advice about not
7 going with the existing document.
8 MR. LAUBEN: That is correct.
9 DR. APOSTOLAKIS: But we will not have a chance to
10 look at the new document before it goes out.
11 MR. ELTAWILA: It's a different organization of
12 the document and adding -- just beefing it in certain areas
13 and reducing the level of the content of the document in
14 other areas. But I think the general flavor is as we
15 indicated here in the outline, in that diagram that Norm put
16 on there.
17 DR. WALLIS: So you will go out with a new
18 document which we will not see; is that right?
19 DR. APOSTOLAKIS: That's what they're saying.
20 DR. WALLIS: So the risk of not getting our input
21 at that stage is that if we have significant input later,
22 it's more difficult to make changes.
23 MR. LAUBEN: No, no, it's no more difficult to
24 make changes based on your input and the public input than
25 it is before we even send it out, Dr. Wallis. The process

1 is the same. We would treat any additional input on the
2 version that you see that goes out for public comment.
3 MR. VERMEIL: Yes, but doesn't it have to go back
4 out for public comment then if it's changed?
5 DR. WALLIS: Yes, if it's changed significantly,
6 it would have to go out again, wouldn't it?
7 MR. LAUBEN: We would make a judgment as to what
8 significant means, how much of a change.
9 DR. WALLIS: It isn't minimal; we know that.
10 MR. LAUBEN: No, it's above minimal.
11 [Laughter.]
12 DR. APOSTOLAKIS: As long as it doesn't touch on
13 adequate protection.
14 [Laughter.]
15 MR. LAUBEN: Fortunately, we're not dealing with
16 that here. This is not a regulation.
17 DR. WALLIS: but would it be useful for you, for
18 some members of the committee, at least, to see the next
19 version before you send it out or --
20 MR. ELTAWILA: We will send it to you at the same
21 time we send it to --
22 DR. WALLIS: Will the subcommittee see it?
23 MR. ELTAWILA: We really believe we don't need
24 another subcommittee meeting. If you insist about having a
25 subcommittee meeting, that's your choice.

1 DR. WALLIS: We are trying to be helpful, really.
2 MR. ELTAWILA: Yes.
3 DR. WALLIS: Trying to find the process which will
4 produce the best document is what we're trying to do.
5 MR. VERMEIL: It will get to you and CRGR
6 simultaneously, and there will be time between then and
7 actually publishing it for us to consider any additional
8 thoughts you might have, because we also have to consider
9 any thoughts that CRGR might have that would change the
10 document.
11 DR. WALLIS: Well, next time you bring it up here,
12 you will get a letter.
13 MR. VERMEIL: Yes.
14 DR. WALLIS: And if there are still some things
15 that we have trouble with, that will appear in the letter.
16 MR. VERMEIL: Yes.
17 DR. WALLIS: If we really like it, that will
18 appear in the letter.
19 MR. VERMEIL: Yes.
20 DR. SEALE: You hope.
21 MR. VERMEIL: I hope.
22 DR. APOSTOLAKIS: So the agreement is that this
23 letter will be written after the period of public comment?
24 MR. VERMEIL: Yes; that's generally how it works.
25 DR. SEALE: And if we want to make any comments at

1 the same time it goes out to help them, we can do that.
2 MR. VERMEIL: Okay.
3 DR. WALLIS: This is what the staff is proposing.
4 is that what the committee will agree to?
5 DR. POWERS: The committee will have to take a
6 vote on this. This is strictly advisory at this point.
7 Take it into discussion? My own view, right now,
8 it would not be unusual for the staff to go out for public
9 comments and come back to us with the resultant comments on
10 a document of this nature.
11 DR. KRESS: Yes, we've done it both ways.
12 DR. POWERS: Well, I think this one is
13 particularly susceptible to this because I think we're not
14 bending metal when we have to make changes here.
15 DR. SEALE: And they're on a roll. I mean, they
16 know where they want to go. It's not as if they're running
17 up against a stone wall.
18 DR. WALLIS: We don't want to slow that down.
19 DR. SEALE: Yes; yes.
20 DR. WALLIS: So we do get, then, the old question
21 about how much of our role is sort of participating with the
22 staff and how much of it is formal review. We may need to
23 sort that out a bit.
24 DR. POWERS: Professor Wallis, if you would like
25 to make a motion at this point, we can entertain this issue.

1 DR. WALLIS: The issue being?

2 DR. POWERS: The question of whether we should --

3 DR. WALLIS: Write a letter?

4 DR. POWERS: -- do this document before it goes

5 out to public comment or not.

6 [Pause.]

7 DR. WALLIS: I felt that the committee should make

8 a decision, so perhaps we should have a motion, then.

9 DR. POWERS: Yes.

10 DR. WALLIS: And so we simply have to make a

11 decision. I will make a motion that we should review it

12 before it goes out for public comment with the understanding

13 that I don't -- this isn't necessarily the view I favor, but

14 to get us going, I will make a motion that we review it

15 before it goes out for public comment.

16 DR. POWERS: Okay; I have a motion to review the

17 document before it goes out to public comment.

18 DR. SEALE: I'll second it.

19 DR. POWERS: All right; I have a second.

20 Is there any discussion of this motion?

21 DR. APOSTOLAKIS: What is the time frame for that?

22 When will we do this?

23 DR. WALLIS: We'll have to do it at the next

24 meeting of this committee.

25 DR. APOSTOLAKIS: You will have to be in the June

1 meeting?

2 DR. WALLIS: How fast can you move? When are you

3 actually intending to have the new document ready for it to

4 go out?

5 MR. ELTAWILA: We'll try to get it in the next

6 month or so.

7 DR. WALLIS: Okay; so, it would be possible for us

8 to review it.

9 MR. ELTAWILA: Yes.

10 DR. APOSTOLAKIS: The latest in July.

11 DR. WALLIS: Now, the reason that I think you

12 ought to consider this is that I don't want to get into a

13 situation where our ability to be helpful to the staff

14 ceases, and then, this results in something not being as

15 good as it might be down the road. I feel that we have made

16 considerable input already; I hope it's been helpful. But

17 it seems to have been a big change, and I'm a bit nervous

18 about saying now, the staff knows enough to go ahead without

19 some --

20 MR. ELTAWILA: Am I allowed to say anything during

21 this motion? I don't want to interfere in the process, but

22 what makes sense is to go to the CRGR, because you know that

23 the CRGR is going to look at this document very thoroughly.

24 So we might be able to satisfy you, and the staff has all

25 the intention to do the right things, but it might, in the

1 eyes of CRGR, constitute a backfit, and we want to be
2 careful about that, not to go all the way and to come here
3 satisfying you and to go to the CRGR and undo everything
4 that you're doing.
5 So I think it will be appropriate to send it to
6 CRGR; we'll send you a copy at the same time, and if CRGR
7 blesses it, it will go out for public comment, and during
8 that time, if you have any comments on it, we will be happy
9 to receive them and try to accommodate them as much as we
10 can.
11 DR. WALLIS: Well, maybe we could change the
12 motion a bit, that we would like to see it before it goes
13 out for public comment. We don't necessarily need to have
14 any input; we'd just like to decide at the time --
15 MR. VERMEIL: You would get it anyway, Dr. Wallis.
16 That's a given.
17 DR. WALLIS: -- to let you know whether at that
18 time, we feel it would be useful to see you again or whether
19 we should just let you go out with it.
20 MR. VERMEIL: You'll get it.
21 DR. WALLIS: We'd simply ask that we get given a
22 document -- can I modify my motion? We see the document,
23 and we decide whether or not we want to review it?
24 MR. VERMEIL: Absolutely, because you will get it.
25 DR. POWERS: I really honestly need to turn to my

1 parliamentarian on this. There is a mechanism for modifying
2 a motion. It's cleaner if it isn't. What do I do?
3 DR. WALLIS: You can substitute your own motion.
4 DR. SEALE: You have to ask me whether or not I'll
5 agree.
6 DR. WALLIS: That's all you have to do.
7 DR. APOSTOLAKIS: If the seconder agrees, then,
8 you can.
9 DR. SEALE: I will.
10 DR. POWERS: Okay; so, we have a modified motion
11 now, which is that we see the -- we receive a copy of the
12 document --
13 DR. WALLIS: And then, we decide whether or not it
14 would be useful for us to meet with the staff before it goes
15 out for public comment or not.
16 DR. POWERS: You're just asking to defer.
17 DR. WALLIS: Otherwise, we're buying a pig in a
18 poke, it seems to me.
19 DR. POWERS: You're not buying a pig in a poke.
20 DR. WALLIS: It's a little bit more risky than I'd
21 sort of like to be.
22 DR. POWERS: You're not getting a pig in the poke;
23 you get a chance to look at this again no matter what.
24 DR. WALLIS: But, you know, I'm not interested in
25 getting a look. I'm interested in the quality of the final

1 document being as good as possible. It's the only thing I'm
2 really interested in. And if we can intervene at some time
3 before it goes out for public comment in a way which will
4 increase the probability that it will be a really good final
5 document, I think we ought to have that opportunity.
6 DR. POWERS: It is cleaner.
7 I think you're just advocating a position of you
8 want to see this before it goes out for public comment. I
9 mean, that --
10 DR. WALLIS: We can see it, but it doesn't mean
11 we're going to have to bring the staff in here, yes; so
12 maybe that's good enough, then, if that's the understanding,
13 that see it doesn't mean a presentation like this,
14 understand.
15 DR. POWERS: The effect on the staff is the same,
16 is that they can't set a date for releasing it for public
17 comment until they get clearance from us. That's the
18 effect.
19 DR. WALLIS: Now, is that the effect? Is that the
20 effect?
21 DR. POWERS: Sure it is; sure that is.
22 I'd like to retain --
23 DR. SHACK: They can take the gamble that we'll
24 approve it and just go ahead and then worry about the
25 process.

1 DR. WALLIS: We may just write a --

2 DR. POWERS: That's what we've got a motion on the
3 floor right now to decide to do, right? Right as we speak
4 now.

5 DR. SHACK: Have we accepted the modified motion?
6 There was a second that changed it.

7 DR. POWERS: I don't think the -- the modification
8 is a reversal.

9 DR. SHACK: It's a reversal, yes.

10 DR. POWERS: I want to stick with the motion that
11 we had.

12 DR. WALLIS: The only reason I'm making the
13 motion --

14 DR. SHACK: All I want to know is which motion are
15 we discussing?

16 DR. POWERS: That's right.

17 DR. APOSTOLAKIS: That's important.

18 [Laughter.]

19 DR. POWERS: I will try to clearly articulate the
20 motion that we have. I have not accepted the change. The
21 motion is that we see it before it goes out for public
22 comment. Now, is there any further discussion on this
23 motion?

24 DR. APOSTOLAKIS: What does see mean?

25 DR. POWERS: Okay; it means you get the document

1 in your hands; that we would make a collective decision on
2 whether we wanted to bring the staff to the meeting --
3 DR. APOSTOLAKIS: Oh, okay.
4 DR. POWERS: -- or not and review it and make a
5 collective decision on whether we wanted to write a letter
6 to the Executive Director of Operations on this document or
7 not.
8 DR. APOSTOLAKIS: Okay.
9 DR. POWERS: Okay? Any further discussions of
10 this motion?
11 [No response.]
12 DR. POWERS: All those in favor of the motion to
13 see this before it goes out for public comment, please so
14 indicate.
15 [Show of hands.]
16 DR. POWERS: All those opposed and that would
17 prefer to have it go out for public comment and then come
18 back to the committee please so indicate.
19 [Show of hands.]
20 DR. POWERS: The committee votes to allow this
21 document to go out for public comment without being brought
22 to this. I certainly would appreciate if you could provide
23 us a copy of it when it goes out at the time.
24 MR. ELTAWILA: We will definitely do that.
25 MR. VERMEIL: We were going to do that anyway.

1 DR. SEALE: That's what I wanted.

2 DR. POWERS: Any further matters on this issue to

3 discuss?

4 [No response.]

5 MR. VERMEIL: So we'll do a Larkinsgram on this.

6 DR. POWERS: Yes, you'll get a Larkinsgram from

7 this that says something to the effect of the committee has

8 no objections to this going out to public comment and that

9 we'd like to see it after it comes back from public comment.

10 MR. ELTAWILA: Thank you very much.

11 DR. APOSTOLAKIS: Can we write additional comments

12 to the Larkinsgram?

13 [Laughter.]

14 DR. POWERS: At this point, I think I can dispense

15 with the transcript.

16 [Whereupon, the meeting was recessed, to reconvene

17 at 8:30 a.m., Friday, May 12, 2000.]

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REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

NAME OF PROCEEDING: MEETING: 472ND ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

CASE NUMBER:

PLACE OF PROCEEDING: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Michael Paulus

Michael Paulus
Official Reporter
Ann Riley & Associates, Ltd.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

April 17, 2000

SCHEDULE AND OUTLINE FOR DISCUSSION
472nd ACRS MEETING
MAY 11-13, 2000

THURSDAY, MAY 11, 2000, 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 (DAP/JTL/SD)
   - 1.2) Items of current interest (DAP/NFD/SD)
   - 1.3) Priorities for preparation of ACRS reports (DAP/JTL/SD)

2) 8:35 - 10:00 A.M. Initiatives Related to Risk-Informed Technical Specifications (Open) (JDS/GA/MTM)

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   - 2.1) Remarks by the Subcommittee Chairman
   - 2.2) Briefing by and discussions with representatives of the NRC staff and industry groups regarding initiatives related to risk-informed technical specifications, initial industry submittals on risk-informed technical specifications, and related matters.

10:00 - 10:15 A.M. *****BREAK*****

3) 10:15 - 11:45 A.M. Potential Revisions to the Pressurized Thermal Shock (PTS) Acceptance Criterion (Open) (WJS/NFD)
   - 3.1) Remarks by the Subcommittee Chairman
   - 3.2) Briefing by and discussions with representatives of the NRC staff regarding a draft Commission Paper that describes potential revisions to the PTS acceptance criterion.

   Representatives of the nuclear industry will provide their views, as appropriate.

11:45 - 12:45 P.M. *****LUNCH*****

4) 12:45 - 2:15 P.M. Proposed Revision to Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis" (Open) (GA/MTM)
   - 4.1) Remarks by the Subcommittee Chairman
   - 4.2) Briefing by and discussions with representatives of the NRC staff regarding proposed revision to Regulatory Guide 1.174 and an associated guidance on the use of risk information in license amendment reviews.

   Representatives of the nuclear industry will provide their views, as appropriate.

2:15 - 2:30 P.M. *****BREAK*****

5) 2:30 - 4:00 P.M. Proposed Regulatory Guide and Standard Review Plan (SRP) Section Associated with NRC Code Reviews (Open) (GBW/PAB)
   - 5.1) Remarks by the Subcommittee Chairman
   - 5.2) Briefing by and discussions with representatives of the NRC staff regarding proposed Regulatory Guide and SRP Section associated with the NRC staff's review of the analytical codes.

6) 4:00 - 5:00 P.M. Break and Preparation of Draft ACRS Reports
   Cognizant ACRS members will prepare draft reports for consideration by the full Committee.

7) 5:00 - 7:00 P.M. Discussion of Proposed ACRS Reports (Open)
   Discussion of proposed ACRS reports on:
   - 7.1) Risk-Informed Technical Specifications (JDS/GA/MTM)
   - 7.2) Potential Revisions to the Pressurized Thermal Shock Acceptance Criterion (WJS/NFD)
   - 7.3) Proposed Revision to Regulatory Guide 1.174 (GA/MTM)
   - 7.4) Proposed Regulatory Guide and Standard Review Plan Section Associated with NRC Staff Code Reviews (GBW/PAB)
   - 7.5) Human Performance Program (GA/NFD)

FRIDAY, MAY 12, 2000, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND

8) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open) (DAP/SD)

9) 8:35 - 10:00 A.M. SECY-00-0062, Risk-Informed Regulation Implementation Plan (Open) (GA/MME)
   - 9.1) Remarks by the Subcommittee Chairman
   - 9.2) Briefing by and discussions with representatives of the NRC staff regarding risk-informed regulation implementation plan that is described in SECY-00-0062.

   Representatives of the nuclear industry will provide their views, as appropriate.

10:00 - 10:15 A.M. *****BREAK*****

10) 10:15 - 11:30 A.M. Operating Event at E.I. Hatch Nuclear Power Plant, Unit 1 (Open) (JJB/AS)
   - 10.1) Remarks by the Subcommittee Chairman

10.2) Briefing by and discussions with representatives of the NRC staff regarding the findings and recommendations of the Augmented Inspection Team, which investigated the January 26, 2000 reactor trip event at E. I. Hatch Nuclear Power Plant, Unit 1.

Representatives of the E. I. Hatch Licensee may provide their views, as appropriate.

11) 11:30 - 11:45 A.M. Reconciliation of ACRS Comments and Recommendations (Open) (DAP, 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.

11:45 - 12:45 P.M. ***LUNCH***

12) 12:45 - 2:15 P.M. Physical Security Requirements for Power Reactors (Open/Closed) (TSK/NFD)
12.1) Remarks by the Subcommittee Chairman
12.2) Briefing by and discussions with representatives of the NRC staff regarding the status of revising the physical security requirements for power reactors by incorporating insights gained from threat assessment activities being conducted by the staff in coordination with other Federal agencies.

[NOTE: A portion of this session will be closed to discuss safeguards information.]

2:15 - 2:30 P.M. ***BREAK***

13) 2:30 - 2:45 P.M. Future ACRS Activities (Open) (DAP/JTL/SD)
Discussion of the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee.

14) 2:45 - 3:30 P.M. Report of the Planning and Procedures Subcommittee (Open) (DAP/JTL)
Report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business.

15) 3:30 - 4:30 P.M. Break and Preparation of Draft ACRS Reports
Cognizant ACRS members will prepare draft reports for consideration by the full Committee.

16) 4:30 - 7:00 P.M. Discussion of Proposed ACRS Reports
Discussion of proposed ACRS reports on:
16.1) Risk-Informed Regulation Implementation Plan (GA/MME)
16.2) Risk-Informed Technical Specifications (JDS/GA/MTM)

16.3) Potential Revisions to the Pressurized Thermal Shock Acceptance Criterion (WJS/NFD)
16.4) Proposed Revision to Regulatory Guide 1.174 (GA/MTM)
16.5) Proposed Regulatory Guide and Standard Review Plan Section Associated with NRC Staff Code Reviews (GBW/PAB)
16.6) Human Performance Program (GA/NFD)

SATURDAY, MAY 13, 2000, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND

17) 8:30 - 12:30 P.M. Discussion of Proposed ACRS Reports (Open)
Continue discussion of proposed ACRS reports listed under Item 16.

12:30 - 1:30 P.M. ***LUNCH***

18) 1:30 - 2:00 P.M. Miscellaneous (Open) (DAP/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.**
- **Number of copies of the presentation materials to be provided to the ACRS - 35.**

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G DRIVE:INTRODUCTORY

INTRODUCTORY STATEMENT BY THE ACRS CHAIRMAN
472nd MEETING, MAY 11-13, 2000

THE MEETING WILL NOW COME TO ORDER. THIS IS THE FIRST DAY OF THE 472ND MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS. DURING TODAY'S MEETING, THE COMMITTEE WILL CONSIDER THE FOLLOWING:

(1) INITIATIVES RELATED TO RISK-INFORMED TECHNICAL SPECIFICATIONS
(2) POTENTIAL REVISIONS TO THE PRESSURIZED THERMAL SHOCK ACCEPTANCE CRITERION
(3) PROPOSED REVISION TO REGULATORY GUIDE 1.174, "AN APPROACH FOR USING PROBABILISTIC RISK ASSESSMENT IN RISK-INFORMED DECISIONS ON PLANT-SPECIFIC CHANGES TO THE LICENSING BASIS"
(4) PROPOSED REGULATORY GUIDE AND STANDARD REVIEW PLAN SECTION ASSOCIATED WITH NRC CODE REVIEWS
(5) PROPOSED ACRS REPORTS

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 STATEMENTS 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.

Advisory Committee on Reactor Safeguards

Risk-Informed Technical Specifications

May 11, 2000

Robert Dennig, Technical Specifications Branch
Mark Reinhart, Probabilistic Safety Assessment Branch
Nanette Gilles, Technical Specifications Branch
Office of Nuclear Reactor Regulation

Plant Operations and PRA Subcommittee Concerns

- ✓Need for details for plant risk decision process
- ✓Need for quality PRA and tools
- ✓Understanding of oversight process role
- ✓Need for public involvement, public support
- ✓Affect on safety culture
- ✓Programmatic aspects for NRC staff

Details of Plant Risk Decision Process

- ✓ Owners Groups including more detail in Revision 1 of TSTF-358 & TSTF-359
- ✓ Risk/reliability calculations to assess risk significance of missed surveillance
- ✓ Staff safety evaluation will outline required decision process characteristics
- ✓ Individual plant amendment requests will include more detail if necessary

05/11/00 3

Quality PRA and Tools

- ✓ Owners Groups performing peer certification, cross comparisons, independent reviews
- ✓ Maintenance Rule (a)(4) guidance proposes recommended PRA model characteristics
- ✓ Staff safety evaluation will identify necessary characteristics of tool for application

05/11/00 4

Oversight Process Role

- ✓ Ongoing discussion
- ✓ Specific Inspection Procedures
  - Surveillance Testing (71111.22)
  - Maintenance Risk Assessments and Emergent Work Control (71111.13)
  - Identification and Resolution of Problems (71152)
- ✓ NRR involved with RES Risk-Based Performance Indicator program

05/11/00 5

Public Involvement & Support

- ✓ Early dialogue with concerned groups
- ✓ Consolidated Line Item Improvement Process
  - Generic safety evaluations published for public comment
  - Notices published for individual amendment requests
- ✓ Communications plan needed

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Affect on Safety Culture

- ✓ Premise is that licensees will operate their plants safely
- ✓ Inspection process will look for programmatic breakdowns
- ✓ Annual Problem Identification and Resolution Inspection includes assessment of safety conscious work environment
- ✓ Safety culture should improve by allowing resources to focus on risk-significant aspects of plant operation

NRC Staff Programmatic Aspects

- ✓ NRR Involved with RES Risk-Based Performance Indicator program
- ✓ Communications plan needed

TSTF 358 - Missed Surveillances

- Plant risk decision process
  - Reference Reg Guide 1.182 - Maintenance Rule (a)(4) guidance
    - Treat missed surveillance as emergent condition
    - Temporary, aggregate risk impacts
    - Risk management actions
    - Control of additional emergent work

NEI

Missed Surveillances

- Risk decision process
  - Use RAW as screen
  - Change failure rates to address missed surveillance
  - Qualitative methods may be used

NEI

TSTF-359 Mode Change Restraints

- Based on owners group transition risk models
  - CEOG model showed most plant systems have insignificant risk effects
  - Other OG to develop similar models
- Must meet AOT or return to previous mode

NEI

Requests for Risk Information

- Industry position
  - Concur that in rare instances, risk issues should be addressed even though licensing basis met
  - NRC legal authority constrained to circumstances of "significant and unanticipated risks"
  - Otherwise would be defacto new licensing basis

NEI

Requests for Risk Information

- Industry position
  - Continue policy of Commission notification
  - Better definition of "significant and unanticipated risk"
  - Acknowledge industry burden in responding to request

NEI

Requests for Risk Information

- Industry position
  - Quantitative guidelines of Reg Guide 1.174 may not be appropriate for this purpose
    - Small change versus significant risk impact
    - Reg Guide acknowledges it goes beyond adequate protection

NEI

Initiative 2 - Missed Surveillances

ACRS Subcommittees

April 28, 2000

NEI

United States
Nuclear Regulatory Commission

Potential Revisions to PTS Screening Criterion

Mark Cunningham
Division of Risk Analysis and Applications
Office of Nuclear Regulatory Research

Ed Hackett
Division of Engineering Technology
Office of Nuclear Regulatory Research

Presentation to
Advisory Committee on Reactor Safeguards

May 11, 2000

Overview

- Discuss draft Commission paper on PTS screening criterion
  - Purpose of draft Commission paper
  - PTS accidents and screening criterion
  - More recent information:
    - Materials research
    - Commission guidance
  - Approaches for revisiting screening criterion
  - Intended staff approach
- Solicit ACRS comment on proposed staff approach
- No letter requested

Purpose

- Staff has work underway to revise the technical basis for the Pressurized Thermal Shock Rule (10 CFR 50.61), to support a possible rule revision to reflect experience in its implementation and research on the materials properties of reactor pressure vessels.

- Purpose of draft Commission paper:

  - To obtain early review and decisions on intended staff direction with respect to revisions to one part of the screening criterion used in the PTS Rule

  - To inform Commission of intended staff direction

PTS Accidents and Acceptance Criterion

PTS Accidents

- Initiators
  - Small LOCAs or transients which lead to rapid overcooling and repressurization
- Vessel response
  - Preexisting flaws may lengthen and deepen; some fraction of these will extend through the vessel wall
  - Through-wall crack expands rapidly to large opening
  - Core coolability (assumed) lost

PTS Accidents and Acceptance Criterion

PTS Accidents (cont.)

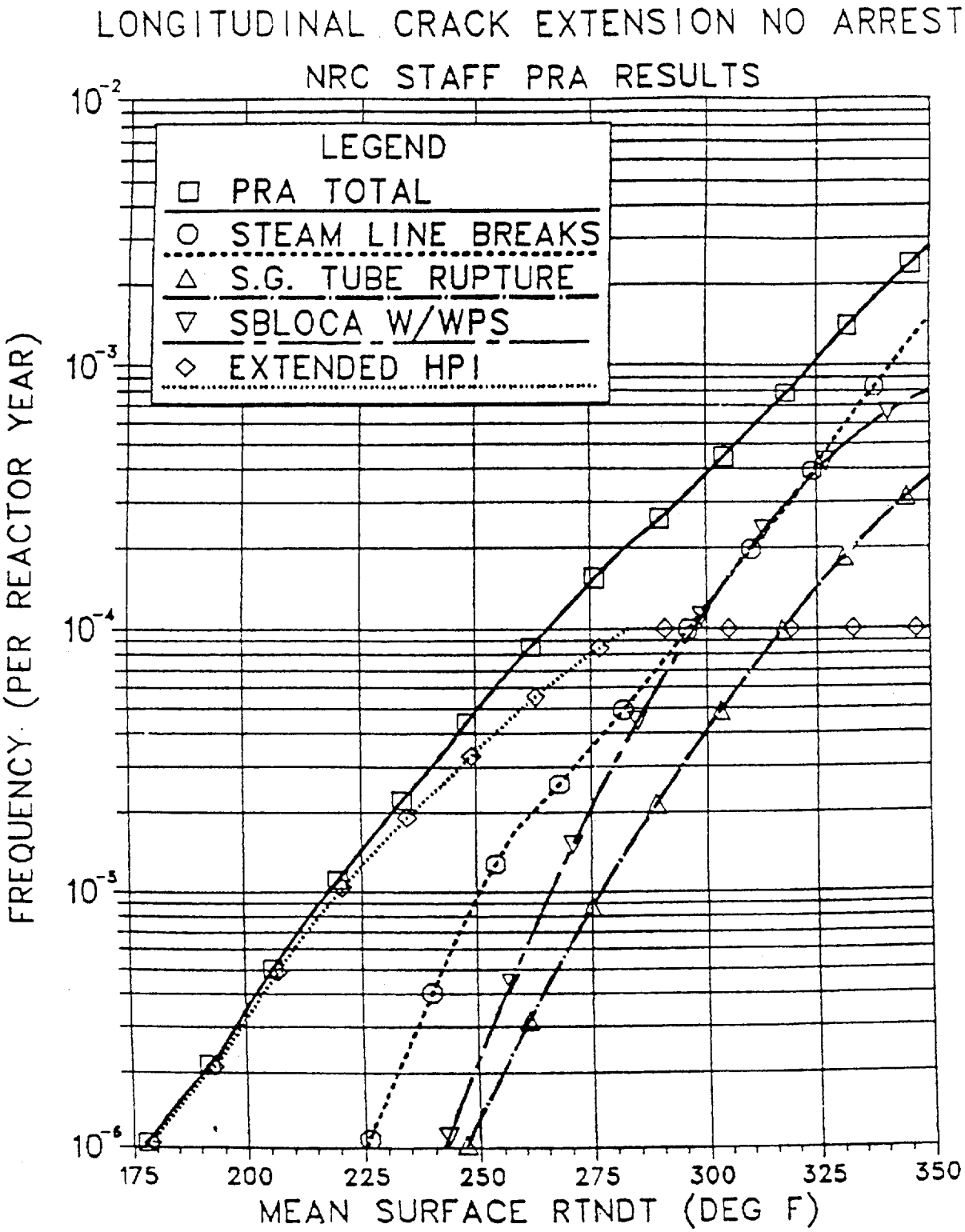
- Containment response
  - Dynamic loadings on core and vessel internals
  - Dynamic loadings on reactor vessel and piping
  - Containment pressure loadings
  - Dispersal and coolability of core material
  - Availability of water
  - Availability of containment engineered safety features

PTS Accidents and Acceptance Criterion

Acceptance Criterion

- PTS Rule issued in 1983 as adequate protection rule
- Established an acceptance criterion (embrittlement screening criterion), above which licensees are required to demonstrate pressure vessel safety
- Associated with screening criterion is a frequency of a through-wall crack in the pressure vessel
  - RT_{PTS} of 270°F linked to 5×10^{-6} per reactor year
  - RG 1.154 - frequency of 5×10^{-6} per reactor year is "acceptable"

PTS Acceptance Criterion (cont.)



PTS Acceptance Criterion (cont.)

- Key underlying assumptions
  - Through-wall crack frequency of 5×10^{-6} per reactor year is acceptable
  - Through-wall crack equivalent to:
    - large opening in reactor vessel
    - core melt
  - Containment performance not substantially impaired by PTS event

Materials Research

Flaw Size, Density, and Location Distributions

- Examination of an actual unused PWR vessel in the Pressure Vessel Research User Facility (PVRUF)
- Examination of Shoreham reactor vessel
- Analysis of NDE/DE data from River Bend-2 and Hope Creek-2 vessels welds and NDE of PVRUF plate material
- Development of generalized statistical distributions on flaw sizes, flaw locations and flaw densities in welds and base-metals

Materials Research (cont.)

Irradiation Embrittlement Correlations

- Improvements to embrittlement correlations; ongoing refinement to include more recent embrittlement data, effect of long irradiation exposure time at vessel normal operating temperatures, and statistical uncertainties in the predicted shift in RT_{NDT}

Statistical Distributions for Material Fracture Toughness

- Extension of the original ASME fracture toughness databases and development of rigorous statistical distributions for K1c and K1a.

Statistical Distributions for Material Chemistry and Initial RT_{NDT}

- Development of statistical distributions for plant-specific material chemistry (nickel, copper) and initial RT_{NDT} (RT_{NDTo}) to represent the local variability of plate and weld materials

Materials Research (cont.)

Beltline Vessel Fluence Calculations

- Calculation of end-of-life fluence values for each of the plants that are being studied in the PTS Rule reevaluation; based on up-to-date information of the plant's cycle-by-cycle fuel loading history and the draft regulatory guide DG-1053 proposed method

Improvements in Fracture Mechanics Methods

- Improvements in FAVOR, including treatment of:
  - The effect of clad to base-metal differential thermal expansion induced residual stress
  - The residual stress distribution through the vessel
  - The stress intensity factor, K, solutions for semi-elliptical surface flaws have been determined for clad vessels
  - The stress intensity factor, K, solutions for elliptical sub-surface (embedded) flaws

Commission Guidance

- Safety Goal Policy Statement
- Station blackout and ATWS rules
- Backfit rule
- Regulatory Guide 1.174

Commission Guidance (cont.)

- Safety Goal Policy Statement
  - Defined qualitative and quantitative goals for acceptable risk
  - Subsequent Commission decisions established a subsidiary core damage frequency goal of 1×10^{-4} per reactor year
  - Intended for generic decisions using industry-average core damage frequency and risk estimates.
- Station Blackout and ATWS Rules
  - Developed as cost-beneficial safety enhancements
  - Used probabilistic goals for the acceptable frequency of core-damage accidents
  - Justified on averted offsite risk basis

Commission Guidance (cont.)

- Backfit Rule (and Regulatory Analysis Guidelines)
  - Includes initial screening on potential reductions in CDF and conditional probability of early containment failure
  - Uses screening criteria based on the Safety Goal QHOs and subsidiary CDF goal
  - Uses final decision criteria based on averted public risk
- Regulatory Guide 1.174
  - Describes a set of general principles for risk-informed license changes
  - Provides probabilistic guidelines defining acceptable changes in CDF and LERF
  - Consistent with Safety Goals and Regulatory Analysis Guidelines

Approaches for Revisiting Screening Criterion

- Make no change to the core damage frequency value underlying the screening criterion.

- Utilize a core damage frequency similar to those for the ATWS and Station Blackout Rules.

- Apply current risk-informed regulation principles (defined in RG 1.174; used in Part 50 technical requirements framework) to define extent of change
  - defense in depth
  - safety margins
  - small CDF and LERF changes
    - maintain separate CDF and LERF acceptance guidelines

- Apply current risk-informed regulation principles (defined in RG 1.174; used in Part 50 technical requirements framework) to define extent of change
  - defense in depth
  - safety margins
  - small CDF and LERF changes
    - set single CDF/LERF acceptance guideline

Approaches (cont.)

- Make no change to the core damage frequency value underlying the screening criterion

  - Would keep the focus the rule's technical basis revision on PTS technology improvements; would then reduce the complexity of a proposed rule revision.

  - Would not require the resolution of the issue of containment performance during PTS accidents and related uncertainties

  - Would not make use of the considerable advances made in agency guidance on use of PRA development since the rule was completed in 1983

Approaches (cont.)

- Utilize CDF consistent with Station Blackout and ATWS Rules
  - Would establish greater consistency among the three major risk-informed rules and associated CDFs.
  - Increase in CDF which would be permitted by this option would be near the limit of those permitted in Regulatory Guide 1.174
  - Would require considerable additional work to establish consistency in containment performance and offsite risk estimates

Approaches (cont.)

- Apply RIR principles and acceptance guidelines

  - Would be most consistent with the Commission's most recent PRA policy implementation guidance (in RG 1.1740 and staff's approach in Part 50 technical requirements study)
  - Would explicitly include in the reevaluation the consideration of defense-in-depth and safety margins issues
  - would maintain the acceptable CDF at a value essentially no higher than it is now
  - Would introduce consideration of containment performance and offsite risk via the use of the guide's LERF guideline
  - Would require staff resolution of the issue of containment performance during PTS accidents and related uncertainties, and the acceptability of a large early release frequency

Approaches (cont.)

- Apply RIR principles and acceptance guidelines, assuming CDF and LERF are equivalent

  - Would be generally consistent with the Commission's most recent PRA policy implementation guidance and Part 50 technical requirements framework
  - Would explicitly include in the reevaluation the consideration of defense-in-depth and safety margins issues
  - Would reduce the acceptable CDF to 1×10^{-6} per reactor year, since CDF and LERF are presumed to be equivalent.
  - Could include provision for plant-specific containment analysis to relax acceptable CDF value.

Staff's Intended Approach

- Apply RIR principles and acceptance guidelines
- Address two key issues
  - Potential for large early release in PTS accident
  - Application of RIR principles and Option 3 framework to risk-informed change to adequate protection rule

Next Steps

- Revise Commission paper
  - Information paper
  - Identify and discuss approaches
  - Identify key issues - adequate protection rule change and LERF
  - Add short descriptions of
    - PTS rule revision program
    - PTS accidents (including potential impacts on containment)
- Provide revised draft to NRR, OGC; resolve comments
- Address Full Committee comments
- Provide to EDO - May 24

Next Steps (cont.)

- Continue technical basis revision
  - Reflect Commission decisions
  - Continue PRA/HRA and thermal hydraulic analyses
  - Complete development of generalized statistical distributions on flaw sizes, flaw locations and densities in welds and base-metals
  - Complete development of material chemistry distributions
  - Continue development of embrittlement correlations
  - Continue development of updated fluence maps
  - Complete development of fracture toughness (K_{1c}, K_{1a}) statistical distributions
- Provide next update to ACRS (August/September)
  - Commission guidance on screening criterion
  - Generalized flaw distributions
  - Materials-related developments (chemistry, embrittlement, fluence, fracture toughness)
  - Uncertainty analysis methodology
  - Some of the initial analyses for a PTS plant (PRA/HRA, TH, possibly PFM)

NRR STAFF PRESENTATION TO THE ACRS

SUBJECT: Guidelines for Using Risk Information in Regulatory Decisionmaking

DATE: May 11, 2000

PRESENTER: Robert L. Palla

TITLE/ORG: Sr. Reactor Engineer
Probabilistic Safety Assessment Branch
Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

TELEPHONE: 415-1095

BACKGROUND

- 1995 PRA Policy Statement encourages increased use of PRA in regulatory activities

- Licensees are not required to consider/submit risk information

- Existing regulatory guidance (e.g., RG 1.174) is geared to situations in which the licensee voluntarily chooses to support licensing actions with risk information

- Policy and process guidance are needed to deal with proposed license actions that:
  - are not risk-informed, and
  - satisfy existing design and licensing bases, but
  - introduce significant and unanticipated risks

- Staff committed to provide clarifying guidance for Commission approval (SECY-98-300)

CHRONOLOGY

12/98	Staff recommends developing guidance to clarify its authority for applying risk-informed processes in non-risk informed licensing actions (Policy Issue 4 in SECY-98-300)
6/99	Commission approves development of clarifying guidance
8/99	Review of electrosleeve amendment for Calloway highlights the need for clear policy and process guidance (SECY-99-199)
9/99	Proposed guidance discussed with ACRS Full Committee
10/99	Staff submits proposed interim guidance to Commission (SECY-99-246)
1/00	Commission approves interim use of guidance while staff finalizes regulatory guidance documents
3/00	Industry informed of interim guidance via Regulatory Issue Summary 2000-07
4/00	Proposed SRP appendix issued for review and comment (ACRS, CRGR, public)

PROPOSED APPROACH (SECY-99-246)

- Establish concept that proposed license amendments could create "special circumstances" under which the regulations do not provide the intended or expected level of safety, and plant operation may pose an undue risk

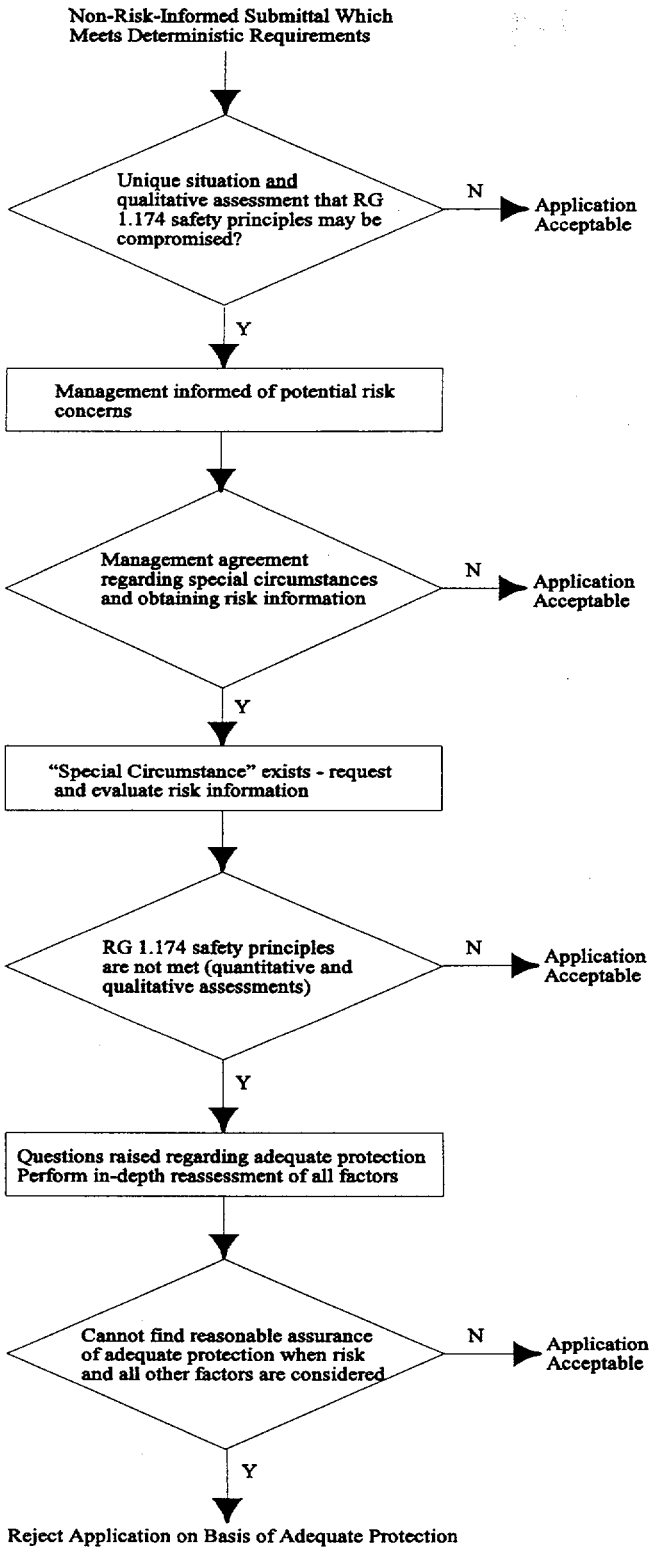
- When "special circumstances" may be created, staff will:
  - explore underlying engineering issues contributing to risk concern
  - obtain management buy-in regarding risk concern
  - request additional information to address risk and RG 1.174 safety principles
  - not issue the amendment until it has assessed risk implications sufficiently to determine there is reasonable assurance of adequate protection

- Use safety principles and decisionmaking process in RG 1.174, and the standard of exceeding the acceptance guidelines as a <u>trigger</u> at which questions are clearly raised as to whether adequate protection is reasonably assured

- Further evaluate special circumstances, safety principles, and other factors if trigger is exceeded

- Base final acceptability on consideration of regulatory requirements and adherence to safety principles, and not solely on comparison with numerical acceptance guidelines

Figure 1 - Process and Logic for Considering Risk in License Amendment Reviews



MODIFICATIONS TO GUIDANCE DOCUMENTS

- New appendix to Chapter 19 of Standard Review Plan providing guidance to risk analyst on use of risk information in review of non-risk informed license amendments

- Limited modifications to text of SRP 19 and RG 1.174 to refer to new appendix

- Conforming changes to Office Letter 803, "License Amendment Review Procedures"

NEW APPENDIX TO SRP

- Mirrors SECY-99-246 approach and language rather than create new concepts or language

- Provides additional description of the threshold/criteria for an issue to be considered a "special circumstance"

  - situations not identified or addressed in development of regulations, and important enough to warrant a new regulation if encountered on a widespread basis

  - reviewer has: (1) knowledge that risk impact is not reflected by the licensing basis analysis, and (2) reason to believe that risk increase would warrant denial if the request were evaluated as a risk-informed application

- Includes examples of situations that could create "special circumstances" (bullets middle of page 3)

MODIFICATIONS TO TEXT OF SRP 19 AND RG 1.174

- Indicates that "special circumstances" may exist even when all regulatory requirements are met

- Indicates that in those situations staff may request risk related information and will not approve the requested change until it has determined that public health and safety will be adequately protected

- Refers to the new appendix regarding the use of risk information in the review of such requests

CHANGES TO OFFICE LETTER 803

- Guidance for processing license amendments is provided in OL 803, "License Amendment Review Procedures"

- Recent OL revision (Rev. 3, 12/99) added general guidance on types of amendment requests on which risk analyst should be consulted
  - screening questions based on analysis of previous amendment requests
  - includes "special circumstances" as one consideration
  - does not describe what constitutes special circumstances

- OL 803 update will include clarification regarding screening process and special circumstances

SCHEDULE FOR COMPLETING GUIDANCE
(per 2/14/00 response to SRM)

Issue Regulatory Issue Summary describing interim guidance	3/2000C
Develop mods to SRP 19 and RG 1.174	
▸ Transmit draft mods to ACRS, CRGR, public	4/2000C
▸ Meet with stakeholders, ACRS, CRGR	5/2000
▸ Resolve comments and transmit proposed final mods	7/2000
▸ Meet with ACRS and CRGR on proposed final mods	8/2000
Develop mods to Office Letter 803	9/2000
Transmit final mods to Commission (SRP 19, RG 1.174, OL 803)	9/2000

SRP Development for T/H Code Reviews

Joe Staudenmeier
Reactor Systems Branch, NRR
Email: JLS4
Phone: 415-2869

Presentation to ACRS
May 11, 2000

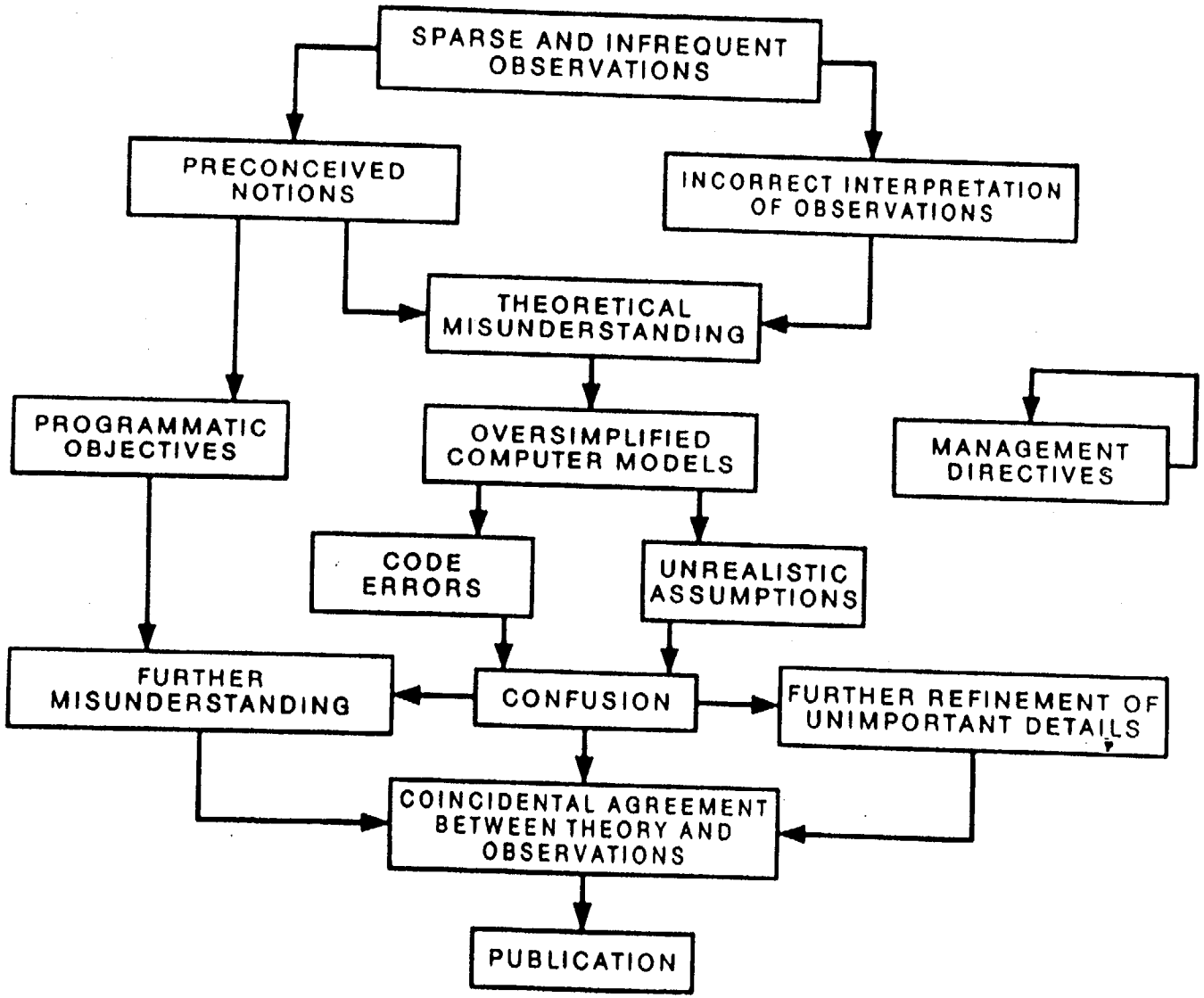
Problems Identified by Maine Yankee ISAT (and ACRS in AP600 and Other Reviews)

Adequacy of Code Documentation

Adequacy of Code Assessment

Inconsistencies in Staff Code Review Process

FLOWCHART: COMPUTER MODEL DEVELOPMENT



Activities

Develop Standard Review Plan Section (NRR Lead)

Develop Standard Format and Content Guide / Regulatory Guide (RES Lead)

The Code SRP Topics

Areas of Review are consistent with the Reg. Guide. General principles applicable to all analytical computer codes covering key areas of review:

- Documentation
- Accident Scenario and Process Identification
- Code Theory
- Code Assessment
- Plant Modelling
- Quality Assurance
- Confirmatory Analysis
- Revisions to Previously Approved Models

Details will be provided for certain accident and accident classes in Appendices for:

- Modeling Requirements (Physical and Plant)
- Code Assessment

The Code SRP Organization

The Organization of the Code SRP Section Follows the Existing SRP Format.

I. AREAS OF REVIEW

Describes the scope of the review

II. ACCEPTANCE REVIEW

Describes the acceptance criteria for each area

III. REVIEW PROCEDURES

Describes the review procedures

IV. EVALUATION FINDINGS

Describes the requirements for documenting the review findings

V. REFERENCES

Future Actions

Incorporate ACRS comments into Draft SRP Section and Reg. Guide

Provide for CRGR Review

Solicit public comments on Draft SRP Section and Reg. Guide

Resolve Public Comments

Issue final versions of SRP and Reg. Guide

Develop Appendices for review of analytical codes for specific transient or accident classes.

DRAFT REGULATORY GUIDE DG-1096

-

TRANSIENT AND ACCIDENT ANALYSIS METHODS FOR CHAPTER 15 EVENTS

Advisory Committee on Reactor Safeguards
May 11, 2000

G. Norman Lauben
Safety Margins and Systems Analysis Branch, RES

acrs0500.01

PURPOSE

Present the background and content of DG-1096, a regulatory guide for transient and accident methods used to analyze events required in 10 CFR 50.34 and defined in SRP chapter 15.

OUTLINE

1. Background and Need
2. Contents of DG-1096
3. Graham Wallis comment disposition
4. Status and Summary

BACKGROUND AND NEED

- The Maine Yankee Independent Safety Assessment Team (ISAT) identified the need for NRC to provide guidance on transients and accident methods to:

  1. Ensure sufficiency and consistency in the level of documentation and validation, and

  2. Have a documented process in place to identify and rank key phenomena for relevant events, which is then used in the code development and assessment process.

- To implement this, the NRR Maine Yankee Lessons Learned Task Group recommended development of:

  1. A standard review plan section for code review, and

  2. A regulatory guide for code development and assessment.

- Since the items identified by the ISAT do not, by themselves, constitute all needed parts for a description of transient and accident analysis methods, additional items, such as determination of basic code capability are being added to DG-1096.

BACKGROUND AND NEED (CONTINUED)

- Plans and status of this guide (DG-1096) and the companion Standard Review Plan (SRP) sub-chapter (Chapter 15.01) have been discussed with the T/H Subcommittee on three occasions.

- Three drafts of this guide have been provided to the ACRS for their review and comment.

- The most recent draft, discussed with the sub-committee on 4/27/00, considered informal verbal comments from a previous sub-committee meeting on 11/17/99.

- Provisional draft written comments from Graham Wallis on DG-1096 were received on 4/25/00 and will be briefly addressed today.

DG-1096 CONTENTS

- In December 1998 the following proposals were made to the ACRS T/H subcommittee regarding the reg. guide:

  1. Address analysis methods for all Chapter 15 events on a generic basis stressing verification, validation, documentation, and quality assurance.

  2. Describe application of the evaluation model concept which includes all computer programs, analysis methods not included in the computer programs, and other information used to show compliance with analyses required by 10CFR50.34.

  3. Describe an acceptable evaluation model development and assessment process based on Code Scaling, Applicability, and Uncertainty (CSAU) principles refined over the last dozen years.

- The proposed content was incorporated into DG-1096.

- The evaluation model development process is currently being updated to include development methods based on the heirarchical system decomposition principles, largely inspired by the Severe Accident Scaling Methodology (SASM).

PRINCIPLES OF EVALUATION MODEL DEVELOPMENT AND ASSESSMENT

1. Determine requirements for the evaluation model and the importance of key systems, components, processes and phenomena. A process like the hierarchacal system decomposition should be used to assure that all levels of evaluation model development are properly considered.

2. Develop an evaluation model that meets the requirements.

3. Develop an assessment base appropriate to the requirements and the evaluation model. (SA of CSAU)

4. Assess the adequacy of the evaluation model in light of analytical and experimental uncertainties. (U of CSAU)

5. Establish and follow an appropriate quality assurance protocol during the evaluation model development and assessment process.

6. Provide comprehensive, accurate, up-to-date documentation.

EVALUATION MODEL DEVELOPMENT AND ASSESSMENT PROCESS

I. Establish Requirements for Evaluation Model Capability

1. Identify transient, power plant, figures of merit.
2. Identify systems, components, processes, phases and fields that must be modeled.
3. Identify and rank phenomena and processes

II. Develop Evaluation Model

1. Select, develop and/or modify system code, other calculational instruments and procedures, boundary conditions and their relationship that address requirements established above.
2. Determine pedigree and applicability of numerics, governing equations and closure relations for the codes and calculational instruments.

III. Develop Assessment Base

1. Select and/or perform appropriate separate effects tests, integral systems tests.
2. Perform scaling analysis of experimental data base.
3. Obtain appropriate available plant transient data.

IV. Assess Evaluation Model Adequacy

1. Using the systems code and other calculational instruments of the evaluation model with consistent nodalization, perform assessment analysis of experimental base, plant transients, closed form solutions, other simple cases and benchmarks with other codes.
2. Assess scalability, fidelity and accuracy of evaluation model comparisons to data and other assessment cases.

Are there significant inadequacies?

YES → Make corrections, return to appropriate steps and reassess

NO → Perform plant transient and accident analysis

acrs0500.08

SUMMARY DISPOSITION OF GRAHAM WALLIS COMMENTS

- **31 general and specific written comments were received on 4/25/00.**

- **12 of those comments had to do with structure of the guide, improper balance, lack of a clear "roadmap" for following the guide, need for more specific guidance, and lack of focus beginning with overall code structure based on fundamental equations.**

  We agree that this should be improved and it is being addressed in DG-1096. However, care is needed to avoid unneeded specificity which could inhibit creativity, and result in unintended backfit.

- **16 comments appear to be readily accommodated.**

  These will be addressed in DG-1096.

- **3 comments we don't believe will result in changes to the guide.**

  Those comments are addressed on the next slide.

G. WALLIS COMMENTS - NO CHANGES ENVISIONED

1. **Add more specificity about when peer review should be done.**

   We do not believe that this degree of specificity is consistent with RES Office Letter 3A on Regulatory Guide Development.

2. **Effect of changing regulations on DG-1096.**

   Regulations change slowly. Any changes that we can envision relative to the requirements in 50.34 would probably have a bigger effect on SRP Chapter 15 transient definition and standards than on DG-1096.

3. **Implementation section too short; needs roadmap.**

   The content of this section is consistent with RES OL 3A and other recent regulatory guides.

STATUS AND SUMMARY

- DG-1096 on transient and accident analysis methods addresses the findings of the Maine Yankee panels and other review groups.
- Timely inclusion of current ACRS comments is the next step in the process of eventually releasing DG-1096 and SRP sub-chapter 15.01 for public comment.
- After incorporation of ACRS comments, DG-1096, SRP sub-chapter 15.01, and the regulatory analysis will be sent to OGC for concurrence and then to CRGR for review.
- After appropriate OGC and CRGR consent, the documents will be released for public comment.

Requests for Risk Information

- Industry position
  - Concur that in rare instances, risk issues should be addressed even though licensing basis met
  - NRC legal authority constrained to circumstances of "significant and unanticipated risks"
  - Otherwise would be defacto new licensing basis

NEI

Requests for Risk Information

- Industry position
  - Continue policy of Commission notification
  - Better definition of "significant and unanticipated risk"
  - Acknowledge industry burden in responding to request

NEI

Requests for Risk Information

- Industry position
  - Quantitative guidelines of Reg Guide 1.174 may not be appropriate for this purpose
    - Small change versus significant risk impact
    - Reg Guide acknowledges it goes beyond adequate protection

NEI