

NUCLEAR REGULATORY COMMISSION

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

RELIABILITY SUBCOMMITTEE MEETING

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MONDAY

SEPTEMBER 9, 2002

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ROCKVILLE, MARYLAND

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The Subcommittee met at 8:30 a.m. in Room T2B3,
Two White Flint North, Rockville, Maryland, George
Apostolakis, Chairman, presiding.

ACRS MEMBERS PRESENT:

- GEORGE APOSTOLAKIS Chairman
- MARIO V. BONACA Member
- F. PETER FORD Member
- THOMAS S. KRESS Member
- DANA A. POWERS Member
- STEPHEN L. ROSEN Member

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NRC STAFF PRESENT:

HOWARD LARSON	Designated Federal Official
AUGUST CRONENBERG	Cognizant Staff Engineer
MARK CUNNINGHAM	NRC Staff
ASHOOK TADANI	NRC Staff
MARY DRUHAN	NRC Staff
CHRIS GRIMES	NRC Staff
MICHAEL JOHNSON	NRC Staff
GARY HOLLAHAN	NRC Staff

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

(8:31 a.m.)

CHAIRMAN APOSTOLAKIS: The meeting will now come to order. This is a meeting of the ACRS Subcommittee on Reliability and Probabalistic Risk Assessment. I am George Apostolakis, Chairman of the Subcommittee.

The purpose of this meeting is to discuss stop plans, to address ACRS concerns enunciated in our letter of July 23, 2002, regarding our recommendation not to proceed with publication of the proposed revisions to Regulatory Guide 1.174, an approach for using probabalistic risk assessment, and risk-informed decision, and plant-specific changes to the licensing basis. And for Chapter 19 of the Standard Review Plan, use of probabalistic risk assessment in plant-specific risk-informed decision making general guidance.

Mr. August Cronenberg is the Cognizant ACRS Staff Engineer for this meeting, while Mr. Larson is the Designated Federal Official. The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register on August 22nd, 2002.

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1 A transcript of this meeting is being
2 kept, and will be made available, as stated in the
3 Federal Register notice. It is requested the speakers
4 first identify themselves and speak with sufficient
5 clarity and volume so that it can be readily heard.

6 We have received a request from Mr.
7 Petrangelo of the Nuclear Energy Institute to make a
8 15 statement regarding any eye views on Regulatory
9 Guide 1.174. We have not received any other requests
10 for time from members of the general public.

11 We will now proceed with the meeting, and
12 I call upon Mr. Cunningham, of the Office of Research,
13 to begin.

14 MR. CUNNINGHAM: Good morning, sir. We
15 have three of the four participants in the
16 presentation here at the moment, myself, Mary Druhan
17 will do most of the introductory comments, Chris
18 Grimes from NRR, and Mike Johnson, I believe, will be
19 joining us shortly.

20 Before we get into the formal discussion,
21 I believe Mr. Tadani would like to say a few words.

22 MR. TADANI: Of course. Thank you, Mark,
23 and good morning. I just wanted to give you my own
24 sense, perspective on the recent letter that you
25 issued on July 23rd.

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1 I think fundamentally, it is important
2 that we make sound use of risk analysis techniques,
3 and the information that's provided through those
4 analyses. And that one ought to really be looking for
5 not only good quality work, but the scope of the
6 analysis ought to be complete enough, particularly if
7 there's relevance to the decision that's being made.

8 The second element that I think we need to
9 do a better job on is the whole issue of
10 uncertainties. I think that as you noted in your
11 letter, that certainly parameter uncertainties ought
12 to be included in many of the decisions that we make
13 based on risk analyses.

14 I also think that in some cases, while
15 we've made some progress, we still need to do a better
16 job of at least attempting to use uncertainties in
17 models.

18 As you know, there's considerable ongoing
19 effort in a number of areas, and let me focus just now
20 in terms of these standards, as well as the NEI's peer
21 review guidance. You will hear about the Regulatory
22 Guide that's under development. It certainly is our
23 intention in that Regulatory Guide to articulate
24 better the whole issue of the scope and the
25 uncertainties of what is evaluations, and at least to

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1 make sure that those uncertainties are displayed, so
2 the decision-maker has that information up in front.

3 It is our intention to go through various
4 stakeholder discussions. I'm pretty sure there will
5 be an issue at the end of the day, if one were to
6 require such analyses, as to how does this all fit in
7 within the context of the backfit rule? I'm fairly
8 sure that that will be an issue if the agency were to
9 go forward and push, and make this a requirement.

10 It was our judgment, judgment that I fully
11 support, that we really ought to not hold up the
12 publication of this revision to Reg. Guide 1.174. I
13 think it has two important elements. One, certainly,
14 is to put the industry on notice, basically, that
15 there will be cases when even if the industry were not
16 to provide risk analysis to support certain decisions,
17 the staff would be able to go forward and ask for such
18 information.

19 Second issue, and the one that has been on
20 my mind for some time, is the issue of a lot of
21 changes that are taking place out there, and do the
22 risk analyses adequately address or cover those
23 changes? Certainly, cycle lengths, burn-up levels,
24 but in particular, the significant power-up rates, for
25 example, that have been approved. While we have a

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1 study underway to fully assess the impact of these
2 changes, we think it's important to get this message
3 out to the industry, to those licensees who have plans
4 to go to higher power levels would not be missing out
5 on this issue.

6 We thought, and I fully support the staff
7 views that we ought to get this revision to the
8 Regulatory Guide out, but there is, in fact, net
9 benefit. And recognizing the points you have made,
10 that we have plans to go forward and address those
11 points, get various viewpoints, and I would urge you
12 to certainly support publication of this revision of
13 the Regulatory Guide. Thanks.

14 MR. CUNNINGHAM: Mary.

15 MS. DRUHAN: Can we go to the first slide?
16 We saw the purpose of being here was to, you know --
17 we have on here initiate dialogue. We certainly have
18 had a lot of discussion on many of these issues in the
19 past, but we want to get more to the recommendations
20 that were in the letter so that ultimately we could
21 fully comprehend and understand what your concerns
22 are, what the issues are. And so, ultimately, between
23 all of us and the stakeholders, decide on how we move
24 forward from here. So today's purpose we saw more as
25 an open discussion. We haven't really prepared a full

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1 presentation. It's to go through your recommendations
2 and the issues you brought up in the letter, and to
3 ensure that we have a common understanding of them.

4 So if we go to the next slide, in reading
5 both your letter, and we also went back to the
6 Commission Briefing, and to the actual ACRS briefing,
7 and went through the transcript. And what we saw were
8 two type of concerns we felt that the Committee had
9 raised, one that we had identified as policy and
10 technical issues, and the other set of concerns and
11 issues had to deal with public confidence, so I go to
12 the next slide, and go to the first bullet.

13 When we looked at the policy and technical
14 concerns, this is our interpretation. And we'd like
15 to come back and go through each one of these, and
16 others if you feel like we did not fully categorize or
17 understand these properly. But in looking at all the
18 comments that were in the letter and in the briefing,
19 what we saw was a message saying that the Regulatory
20 Guidance that's out there is incomplete in addressing
21 all sources of risk for our nuclear power plants.

22 The second one had to deal with
23 uncertainties, a lot of concerns, and how we are
24 treating certainties, and that has been incomplete, in
25 your view, in our opinion. And the last one under

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1 "Policy and Technical", was dealing with the risk
2 matrix, that we should be looking at other ones, and
3 not necessarily just staying with CDF and LERF. And
4 so in looking at the policy and technical issues we
5 felt that you raised, they covered those three things.

6 The last concern that we picked up, we
7 characterize it as public confidence, and it had to
8 deal with that not having rigorous PRAs undermined the
9 credibility, so to enhance public confidence, we were
10 looking for more rigorous PRAs. And in a nutshell, we
11 felt that these were the four messages, or the bottom
12 lines that you're bringing up in your letter.

13 Next slide, please. So once we finish
14 today's briefing and discussion, where do we go from
15 here? We feel that there'll be a lot more dialogue,
16 many more meetings to go with. We feel, also, we're
17 going to have to bring in stakeholder input and have
18 public meetings and discussions with the stakeholder.
19 And then ultimately, depending on where we come to in
20 resolution, will depend on what we revise. It may be
21 Regulatory Guide 1.174, or it may be more appropriate
22 to revise something else.

23 At this point, we don't know where we're
24 going to go until we try and have a more full
25 understanding of what the issues are, so what we'd

1 like to do at this point is go back to the previous
2 slide, and just start walking through, and getting
3 your views. I mean, as we've said, this is an open
4 discussion. We are here more to try and understand
5 what your concerns are, and for you to share them with
6 us.

7 CHAIRMAN APOSTOLAKIS: I wonder whether,
8 before we go into the technical discussion, we should
9 hear from Mr. Petrangelo. Okay. That's fine, what
10 you suggest. Let's go back to the previous slide.

11 MS. DRUHAN: Okay. To the first bullet of
12 the previous one?

13 CHAIRMAN APOSTOLAKIS: No, the previous.
14 Just keep going forward.

15 MR. CUNNINGHAM: We've got to go back.

16 CHAIRMAN APOSTOLAKIS: Yeah, back. Just
17 the first bullet.

18 MS. DRUHAN: We went all the way back.

19 CHAIRMAN APOSTOLAKIS: You went all the
20 way. Keep going forward now.

21 MS. DRUHAN: I do have transparencies.

22 CHAIRMAN APOSTOLAKIS: No, we can do it.
23 Okay. Next slide. Next slide. Next. I think she
24 wants to go to the next --

25 MS. DRUHAN: One more slide.

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1 CHAIRMAN APOSTOLAKIS: One more slide.
2 Stop.

3 MS. DRUHAN: There we go.

4 CHAIRMAN APOSTOLAKIS: Well, now what?
5 You ladies and gentlemen disagree that the Regulatory
6 Guidance is incomplete? Well, I think a related
7 comment here is that that applies not only to the
8 issue of all sources of risk, but also other things,
9 is that there is a lot of good stuff in the existing
10 version of Regulatory Guide 1.174. The question is,
11 are these things being implemented? That's really the
12 question, so in terms of Regulatory Guidance, if I
13 read 1.174, I would say, you know, there's really no
14 problem. But the question is when the applications
15 come, are all these things really in the application,
16 or are we willing to accept applications that do not
17 really comply with everything that's in 1.174? And I
18 think the Committee has that impression, if I -- my
19 colleagues can disagree.

20 To give you an example, which is not
21 directly related to this, to the second bullet. I
22 mean, there is this wonderful discussion about
23 incompleteness uncertainty, and model uncertainty, and
24 so on. Is there a single example of a licensee
25 application where these things were, in fact,

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1 addressed? Because it's not an issue of how good the
2 guide is. The question is, how well is it
3 implemented? You want to say something?

4 MS. DRUHAN: I also -- can I ask a
5 separate question related to that?

6 CHAIRMAN APOSTOLAKIS: Of course.

7 MS. DRUHAN: You asked, you know, did we
8 agree or disagree with this? I think, you know, if
9 you read it at a high level, I don't think anyone is
10 going to, perhaps, argue. I think it's the
11 assumptions that go behind it, or the details behind
12 it, in what you're really trying to say here, if it's
13 incomplete. Are you trying to say that for every
14 application there is, you should have a complete all
15 sources of risk looked at quantitatively, or is it
16 acceptable to have qualitative analysis for some of
17 the sources of risk, for some of the applications?
18 It's what you're really saying behind this, I think,
19 is where there might be some divergence.

20 MEMBER KRESS: Let me give you one
21 perspective on that. Part of this was one of my
22 concerns, and let me give you my perspective on that.
23 Reg. Guide 1.174 has two sets of metrics in them, one
24 of which is the absolute values of the CDF and LERF,
25 and the other is the deltas. And we're saying that

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1 for changes to the licensing basis to be acceptable,
2 some sort of acceptance value has to be on both of
3 those, the absolute value, as well as the deltas.

4 Now I understand that the deltas can be
5 much more differently treated because, you know, every
6 change doesn't affect every sequence, may not affect
7 -
8 - may not matter whether there's fires, or seismics,
9 or stuff, so the deltas could be treated one way. But
10 you've got an absolute metric in there. It's the CDF
11 and LERF, and you have to know what that is, and you
12 need to -- if you're going to go by this concept, then
13 you have to have a pretty good PRA with uncertainties
14 to tell you what those are. And I think that's where
15 I come down saying, I haven't seen -- when we looked
16 at people coming in with changes to the licensing
17 basis, I haven't seen a good quantification of the
18 total CDF and LERF, because they've always had missing
19 elements, shutdown, fire, seismic. And not only that,
20 a lot of them come in with multiple plants on a site,
21 and I think that's a missing ingredient in there, so
22 that was my perspective on that.

23 PARTICIPANT: If you go back to the
24 development of the guide itself, I think we were
25 trying -- we were encouraging people to have a more

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1 complete, more quantitative analysis, but we also left
2 the door open to say if you can make a qualitative
3 argument as to why some aspect of the risk, shutdown
4 or something like that is small in an absolute sense,
5 then we can work with that.

6 I guess part of what you're saying is
7 well, that may be in concept okay. I think part of
8 what you're saying is in actual implementation, you
9 haven't seen the examples where the licensee, or the
10 staff, or whatever has given you sufficient confidence
11 in the answer that that's okay.

12 CHAIRMAN APOSTOLAKIS: And it's not just
13 small though. It's not just small. We have not seen
14 a situation where somebody comes in and says look,
15 like everybody else, we have a good Level I PRA for
16 power operations. We've done everything, and
17 meanwhile your CDF and LERF is this. Now because we
18 haven't really done a very good low power and shutdown
19 PRA, we can't give you an estimate of the total CDF.
20 But here is a number of reasons why we think that the
21 CDF wouldn't change, or it should be increased by a
22 factor of two, or a factor of 1.8.

23 That's a qualitative, semi-quantitative
24 argument that the Committee would appreciate. But
25 often, there is silence, nothing. We haven't done

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1 good fire analysis, or earthquake, or whatever, but
2 here are some arguments that we believe will affect it
3 this way, and that would be fine. I mean, we're not
4 really asking for a perfect PRA. But, I mean, if the
5 guide says you put the absolute values there, then you
6 owe it to people, I think, to go through arguments
7 like that.

8 And another point here is that's --
9 related to the public confidence issue. If you claim
10 that something is bounding, I think you should
11 demonstrate it, somebody should demonstrate, give some
12 arguments why it's bounding, rather than saying well,
13 it doesn't matter.

14 MEMBER KRESS: And one other thing that
15 disturbs me about this is we have these acceptance
16 values, which we all means on the absolutes, but we
17 rarely see a true mean, because there's no uncertainty
18 help us to get the mean. And not only that, it seems
19 to me like a viable acceptance criteria ought to
20 depend on the uncertainty in it. And, you know, just
21 saying the mean just to apply to all plants where some
22 uncertainties may be much bigger than the others,
23 doesn't seem to me quite the right concept that we
24 ought to have. Now this is questioning the
25 fundamental basis of 1.174, but it seems to me that

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1 there's a problem with that.

2 MEMBER ROSEN: One of the particularly
3 dissatisfying parts of it to me is, when you follow
4 along the scenario that Dr. Apostolakis and Dr. Kress
5 have laid out, and you press a licensee for some
6 answers in this area, someone invariably gets up and
7 raises the flag and says okay, you can ask these
8 questions, but this is not a risk-informed submittal,
9 so you're pressing too far. And the front wheels of
10 the train come off the track. You can't get any place
11 with that kind of discussion, so that is part of where
12 you end up at the very end of this discussion.
13 There's no way to back out of that.

14 MR. GRIMES: This is Chris Grimes. I
15 think that when we talked about the need to develop a
16 plan for coherence, we envisioned that, as you point
17 out, there are certain applications of these models
18 for certain decisions. And you have to reach a point
19 at some point, you have to reach a point in the
20 process where you decide what is the degree of rigor
21 for its purpose, and what level of detail do you have
22 to go into. And we, as Dr. Rosen points out, we
23 haven't organized all of the possible regulatory
24 applications for these models in such a way that we
25 could say that there's a greater combination of

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1 applications and rigors that we could articulate to
2 the public. And I think that in the end, we're going
3 to have to couple the regulatory guidance and public
4 confidence in terms of the level of detail, and the
5 level of rigor in the analysis is appropriate for its
6 purpose, appropriate for the decision process.

7 Up until now, we've talked about risk-
8 informed decision making being risk-informed for a
9 particular risk purpose. We haven't said what that
10 is. As you point out, most of the time we say we're
11 making risk-informed actions, and all they are are
12 well-organized deterministic decisions.

13 We're now facing having to organize the
14 Commission's policy statement in a way that we can
15 demonstrate how that's being implemented.

16 CHAIRMAN APOSTOLAKIS: I would say, Mr.
17 Grimes, that what you just said applies to the
18 calculation of delta CDF and delta LERF, but
19 unfortunately, the diagrams, as Dr. Kress pointed out,
20 require the absolute value, as well. So for
21 calculating the change, there is absolutely no
22 question that you will have to do what is required for
23 this particular decision. But then when you go to the
24 two figures, you enter the horizontal axis with the
25 absolute values.

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1 MR. CUNNINGHAM: I'm not sure that's
2 unfortunate, but that's it.

3 MEMBER ROSEN: It's fortunate, but then
4 you have to have all sorts of risks. I don't think
5 the absolute value is the absolute value part of the
6 risk.

7 MS. DRUHAN: What do you do in a situation
8 where you have maybe some plant where fire is a high
9 contributor. For seismic, they aren't vulnerable at
10 all, and they want to do something in the seismic
11 area. Are we now saying no, they can't do it because
12 we're going to hold them hostage to the fire part?

13 CHAIRMAN APOSTOLAKIS: How would you know?

14 MS. DRUHAN: Well, Tom is saying yes.

15 CHAIRMAN APOSTOLAKIS: No, but how would
16 you know that the seismic risk is much lower than
17 fire, unless you've done all sources of risk? That's
18 the Committee's position, so you're speculating there.

19 MS. DRUHAN: No. I think there's stuff
20 that you can do qualitatively to know whether you're
21 vulnerable for seismic.

22 CHAIRMAN APOSTOLAKIS: The Committee
23 opened the door there by saying that the analysis
24 should be rigorous. You can -- if you demonstrate
25 that this is the case without doing a detailed

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1 analysis, fine. But you should demonstrate it, not
2 just say we believe it is, or it is. The Committee is
3 not requiring extreme rigor in everything, but it says
4 -- well, rigor has many -- no, I'm sorry. The
5 Committee does require rigor. It doesn't require
6 detailed calculations all the time. But it says if
7 you're going to use something approximate, just show
8 that it is approximate.

9 MEMBER POWERS: Can I understand what's
10 meant by qualitative PRA, just a little bit more
11 explicitly? I can imagine a variety of things when
12 you say qualitative. I can imagine, for instance, an
13 event tree in which you don't have good estimates of
14 the probabilities of the various junctions, and their
15 uncertainty distributions, but you can have bounds on
16 them, which might be one. And you walk through that
17 just qualitative. I can imagine something less than
18 that, as well. What exactly do you have in mind?

19 MR. CUNNINGHAM: I'm just -- one of the
20 things we may be doing here is mixing together two
21 terms that we talk about qualitative. I think what we
22 mean is not probabalistic. Not quantitative in the
23 probabalistic sense, so you could have quantitative
24 analyses. Seismic margin analyses are very
25 quantitative, they're not particularly probabalistic

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1 in the sense that it would yield a core damage
2 frequency. But I think a margins analysis has a role
3 in helping make the case that the risk from seismic
4 may be small in the particular case, or something like
5 that.

6 MEMBER POWERS: So when -- I mean, one of
7 the possibilities that I hadn't considered is that
8 when you say a qualitative PRA is, in fact, a
9 deterministic analysis.

10 MR. CUNNINGHAM: Yeah, it could be. It
11 could be. Again, in --

12 CHAIRMAN APOSTOLAKIS: Or a bounding
13 analysis, from what you said, would be a bounding
14 analysis.

15 MR. CUNNINGHAM: That's right.

16 CHAIRMAN APOSTOLAKIS: Maybe we need a
17 better term than qualitative.

18 MEMBER KRESS: Yeah. When you do a
19 seismic heathcliffe - I don't know how to pronounce
20 it - isn't that a determination that there's low
21 probability of failure?

22 MR. CUNNINGHAM: Yes, high confidence, low
23 probability of failure. Yes.

24 MEMBER KRESS: So it is a probability.

25 MR. CUNNINGHAM: Yeah, but it's

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1 probabalistic up to the point, but it doesn't include
2 the frequency of the initiator. So in a pure sense,
3 it's not a PRA.

4 CHAIRMAN APOSTOLAKIS: You postulate the
5 -

6 -

7 MR. CUNNINGHAM: Yes, that's right.

8 CHAIRMAN APOSTOLAKIS: So it's kind of
9 bounding.

10 MR. CUNNINGHAM: That's right. It's a
11 mixture of all kinds of things. And certainly,
12 seismic margin analyses have a role. But again, I'm
13 hearing, at least in cases that the Committee has
14 seen, they haven't seen the argument put forward that
15 -- in a sense that would tell them in this decision,
16 this is how we used the margins analysis to conclude
17 that the seismic was -- the absolute contribution from
18 seismic was small. But the Committee hasn't seen
19 that.

20 CHAIRMAN APOSTOLAKIS: There should be
21 some argument. Yeah.

22 MR. CUNNINGHAM: Okay. And the Committee
23 isn't seeing that, at least in whatever examples you
24 have had before you.

25 CHAIRMAN APOSTOLAKIS: No.

1 MR. CUNNINGHAM: Okay. One of my, what I
2 have a sense for is, what applications the Committee
3 has and hasn't seen. I think routine types of license
4 amendments, the Committee just typically does not see.

5 MEMBER KRESS: Well, we're partially
6 concerned with that, but in our mind, Reg. Guide
7 1.174 has now become a synonym for risk-informing the
8 regulations in a broader sense, rather than just
9 change it to the licensing basis. And that concerns
10 us because, you know, in one sense it may have been
11 okay just for changes to the licensing basis, but when
12 we now use the concept or the hypothesis and the
13 principles in the broader sense, then we begin to
14 worry about some of these other things.

15 MR. CUNNINGHAM: Perhaps that's a somewhat
16 different issue, but how is the Staff, and how is the
17 licensees extending the concepts and the principles of
18 1.174 in other applications? Clearly, we are doing
19 it, and it's --

20 MR. GRIMES: If I could, I'd like to turn
21 the question around in a different way. The
22 construction of Reg. Guide 1.174 was originally --
23 envisioned small changes to a deterministic licensing
24 basis, or a traditional licensing basis. And at some
25 point, you go from the retail to the wholesalers. And

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1 as I understand your point, we should be in a position
2 that when we're making wholesale decisions for
3 licensing basis, we should be able to articulate to
4 the public how we've treated all sources of risk,
5 because historically we've looked at this from the
6 standpoint of, we only looked at the risk that is
7 important for the purpose of the change. But now have
8 we reached the point where we're making changes, so
9 many changes to the licensing basis, that we should be
10 able to clearly articulate how all sources of risk
11 have been treated in this change to the licensing
12 basis.

13 MR. HOLLAHAN: Yeah. This is Gary
14 Hollahan of NRR. I'd like to make a few points
15 following up on that. I think the Committee has made
16 a good point about, you know, where are the examples
17 of submittals from the licensees that really follow
18 Reg. Guide 1.174 in some detail?

19 I have some sympathy for that subject,
20 because when I look at what the Staff is doing, what
21 I see is examples where the Staff is, in fact, in our
22 safety evaluation, doing some analysis to show that
23 seismic may not be important because we want to
24 document, you know, the reasons for our decisions, but
25 I think there is a lot of room for the industry to

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1 grow into better and more substantive submittals on
2 their part.

3 I think when you look at the submittals
4 and the safe valuations together, I think we do a
5 respectable job in covering the scope of Reg. Guide
6 1.174 issues. I would like to see a little shift to
7 have the licensees take on more of those roles,
8 quantitative and qualitative, and have less of that
9 done by the Staff. So I think there, you know,
10 clearly there's room to grow in that area.

11 I'd like to make another point, that I
12 think is a difficulty in this whole discussion; and
13 that is, if you look at the articulation of the issue
14 on the board, talks about incompleteness, and a couple
15 of the Committee's concerns appear to be open-ended,
16 do more, do better. And it's not clear how much is
17 good enough. And I think we've dealt with this issue
18 before in a different context. And just let me lay it
19 out as a, not necessarily a roadmap for this issue,
20 but an example of how to deal with these issues.

21 I think it comes from this Committee as
22 well, and that is, the concern over thermal hydraulic
23 issues, and the quality of thermal hydraulic codes was
24 a big issue for many years in the industry and with
25 this Committee. And I think that issue has largely

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1 sorted out through a formalized and organized process.
2 You know, the Staff endorsed something called the CSAU
3 process, which basically is the use of phenomenon
4 identification and ranking tables, that sort of
5 process. And in my mind, what happened in that arena
6 was, rather than worrying about all the detail of all
7 the issues, we developed a technique that the industry
8 could use to focus on what were the most important
9 issues, what's the most important phenomenon for the
10 concern of interest?

11 And remember, one of the things we've said
12 about risk-informed regulation is we're trying to
13 focus our resources and the industry's resources on
14 things that are most important, so when we talk about
15 incompleteness or more quantitative analysis, it seems
16 to me we need to be focusing those issues on things
17 that we really think are important. And perhaps what
18 we need is some formal way of deciding what are the
19 most important issues, so that we're not diluting our
20 resources and our efforts.

21 You can always model systems, you know,
22 down to another level of detail. You can always
23 collect more data, but it doesn't always change the
24 results, so I think if you look at these issues as
25 open-ended, it scares people.

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1 MEMBER KRESS: Well, Gary, part of what -
2 excuse me. What bothers me a little about that is,
3 we're dealing here in the abstract analytical world
4 with PRAs, and to decide what's important to focus on
5 and what's not important to focus is, you need some
6 analytical estimate of the importance of particular
7 things. And without having actually put in models for
8 these and analyzed the, you're kind of using intuition
9 and guessing. So, you know, it was partly our concern
10 that you need pretty good PRAs. It wasn't open-ended.
11 You need to address all the things in there, because
12 we're dealing in an analytical world, and we don't
13 have experimental evidence to tell us, so I don't see
14 how to go about focusing on what's important without
15 having, at least, some basis for deciding that
16 importance.

17 And, you know, it may not have to be a
18 full complete PRA for every plant, but maybe something
19 like the SPAR models or something have to be complete
20 in some sense for us to decide what's important, and
21 how important things are.

22 CHAIRMAN APOSTOLAKIS: I, also, would like
23 to challenge this argument of open-endedness. It
24 seems to me there is a sentence in the letter that
25 people are not paying attention to, and the EDO's

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1 response to our letter was completely silent on it.

2 "If bounding estimate of the risk
3 contribution plant modes not rigorously analyzed are
4 used, justification of the estimates should be
5 provided." It seems to me, that sentence bounds the
6 problem. You cannot claim that our position is open-
7 ended when we write something like this, because we're
8 saying well, yeah. Okay. If you want to claim that
9 this particular mode does not contribute
10 significantly, just show it. You have some bounding
11 analysis, something, some argument, some deterministic
12 argument perhaps, but don't just rely on intuition, as
13 Dr. Kress said, to say that it's not.

14 Remember the Reactor Safety Study, how it
15 dismissed earthquakes in two pages? And then design
16 on PRAs coming four or five years later, and they say
17 earthquake --

18 MEMBER KRESS: Uh-huh.

19 CHAIRMAN APOSTOLAKIS: And again, you
20 cannot blame. They did a decent job based on the
21 state of knowledge they had at the time, relying on
22 their intuition. They said look, there is too much
23 redundancy here, so it can be important. And then you
24 do a detailed analysis, and the results are completely
25 different. So I think this sentence is really an

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1 important one that shows that the Committee is
2 realistic.

3 MEMBER BONACA: Yeah, not just an
4 observation that -- first of all, I second that
5 completely, but the point that you made before, Gary,
6 was that there has been compensation on the part of
7 the Staff for some of the shortcomings in the
8 application. And that's exactly a very good point.

9 A number of the applications I've seen
10 based on Reg. Guide 1.174 go out of their way to
11 explain why some of the shortcomings in the PRA
12 analysis provided can be accepted because of a lot of
13 different considerations. It troubles me that the
14 Staff has to do the complimentary work. It should be
15 part of the licensee application.

16 Any time -- I mean, a PRA analysis should
17 be like any other analysis where you have to define
18 what it applies to, the applicability of the
19 methodology used, what kind of affect that could
20 result from the change are not being considered, and
21 why they're not being considered, rather than being
22 mute about this. Some of the examples we've had in
23 power uprates are exemplary of that. I mean, they've
24 been skimpy, and they have had -- some affects are not
25 even discussed.

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1 And one may say well, they're not
2 significant. Well, then say it, and say why they're
3 not significant. You know, that kind of information
4 is necessary to understand that the person who is
5 using this analytical tool, understands what he's
6 doing with it. And it puts a bound on what he's
7 considering, so you know, you already recognize in the
8 statement that that's something that the industry has
9 to go into. We need to see that happening, and it
10 hasn't happened.

11 CHAIRMAN APOSTOLAKIS: Yeah. And since
12 you mentioned power uprates, that's another example.
13 I'm not sure exactly how it falls within this letter,
14 but my personal complaint is that in the majority of
15 cases, PRA is not treated with the same discipline
16 that we are putting on other analysis, the so-called
17 deterministic analysis, perhaps because of tradition.
18 And in the power uprates, I was very impressed by the
19 amount of detail that the staff went into, looking at
20 human errors, identifying all possible human actions
21 that could be affected by either power uprate, then
22 identify the two or three that were -- I remember now
23 several of them we have seen.

24 The two or three that were important, and
25 then saying that, you know, the change in the time is

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1 not significant, so we don't believe that there will
2 be any significant change in the probability of
3 failure, of human error. If they stop there, I would
4 be out there applauding the staff' approach, but then
5 they continue and say the licensee used the EPRI
6 model, and showed that the number goes from 1.8 ten to
7 the minus three, to 1.2 ten to the minus three. The
8 problem with that is, first of all, it does not
9 recognize that human error models that will make such
10 distinction do not exist.

11 Second, it refers to a model that has not
12 been reviewed by the staff, as far as I know. And the
13 argument we got back was well, gee, a lot of licensees
14 are using it, so it must be good. Well, I haven't
15 heard that in the case of thermal hydraulics, or
16 materials, or the other traditional sciences. And, in
17 fact, these are the people who complained when we were
18 eliciting expert opinions that we are replacing
19 science by voting, so now I'm reversing the argument.
20 You are replacing analytical rigor by voting.

21 And then the last point that was made was
22 well gee, you know, maybe you're right, but this is
23 not a risk-informed application, so what do you want?
24 This applied some risk information. This is good
25 enough. Well, no, it is not good enough. It is not

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1 good enough. It does not promote public confidence.
2 It does not promote ACRS confidence.

3 I don't understand that. If it is not
4 labeled as a risk-informed application, where you can
5 do anything you like with risk information. It
6 shouldn't be that way. And the argument was very good
7 up until the point where they said, and the licensee
8 used the EPRI model. The staff should say look, we
9 will not pass judgment on this, because we have not
10 reviewed it. But we accept the application on the
11 basis of what you just said, which I thought was very
12 good.

13 So it's this kind of discipline and rigor
14 that I think the Committee is requesting here, and I
15 repeat. It is this key sentence there, "If bounding
16 estimates are going to be used, just justify them."
17 Maybe all you need to do is justify them once, but --
18 and there are numerous examples. You don't need to do
19 uncertainty analysis, because even with point
20 estimates you're within a factor of two of the mean
21 value. I've never seen anybody do -- maybe you're
22 right. A factor of two or three. I don't think it's
23 going to be more than that.

24 But then somebody comes back and says
25 well, gee, maybe that's true for CDF but not for LERF,

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1 because the state of knowledge dependencies are
2 stronger there and so on. Well, it would be
3 worthwhile to see whether, you know, doing a point
4 estimate analysis for Level I gives reasonable
5 results. And then whether it gives reasonable results
6 for LERF, as well. But we haven't seen anything like
7 that.

8 People say well, here, you know. Nobody
9 does it, and we know it's within a factor of two. I
10 don't know why. It may be true. So I'm not sure that
11 the statement regulatory guidance is incomplete is
12 really what the Committee said. It's not what we
13 said. I like Regulatory Guide 1.174. It's very good.

14 MR. GRIMES: Dr. Apostolakis, and if I may
15 -- what I hear you saying is it's not so much that you
16 have an issue with whether or not we have adequate
17 regulatory guidance for the presentation of
18 probability and consequences, as much as you have a
19 problem with the guidance that we have on how we
20 articulate the dissemination of information and the
21 development of decision-making. A certain amount of
22 information that we present in our safety evaluation
23 is simply there for the purpose of divulging it to the
24 public, but it does not necessarily get drawn to the
25 basis for the conclusion.

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1 In much the same way that we may have not
2 read enough into your statement concerning the
3 applicability of bounding decisions, there's certain
4 information that we put in the safety evaluations, but
5 then we don't go onto say, therefore, the staff
6 concludes it's acceptable. And that's an important
7 distinction in the way that we write our safety
8 regulations.

9 CHAIRMAN APOSTOLAKIS: It could be a
10 contributing factor. Yes. But I certainly don't
11 believe that the Committee claimed that there is no --
12 that the regulatory guidance is incomplete. I think
13 if you read Regulatory Guide 1.174, it covers all
14 grounds. This is implementation, I guess. And then
15 how we go through the integrated decision-making
16 process.

17 MR. CUNNINGHAM: Okay. And when I think
18 about incompleteness here, I think about just that
19 type of thing, is there additional guidance in 1.174
20 and the SRP or something that might push us in the
21 direction so that it's clear that the licensee is
22 responsible for doing more of what Gary says, of
23 bringing in the case, for example, ahead of time of
24 this is why these things are important, or not
25 important. That's what I was thinking about as an

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1 extension or an incompleteness in the current
2 guidance. Maybe it's not 1.174. Maybe it's some
3 place else.

4 MEMBER KRESS: One of my hobby horses is,
5 it's silent on the question of multiple plants on a
6 site.

7 MR. CUNNINGHAM: I'd like to come back to
8 that.

9 MR. HOLLAHAN: I'd like to follow-up. I
10 think there are about a dozen issues floating around
11 right now. I'd like to just talk about a couple of
12 them.

13 The Committee's letter, which didn't
14 support Rev. 1 to Reg. Guide 1.174, I think was read
15 by the staff as a reluctance on the part of the
16 Committee to re-endorse Reg. Guide 1.174. And I think
17 a lot of what we heard today has got a lot more to do
18 with how well it's implemented, than the guidance
19 itself. And if nothing else, that has made this
20 discussion very helpful.

21 With respect to the issue of power uprates
22 and the role of PRA, and whether they're given the
23 same degree of respect as the engineering analyses,
24 ironically, the revision that the staff is trying to
25 put into Reg. Guide 1.174 is, in fact, the guidance

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1 document to clarify the role of risk analysis in non-
2 risk-informed submittals, so one of the reasons we'd
3 like to go forward with that, is to clarify to people
4 when the PRA is playing a central role, and when it's
5 playing a supportive role in the license amendment
6 process.

7 Power uprates is a good example which the
8 licensee in all of the cases to date isn't asking for
9 an exemption to the regulations. They're showing that
10 at some higher power level, the plants meets all of
11 the current regulations. When they submit that
12 information and they do the thermal hydraulic
13 analysis, and the fuel and materials, and all those
14 other issues, in effect, they're showing that they
15 meet the regulations just as, you know, a new plant
16 would.

17 I think it's natural in that context that
18 the PRA plays a supplemental role, and not the key
19 role. Whereas, Reg. Guide 1.174 and risk-informed
20 regulation plays the central role, is when the
21 licensee doesn't want to follow the existing
22 regulations. And then, you know, you're in new and
23 different territory. Okay? And you need some
24 guidance. And I think Reg. Guide 1.174 is the best
25 that we, or a lot of other agencies, have ever done in

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1 providing guidance on how to go beyond the boundaries
2 of the current constraints. So it plays a central
3 role in rule-making, when we're changing what the
4 rules are, or when we're going outside the regular
5 rules.

6 When a licensee is meeting the existing
7 regulations and does it with the kind of engineering
8 margins and analyses that they normally do, I think
9 it's natural that the PRA plays a supplemental role.
10 And, I guess, I'm not insulted by that. It's clear
11 what the roles are.

12 CHAIRMAN APOSTOLAKIS: Let me comment on
13 that. I think my answer will come back to something
14 that Mark said. I think the part of the analysis that
15 the staff did going through the PRA, looking for --
16 and the licensee, in fact, looking for the human
17 actions, the accident sequences where these actions
18 appear, and evaluating them, and the time that it
19 would be available to the operator. That, to me,
20 would be a good example of what Mark called the
21 qualitative evaluation, PRA-kind of evaluation. And
22 I recognize it's in a supporting role. That's fine.
23 Stop there.

24 It seems to me, going beyond that and
25 implicitly blessing a model you have not reviewed,

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1 which now my point goes beyond the letter, of course,
2 is something that I don't think is appropriate. And
3 it shows a certain attitude towards the PRA that I
4 don't like.

5 You know, when you put something on paper
6 that deals with PRA, you should be as cautious as when
7 you do it in another discipline, and ready to defend
8 it. Not just say well, the licensee said that the
9 number went from there to there, and it's okay. They
10 used their model. That's not acceptable, but this is
11 a good example of a supporting role that Gary
12 mentioned, because all this human performance analysis
13 is based on a PRA. And it is really a qualitative
14 evaluation, ending up with some quantitative estimate
15 based on judgment, that look, if the time goes from 42
16 minutes to 39, we really don't expect to see a
17 significant change in operator performance. That's
18 good enough. It's acceptable.

19 MEMBER KRESS: I'd like to also have a
20 comment on what Gary said, and it's something that's
21 bothered me ever since I've been on this Committee.
22 The current set of regulations are by no means
23 perfect. We end up with a set of plants out there who
24 have a distribution of risk, some much worse than
25 others, some very good. Most of them -- at least most

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1 of them have an acceptable risk, although we haven't
2 really defined what an acceptable risk is. We have
3 the safety goals, but we don't say that's an
4 acceptable risk in an individual plant.

5 Now when a plant comes in with a
6 substantial power uprate, as an example, just as an
7 example, it has been my feeling that if that plant is
8 bordering on an unacceptable risk for its location and
9 its design, that ought not be approved, probably in
10 the name of public acceptance, in the name of
11 satisfying our mission of keeping the risk acceptable.

12 We don't have anything called an
13 acceptable risk for an individual plant. And we don't
14 have the PRA capability to determine whether that
15 plant meets it or not. I would not put the PRA in
16 this case in a subsidiary role. I would say we need
17 a very good PRA, and we need to decide whether that
18 plant is bordering on an unacceptable risk. We need
19 a definition of what unacceptable risk is. We don't
20 have any of this, and that has bothered me ever since
21 I've been on the Committee. And I refuse to believe
22 that just because they meet the body of regulations,
23 that they are still at an acceptable risk level. You
24 know, that's an assumption everybody else makes, but
25 I have yet to come to that determination.

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1 MR. CUNNINGHAM: So in a sense, you're
2 saying there's a class of regulatory decisions where
3 the use of PRA should not be voluntary.

4 MEMBER KRESS: Yes.

5 MR. CUNNINGHAM: Okay.

6 MEMBER KRESS: Because we're in the
7 business of regulating risk.

8 CHAIRMAN APOSTOLAKIS: This is way beyond
9 the letter.

10 MEMBER KRESS: I know. I mean, that's why
11 I said --

12 CHAIRMAN APOSTOLAKIS: I understand your
13 point.

14 MEMBER KRESS: Just giving a personal
15 opinion. It goes well beyond what the Committee --
16 the Committee probably wouldn't support that.

17 MR. HOLLAHAN: Well, it seems to me, one
18 of the difficulties of the subject is, Dr. Kress just
19 made what sounds like a very reasonable argument. And
20 Dr. Apostolakis made a very reasonable argument, and
21 those are pretty far apart. I think it would be
22 impossible for the staff to follow both of those
23 thoughts at the same time.

24 CHAIRMAN APOSTOLAKIS: And I must say, Mr.
25 Hollahan makes a very reasonable argument just now.

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1 MEMBER POWERS: How many Marc Anthonys can
2 we try?

3 MR. CUNNINGHAM: This is very useful in
4 the sense of illuminating some of the concerns of the
5 Committee, that I'm not sure I'd heard it that
6 precisely before.

7 CHAIRMAN APOSTOLAKIS: I must say, I was
8 shocked when Mr. Hollahan said that he read the letter
9 as meaning that the Committee refuses to endorse 1.174
10 again. No, absolutely not. 1.174 is very good. It's
11 the implementation that creates problems.

12 MEMBER KRESS: Well, we haven't talked
13 about risk metrics yet. That may be another area
14 where some of us feel is the incomplete. For
15 instance, Mario might comment on it.

16 MR. HOLLAHAN: Before we leave George's
17 comment, it seems to me that if implementation is a
18 major issue, then maybe the Committee and the staff
19 ought to sit down and go through one of the examples.
20 Okay? As opposed to just talking about the Reg. Guide
21 1.174.

22 CHAIRMAN APOSTOLAKIS: Could be, yes.

23 MR. HOLLAHAN: Perhaps the staff ought to
24 -- I mean, we didn't want to ask for examples today.
25 We didn't bring you any. Perhaps we ought to go back

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1 and think about that subject, and maybe offer some
2 example that we can put on the table, provide either
3 a past one, or maybe one that we're doing.

4 CHAIRMAN APOSTOLAKIS: Right.

5 MR. HOLLAHAN: And discuss it.

6 CHAIRMAN APOSTOLAKIS: Yeah.

7 MR. HOLLAHAN: And that may be a more
8 practical way of getting to the issues of, you know,
9 what would a good submittal look like? What would a
10 good safety evaluation that people could rally around.

11 CHAIRMAN APOSTOLAKIS: I agree.

12 MR. JOHNSON: George, I was -- I'm sorry.
13 I've been thinking this for a few minutes now. I
14 think maybe what we want to do is offer maybe a class
15 of examples from various applications, to give you a
16 feeling for what we got in and, you know, what
17 submittals look like, and what we did with it, and why
18 we did what we did with it. That might be a help to
19 the Committee, and it might help us understand what it
20 is when you say that you have concerns about how we're
21 implementing Reg. Guide 1.174.

22 CHAIRMAN APOSTOLAKIS: Let me raise now a
23 question. I'm sorry.

24 MEMBER ROSEN: Can I follow-up on one
25 thing, George?

1 CHAIRMAN APOSTOLAKIS: Of course.

2 MEMBER ROSEN: I think when we get into a
3 lot of the details of the Committee's concern, but
4 enable us to not get too mired down in that view.
5 Reflect for a minute about what we're trying to
6 achieve. What's the desired outcome of this
7 discussion?

8 It seems to me it's coherence, and in that
9 sense, coherence between what the licensee, the
10 applicant, perhaps, is expected to provide, what the
11 staff is going to look at and expect, and what the
12 ACRS is going to look from both the applicant and the
13 staff for different issues.

14 In some cases, there should be no risk
15 information. In other cases, risk information may be
16 supplementary. In the third case, it may be central.
17 And some sort of matrix could be developed against
18 those three things where the Committee, the applicant
19 and the staff all know what's going to be required at
20 the end. And that seems, to me, the goal.

21 CHAIRMAN APOSTOLAKIS: That would be
22 helpful, but let me ask a different -- you have a
23 comment on this, Mary?

24 MS. DRUHAN: I had a question.

25 CHAIRMAN APOSTOLAKIS: I want to raise a

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1 question. Oh, question to Mr. Rosen?

2 MS. DRUHAN: No, to the Committee.

3 CHAIRMAN APOSTOLAKIS: Go ahead.

4 MS. DRUHAN: I'll be honest. I'm
5 confused.

6 CHAIRMAN APOSTOLAKIS: Is that a question?

7 MS. DRUHAN: The reason I'm confused is
8 that, you know, it sounds like you're very happy with
9 Reg. Guide 1.174, and it's all an implementation
10 issue. But I go back to your letter, and I see
11 statements in the letter that says Reg. Guide 1.174
12 should state that changes to the licensing basis will
13 require PRAs that conform at least to Category 3 of
14 the ASME Standard, blah, blah, blah.

15 To me, that doesn't sound like an
16 implementation issue. That sounds like something you
17 want the reg. guide to change.

18 CHAIRMAN APOSTOLAKIS: In that case, yes.

19 MEMBER ROSEN: We probably would be happy
20 if there was a standard review plan, but at least it
21 was some place.

22 MR. CUNNINGHAM: I think what Mike was
23 talking about, and the matrix you're talking about,
24 will inevitably lead to either changes to 1.174,
25 presuming we reach some common ground, 1.174, or

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1 Chapter 19, or something. Show up some place in terms
2 of better guidance to everybody.

3 MEMBER ROSEN: Again to that coherence, so

4 MR. CUNNINGHAM: Yes, sir.

5 MEMBER ROSEN: So the licensee who wants
6 to make a change can go into that matrix and say okay,
7 we're going to have to get into this box. To do that,
8 we might have to improve our PRA in this respect, and
9 everybody get on the same page.

10 CHAIRMAN APOSTOLAKIS: Since you raised
11 this issue of --

12 MS. DRUHAN: There were two parts to my
13 question.

14 CHAIRMAN APOSTOLAKIS: Okay.

15 MS. DRUHAN: And so maybe --

16 CHAIRMAN APOSTOLAKIS: Go ahead.

17 MS. DRUHAN: The second part of that, it
18 seems to me that that statement is contradictory with
19 that, you know, your level of detail is going to be
20 commensurate with your decision, because if you say
21 you have to conform to Category 3, or whatever
22 category it is, you're saying you have to have a PRA
23 that meets all of these regardless of the application.

24 CHAIRMAN APOSTOLAKIS: No, because of the
25 baseline issue that we've discussed, that you enter

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1 the axis, the horizontal axis with an absolute value.
2 The delta CDF does not require this. But if you have
3 it, of course, it's easier. But that's only the
4 vertical axis. Right? The horizontal says absolute
5 value. And then that brings me to my next question.

6 What is wrong with that? Why doesn't
7 every unit have this? Having done the IPE and IPEEEs,
8 how expensive is it to actually have a Category 2 PRA?
9 I mean, there are a very licensees, as we all know,
10 that have actually pushed the state-of-the-art. But
11 the vast majority, I guess, don't have this.

12 MEMBER POWERS: Forwards or backwards?

13 MR. HOLLAHAN: Aren't these questions for
14 the industry?

15 MR. CUNNINGHAM: I think the staff needs
16 to answer the question. What information do we need
17 to make regulatory decisions? Here are many reasons
18 why licensees might want to have a state-of-the-art
19 PRA, and I think that -- I don't think the staff can
20 answer that question. Mr. Petrangelo will be up here
21 in a little bit, and you can ask him that question,
22 perhaps get a better answer.

23 MEMBER BONACA: I guess -- let me just
24 take a simple example. I don't think that -- and I am
25 going to view that back, because I wasn't part of the

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1 Subcommittee in that time, but I don't think the Quad
2 City event was prominent at all in the application for
3 a power uprate for the plant. Okay? Even in the
4 discussion, so it was not quantified as part of the
5 risk increase associated with a power uprate. It
6 wasn't even treated, wasn't discussed.

7 Now it happened. Are we going to expect
8 that in the next power uprate there will be a big
9 discussion on the possibility of components failures
10 due to, you know, change in a different frequency
11 level, and so on. I mean, see what happened, we have
12 on record a risk evaluation that already is flawed in
13 a sense. I mean, it doesn't address an event which
14 happened immediately we went to a power uprate.
15 That's the kind of thing that bothers me somewhat.
16 Okay? And the superficiality of some of the
17 applications that do not consider all the possible
18 affects. I'm not saying that that's a significant
19 contributor. I never said that. I'm only saying that
20 a proper evaluation should give consideration to all
21 possible affects, and some of those there may be good
22 justification for not quantifying, because we have
23 some good deterministic reasons for not quantifying,
24 or certain expectation that we can qualitatively
25 address. And that's just an example.

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1 CHAIRMAN APOSTOLAKIS: And I have some --
2 just to continue on this. To me, a significant change
3 in the regulatory guide would revisit the integrated
4 decision-making process, because that's kind of fuzzy.
5 And that was 1997, you know, it's okay. But in light
6 of the experience, and one example Dr. Bonaca just
7 gave us. There's another example.

8 The way I understand the integrated
9 decision-making process, we have the PRA and put delta
10 CDF, delta LERF, and all the insights that go with it,
11 not just the numbers. And then we look at defense in
12 depth, safety margins, to make sure that, you know, we
13 are covering everything, and the weaknesses and
14 incompleteness issues in the PRA are taken care of by
15 deterministic means. Otherwise, it would have been a
16 risk-based approach.

17 Now we have the issue of the Davis-Besse
18 safety culture. We know that PRAs do not include
19 organizational issues and management, and cultural
20 issues, and so on. What kind of compensatory measures
21 do we take when we address defense in depth and safety
22 margins to cover that in our integrated decision-
23 making process?

24 Now that -- my comment is not intended as
25 a criticism of the existing regulatory guide, because

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1 this is new development. But if we are to revise it,
2 it seems to me that we ought to pay attention to the
3 operating experience, and ask ourselves are we really
4 integrating everything in the decision-making process?
5 And if the PRA doesn't do that, what else am I doing
6 to make sure that this thing will not happen? Or is
7 that completely irrelevant, in which case again, if
8 bounding estimates are to be provided, they should be
9 justified. So that would be a significant change, and
10 that would certainly justify revising the regulatory
11 guide in light of experience.

12 MR. CUNNINGHAM: Yeah. And there's a set
13 of items like that, that are -- you talked about new
14 technology or new information.

15 CHAIRMAN APOSTOLAKIS: Absolutely.

16 MR. CUNNINGHAM: New methods, whatever,
17 that at some point should be reflected in the
18 guidance, either in 1.174, or in the New Reg. Guide
19 or the standard, or something like that. And I'm not
20 -- that may be the subject of worthy discussion with
21 the Subcommittee, just on that topic. And what are
22 the improvements that we're seeing, the changes that
23 we're seeing, and how might they be reflected in the
24 way we use risk information, not merely focus on
25 1.174.

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1 CHAIRMAN APOSTOLAKIS: I think you're
2 right, Mark. We should have a separate Subcommittee
3 meeting on these issues, and I'm sure we will.

4 MR. CUNNINGHAM: Okay.

5 MR. HOLLAHAN: I'd like to comment on the
6 issue of safety culture for sure.

7 CHAIRMAN APOSTOLAKIS: Yes. Gary.

8 MR. HOLLAHAN: You said one thing about
9 safety culture that I don't completely agree with, and
10 I want to temper the remark a little bit. The affect
11 of safety culture is included in the PRA to the extent
12 that it has, in the past, affected the performance of
13 equipment, and it's in the failure rates. It's in the
14 initiating event frequencies, so to a certain extent --
15 and it can be individual per plant performance, why
16 this plant has twice as many reactor scrams as the
17 average. If safety culture is producing that affect,
18 then it should be in the analysis, and there's a
19 direct mechanism for doing that.

20 CHAIRMAN APOSTOLAKIS: You're right.

21 MR. HOLLAHAN: There are other aspects of
22 safety culture that wouldn't have a model in the PRA,
23 or in any other engineering analysis that I'm aware
24 of.

25 CHAIRMAN APOSTOLAKIS: That's true.

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1 MEMBER BONACA: Another correlation is --

2 CHAIRMAN APOSTOLAKIS: But the real issue,
3 of course, with these issues is not what happens to
4 the individual failure rates. There's a possibility
5 of coupling and common cause failure.

6 MEMBER BONACA: Yeah.

7 CHAIRMAN APOSTOLAKIS: But you're right.
8 Of course, it affects the way the plant was operated
9 at the time the failure rates were collected.

10 MEMBER ROSEN: Coupling and common cause
11 failures, and cognitive errors.

12 CHAIRMAN APOSTOLAKIS: And cognitive
13 errors, absolutely.

14 MR. CUNNINGHAM: It also brings back the
15 issue of, to what extent are individual PRAs using
16 generic information, generic failure rates as opposed
17 to plant-specific, and that sort of thing, as well.

18 CHAIRMAN APOSTOLAKIS: Yeah.

19 MR. JOHNSON: It is entirely possible that
20 -- and I guess we've already talked about the fact
21 that we might be making changes to the integrated
22 decision-making model to include safety culture, if
23 you will, that would be outside of what is currently
24 in Reg. Guide 1.174, where the decision is to approve
25 a license amendment. Theoretically, I mean at least

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1 to me, it's not all that clear how you would add your
2 box, George, an additional box to this figure that's
3 in Reg. Guide 1.174, with respect to the scope that
4 is intended by Reg. Guide 1.174. But as you say, and
5 I'm sure we'll talk about it in the future.

6 CHAIRMAN APOSTOLAKIS: I don't know, Mike.
7 I'm not saying I know, but I remember the issue was
8 raised years ago when the first results of the IPEs
9 started arriving here, where some people -- I remember
10 there were a couple of plants that were, at that time,
11 on a very low, Category 3 was it? I don't remember
12 what it was. They were declared by the NRC as being
13 badly managed, and their CDF was the same as the best
14 run plants in the country. And people said well, gee,
15 why isn't there a difference? There should be
16 something. And the answer is that most of the studies
17 were really generic at the time.

18 MR. CUNNINGHAM: I'm not sure we ever said
19 -- the NRC ever said some plant was badly managed.

20 CHAIRMAN APOSTOLAKIS: I almost said, but
21 still acceptable, but I decided in the interest of
22 brevity that -- it was not badly managed, no. The
23 risks were still acceptable.

24 MR. CUNNINGHAM: Yes.

25 MR. JOHNSON: A lot of the conversation

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1 we've had earlier today sort of would push us towards
2 increased rigor and analysis, and quantification.

3 CHAIRMAN APOSTOLAKIS: Yeah.

4 MR. JOHNSON: And I'm not sure what
5 happens to that when you throw in safety culture.

6 CHAIRMAN APOSTOLAKIS: Well, no. Nobody
7 is asking you to put this in here now. We're talking
8 about the existing stuff. That's more of a research
9 issue, really

10 MR. CUNNINGHAM: We're mixing together
11 things we should change with Rev. 2, versus Rev. 3,
12 versus Rev. 4.

13 CHAIRMAN APOSTOLAKIS: Somebody said that
14 facts are stubborn things. The fact that it happened
15 now, you know, it's not up to us any more. You really
16 have to address it.

17 MR. GRIMES: This is Chris Grimes. And
18 from the perspective of trying to keep coherence
19 clear, we have three dimensions to this question.
20 First, is what is the state of the, or the quality of
21 the work that can be done today for regulatory
22 decision-making? In some of these cases, there isn't
23 a pure role for the regulator to be making decisions
24 about behaviors, or attitudes, or withdrawing licenses
25 on the basis of dumb luck, as opposed to models that

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1 the management of the company should be using in order
2 to guide their decision-making.

3 But then also, we need to be looking
4 forward in terms of how do we expect the quality of
5 the work to evolve in the future that will give us a
6 picture about what we should aspire to in the way of
7 a regulatory structure. And so, we need to be clear
8 when we're talking about which application, which of
9 these issues. What are we trying to aspire to as a
10 regulatory standard today, based on what we've
11 accomplished up until today? What do we expect to
12 change the regulatory standard to at some point in the
13 future, as for the research work feeds our process.
14 But then also, what should we leave to the industry to
15 use the tools for their purposes, and to guide their
16 behavior?

17 CHAIRMAN APOSTOLAKIS: I think we have
18 addressed all the issues. Are there any more?

19 MEMBER KRESS: I still think we need to
20 talk about the risk metrics.

21 CHAIRMAN APOSTOLAKIS: Oh, the metrics.
22 Yes.

23 MEMBER KRESS: We have uncertainties we
24 may have covered. But, you know, I think CDF and LERF
25 are marvelous concepts, and I'm glad we came up with

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1 them. And very useful to focus our attention on
2 things that are important, but I think we ought not
3 limit ourselves to those concerns.

4 For example, late containment failure
5 ought to be a concern to us. If some change is made
6 to the licensing basis that contributes inordinately
7 to a late containment failure well, I'd be worried
8 about that. It may not show up in LERF. It might
9 show up in LERF, but it might not. And, you know, the
10 LERF was a sort of mean value back-calculated from the
11 prompt fatality safety goal for all the plants. That
12 has bothered me to some extent, because that back-
13 calculation has implicit in it a source term, and the
14 source term did not include things like air ingressions
15 accidents that might come about from spent fuel pool,
16 or latent fuel that's left in the core after a severe
17 accident, or pressurized thermal shock accidents. And
18 as we increase the burnup, and as we increase the
19 content of MOX, mixed fuel, we may get a different
20 source term, where the overriding concern may no
21 longer be prompt fatality.

22 I understand that, you know, if you look
23 at most of the risk assessments, prompt fatalities
24 will be the overriding concern, compared to latents.
25 But I'm not sure that will always be true for every

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1 site. And I know the changes that are ongoing now,
2 that it may be that we need a more coherent system of
3 acceptance criteria that deals with what is the insult
4 to the public, whether it be early, late, prompt, land
5 contamination or what? I don't think we have properly
6 articulated our concerns in that area, and I don't
7 think they're reflected in Reg. Guide 1.174. So
8 that's a concern I have. It's not, you know, I would
9 say this maybe Rev. 4 or 5, or even Rev. 7, somewhere
10 down the line we need to think about that sort of
11 thing. That was my concern there, and I don't know if
12 Mario had additional ones.

13 MEMBER BONACA: Well, to me they're softer
14 than those. I mean, to me it's more that -- I think
15 a good example that I would like to start from, you
16 know, in the original accident analysis you have all
17 this criteria that you have there, and clearly are
18 part of a defense in depth concept by which for
19 reasonably frequent events, you don't want to --
20 certain information to go to fuel damage or anything
21 like this, so you have a number of quick functions
22 that you have that perform intermediate steps. They
23 have nothing to do with preventing core damage
24 probably, most sequences.

25 On the other hand, I mean, there was a

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1 philosophy behind that which was not flawed, in my
2 judgment. It was based on the defense in depth
3 concept, that you simply for a frequent event, you
4 would not allow the sequence to go beyond a certain
5 point.

6 Reg. Guide 1.174 still today defends that
7 approach. It says that you have to look at that. But
8 now, you know, we have Option 2, and Option 2 leaves
9 open the question of how many of these components that
10 may, in fact, be part of this defense in depth will
11 end up in risk three? So that's the first issue, and
12 I think that hasn't been clear enough by the guidance
13 we have right now. That's my judgment, because Reg.
14 Guide 1.174 still says that you have to have defense
15 in depth consideration. But that leaves it to the
16 utility to interpret how it's going to be done, so
17 there isn't a very firm -- and I would expect a lot of
18 those functions, intermediate functions there are for
19 protection in the plant, would probably end up a risk
20 three.

21 But the other thing that concerns me is do
22 we have enough clarification on that issue, even the
23 cultural issues, you know. I was reading NEI-004, and
24 there at the beginning it says the reason why so many
25 of those components now are of no significance is

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1 because original design really didn't understand
2 anything too much. I mean, there are some words there
3 that I can refer, that haven't referred to me but, you
4 know. But today, we understand much more through risk
5 analysis.

6 Well, to me, that could be read by
7 somebody at a plant, somebody who really thought all
8 along that all this stuff, there is too much of it.
9 And I'll tell you, there is a lot of people that think
10 that way at plants. Okay? I mean, they feel very
11 strongly that there is a lot of protection. It gives
12 almost like an encouragement to think that all this
13 stuff is not important there. And I'm saying so there
14 is a cultural issue too, in my judgment, that could
15 result from that approach, that is somewhat cavalier.
16 And that's why I think there has to be some
17 clarification about these intermediate criteria that
18 were used in the original designs are still in place.
19 We're still saying that they're still in place, and
20 they have to be maintained. But in many cases, will
21 end up in being a risk three component because of the
22 use of PRA, and the fact that the PRA only used core
23 damage frequency as a criteria in LERF. Okay? So
24 that's really the thought that I had on that.

25 The other thing I think needs sufficient

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1 definition, of how we are going to treat that defense
2 in depth element there, except we have an expectation
3 that it will be treated. I know Gary at some point in
4 the past has commented on that. I still have a
5 concern, and I don't know if you have any thoughts on
6 that.

7 MR. HOLLAHAN: Not any specific ones. I
8 think this and some of the items that Dr. Kress
9 mentioned are areas just in my mind for continuing
10 development. I don't see that as part of Rev. 1. I
11 think the best we can do at the moment is to use the
12 CDF and LERF, and to use them in a thoughtful manner.

13 For example, if I go back to the spent
14 fuel pool study that the staff did now a year and a
15 half or two years ago, we recognized that LERF was not
16 a very -- you know, there's no such thing as core
17 damage, and large early release frequency didn't apply
18 very well. And we recognized that, and in the absence
19 of having a specific metric associated with that, we
20 did, you know, level 3 dose calculations. And in some
21 cases, if your surrogate measures don't seem to fit.
22 They're not appropriate, and you have some other
23 circumstances going on, you need to be able to
24 recognize that. And if there's not a suitable metric,
25 then I think you have to go to health effects as the

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1 substitute.

2 I think there's room for development. I
3 don't see any substitutes for large early release and
4 core damage frequency. Maybe you would supplement
5 them with other metrics.

6 MEMBER KRESS: Supplement is what I had in
7 mind.

8 MR. HOLLAHAN: I think the Committee
9 probably recalls that the staff recommended to the
10 Commission a year or two ago that it consider in its
11 safety goal addressing land contamination and defense
12 in depth and some other issues. The reason that Reg.
13 Guide 1.174 doesn't address those issues is because
14 they're not in the Commission policy. The Commission
15 hasn't set a direction. Okay? And I think, Dr.
16 Kress, you mentioned that even though it simplified
17 really the LERF criteria, it was intended to be
18 derived from the Commission's safety goal. Okay? And
19 I think that's the role that we want these documents
20 to play.

21 We want to have a Commission policy. We
22 want to be able to derive practical metrics consistent
23 with that policy, and then use that in the decision-
24 making process. So it seems to me that if things like
25 land contamination at the moment are more policy

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1 issues than technical issues. We need to understand
2 it at a Commission policy level first.

3 MEMBER KRESS: I would agree with that
4 statement, but when one looks at prompt fatalities as
5 an insult, and I hope this is not taken in a crass
6 sense, but one could associate that with a dollar
7 loss. You know, a certain death is worth so much
8 money. That, to me, would -- how the coherency, if
9 one would say well, suppose instead of prompt
10 fatalities, I have a lot of latent fatalities or a lot
11 of cancers or injuries that don't result in deaths.
12 Am I not worried about the same amount of dollar
13 insult? And would that not be consistent with the
14 safety goals, if I had that concept in my thinking, so
15 that I could then have a coherency to the process. I
16 would look at late containment failures, and the
17 dollar value may far exceed the prompt fatality funds,
18 and I should be worried about that.

19 You know, it sounds crass to -- and it's
20 hard to get these dollar values, but that's the only
21 consistency coherency in the thing, and you would
22 still, in my mind, be consistent with the safety
23 goals, you know, even with the policy statement as it
24 is now. You know, I may be reaching a little there.

25 MR. HOLLAHAN: I think the Commission

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1 policy statement has separate goals for prompt and
2 latent fatalities. And I think that's why you need to
3 continue to derive them at lower levels.

4 MEMBER KRESS: Yeah. And they're not
5 consistent with each other, by the way.

6 MR. HOLLAHAN: Well that's why they're
7 separate.

8 MEMBER KRESS: Yeah.

9 MR. HOLLAHAN: In fact, if you make them
10 fully consistent, you'd only need one goal.

11 MEMBER KRESS: Yeah. That's right.

12 MR. HOLLAHAN: You wouldn't need two. And
13 I think that the Commission, and the staff, and the
14 Committee and all who were involved in the safety
15 goals in the 80s, recognized that it was difficult,
16 maybe impossible to equate early fatalities to some
17 equivalent number of latents, and so we simply -- we
18 have a dual metrics. And maybe, you know, land
19 contamination is the same sort of thing.

20 You can reduce all of them to dollars if
21 you wish, but it seems to me that the Commission has
22 been reluctant to do that, as a matter of policy.

23 MEMBER KRESS: And if you wanted to make
24 them coherent, that's the only metric in common.

25 MR. HOLLAHAN: Yes. And people have done

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1 that.

2 Let me make one other comment, and that
3 is, there's been a lot of discussion in the past about
4 late containment failures. And the staff is concerned
5 about that subject.

6 MEMBER KRESS: I'm sure they are.

7 MR. HOLLAHAN: And what we've done is,
8 we've dealt with that issue as part of the defense in
9 depth concept. Okay? Late containment failures with
10 core damage would be considered a defense in depth
11 issue. Okay? And it ought to be addressed in that
12 context.

13 We considered at one point developing a
14 metric, but we didn't really see that it was
15 necessary. At that time, it was -- we didn't know
16 what number to put on it. Okay? If you put 10 to the
17 minus 4 on it, then you've already achieved that by
18 having not core damage at that level, so we felt that
19 dealing with it as a defense in depth issue was the
20 reasonable thing to do at the time.

21 MEMBER KRESS: Is it discussed under the
22 defense in depth portions of Reg. Guide 1.174? That
23 may be an area that needs to be looked at, to see how
24 well they discuss that.

25 MR. HOLLAHAN: Yeah.

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1 MR. CUNNINGHAM: I don't think it is.

2 MEMBER KRESS: Yeah. I don't know.

3 MR. CUNNINGHAM: It's not in 1.174. This
4 is where some other documents we're working on kind of
5 go beyond what's in 1.174. At some point in the
6 context of coherence, we would go back and revisit
7 some of these things.

8 CHAIRMAN APOSTOLAKIS: Okay. Any other
9 issues?

10 MEMBER ROSEN: On public confidence
11 concerns?

12 CHAIRMAN APOSTOLAKIS: Go ahead.

13 MEMBER ROSEN: I just wanted to say, what
14 I was thinking about there was that the licensees and
15 the staff, and the industry have put out a lot of
16 effort in the last few years building consensus
17 standards, and directing a peer review process, which
18 although it's not perfect, it is certainly
19 comprehensive and has been reviewed by members of the
20 ACRS staff, and members of the public have accompanied
21 peer review teams, and found fairly rigorous.

22 And it would seem to me that when the
23 licensee comes in to the staff or to the ACRS with a
24 request for a risk-informed change, that it's fair
25 game to ask them how good is their PRA. And one way

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1 to get at that is to tell us about your peer
2 certification, what came up? What were the facts and
3 observations? What were the important ones, and what
4 have you done about those things? And that's kind of
5 why you see in our letter some of the words in that
6 regard. Even if it's not a risk-informed submittal,
7 you know, it gets back to this coherence diagram.
8 When is it fair game to ask those questions, kind of
9 as background, and when is it central to the
10 discussion?

11 MEMBER POWERS: Let me ask a question
12 pertinent to the point that's just been made. Suppose
13 somebody came to you and said I've done this -- I've
14 got a risk-informed submittal here, and I've got this
15 PRA that's been peer reviewed. And during the peer
16 review, that's good. I mean, they were laudatory in
17 their comments about the quality of this PRA. What
18 significance would the staff attach to that?

19 MR. JOHNSON: I'm sorry. I lost a part of
20 your question. The premise is that they had done a
21 peer review, and the results of the peer review were?

22 MEMBER POWERS: Laudatory. I mean, high
23 marks across the board. This is a great PRA.

24 MR. JOHNSON: Yeah, I mean, I guess I'm
25 going to -- I have some guys in the back room who are

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1 probably going to step in to help me out. But, I
2 mean, we typically look and see, to the extent where
3 a licensee has done a peer review, to see, you know,
4 whether that peer review was -- you know, what that
5 peer review found, and what the licensee had done
6 about it, and where there was a peer review and the
7 peer review was good. I mean, that is a good thing.
8 I mean, that adds to the confidence and supports the
9 analysis that we do in terms of being comfortable with
10 what is submitted.

11 Where the opposite is true, where we have
12 problems with the -- well, let's say there's a peer
13 review done, and there were facts or observations, and
14 the licensee had not addressed those, that --

15 MEMBER POWERS: Well, I can guess.

16 MR. JOHNSON: That gives us cause for
17 pause.

18 MEMBER POWERS: I can guess how you'd
19 respond to a less than laudatory. I'm more interested
20 in, if not high marks, certainly good solid Bs or
21 something like that. And I'm asking it in the context
22 of various studies that have taken place in the peer
23 review process, and how it -- what it can and can't
24 do, and how the staff takes into account what people
25 have found out about peer review, in general, as a

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1 method for assessing the quality of a product. What
2 is this to think about these things. And one of the
3 quotes that most sticks in my mind is a quote from a
4 Mr. Colt who is something of an expert in the area of
5 peer review who says, well, peer review may be
6 unbiased, but it's Quixotic; that is, it's
7 irreproducible and succumbs to the peculiar prejudices
8 of the individuals that make up the peer review team,
9 and that simply can't be reproduced.

10 MS. DRUHAN: As you know, we're getting
11 ready to go out for public review and comment on our
12 new regulatory guide on the PRA quality. Part of that
13 guide gets into the peer review, specifically NEI-002,
14 but it gets into the whole topic, you know, of peer
15 review guidance, and how you factor that into your
16 decision-making.

17 It certainly doesn't mean because you've
18 had a peer review that we, as an agency, don't do our
19 own thinking. I do think a peer review helps you
20 substantially focus where our review would be. It is
21 used more as a tool and an asset to that, but remember
22 right now, NEI-002 only looks at the level on portion
23 in the limited Level 2. It does not have a peer
24 review right now on the low power shutdown aspects,
25 the fire or the seismic. Now the standards are

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1 imposing that.

2 MEMBER POWERS: I only want to comment on
3 -- I only want to discuss those parts that are dealt
4 with, and that is the Level 1 aspect of it. I look at
5 the peer review process and whatnot that's done for
6 these PRAs, and my goodness, it's a book this thick
7 that has questions that I'd never even dream of
8 asking. It's voluminous and whatnot, but on the other
9 hand, I look at, when people have studied peer review
10 processes and they come back with not very comforting
11 findings on this process that is so fundamental to
12 science and engineering. And I'm just wondering how
13 the staff reacts to it.

14 MR. JOHNSON: I think my only answer is
15 that we look -- I mean, I think we look favorably on
16 it. I mean, it's explicitly called out in Reg. Guide
17 1.174 as something that we would look at towards
18 seeing what the licensee has done in terms of trying
19 to ensure that their submittal is a quality submittal
20 from a PRA perspective. And we look favorably on --
21 but we do look at what is given with respect to the
22 peer review.

23 We do our own analysis. We do our own
24 thinking about whether the results are appropriate,
25 but it adds assurance to what we get in terms of the

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1 submittal, the quality of the work that was done.

2 MS. DRUHAN: I'm not sure what your
3 question is, Dana, to be honest. I mean, we went back
4 -- to go back in time to SECY 162, as you recall, we
5 walked through and gave what we felt were the
6 technical characteristics and attributes, you know, of
7 a technically acceptable PRA. We also gave them what
8 we felt was an acceptable peer review process.

9 We have incorporated that into the new reg
10 guide, and we used that to state our position on the
11 peer review. I think the peer review -- you need a
12 peer review. We don't have a standard out there that
13 is prescriptive that says, you know, if you do this,
14 this and this in exactly that way, then you're going
15 to have this robust product. The standard is at a
16 higher level, in telling you what should be in your
17 analysis, and how to go about doing it. So the peer
18 review brings closure on that, to look to see how
19 these things have been implemented, and do they meet
20 the intend, the technical intent of what you wanted
21 the analyst to do.

22 The peer review should come in and show
23 you where your strengths and weaknesses are, how well
24 you've handled the assumptions.

25 CHAIRMAN APOSTOLAKIS: But would you

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1 accept these results? Let's say you have one page
2 with two columns. The PRA review process following
3 the NEI guidelines says on the left here are the
4 strengths, and on the right here are the weaknesses.
5 What would you do? That's the question. To what
6 extent would you --

7 MR. CUNNINGHAM: I think that goes to
8 Mike's point, that it's a way of - I think it was
9 Mike's point - of focusing where the staff puts its
10 attention, and how many resources the staff puts into
11 this review, versus another review, if you will. So
12 it's a guidance on how to allocate resources, I think
13 is what Mike was saying before.

14 MR. JOHNSON: And it's very specific to
15 the review. In other words, if we're looking at a
16 specific amendment request, we might know a lot about
17 the peer review in terms of the things that came out
18 of that peer review, but we're going to be very
19 focused on the PRA or the risk insights as they impact
20 whether or not we ought to be approving that specific
21 amendment request.

22 MR. GRIMES: I'd also -- I'd like to pick
23 up on a point that Dr. Powers made with respect to the
24 reliance on peer review process is not unique to PRAs.
25 We've often gone out and said we want independent

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1 reviews of processes, where we had concerns about the
2 susceptibility of the process to a failure that we
3 might not be able to reveal. Independent quality
4 evaluations for construction, reliance on third-party
5 reviews for quality assurance, processes of
6 procurement, peer reviews for research results if
7 we're going to use them in some important way, so the
8 peer review process doesn't really change our
9 behavior, as much as it is that we look to it as a
10 means of bolstering public confidence in the process.
11 And so peer reviews are an integral part of almost any
12 process-driven decision-making. And I would contend
13 that the reliance on peer reviews, and the quality of
14 the peer reviews, and our use of the peer review
15 results is probably reasonably consistent.

16 We look to it for information and advice,
17 but we still expect to perform a regulatory function
18 that is driven by our insights, our knowledge, our
19 behavior, our values, and not attempt to reproduce the
20 peer review results.

21 MEMBER ROSEN: In the specific case that
22 I think Mr. Johnson was referring to, an applicant
23 comes in with a request for a risk-informed change,
24 exemption of the regulations, and you have a peer
25 review for that, and it's based on the PRA that the

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1 licensee or applicant has. You have a peer review
2 that in that area, in the area where he's asking for
3 a change, he has significant uncorrected weaknesses.
4 Well, it seems to me, that's the kind of advice that
5 would lead you to say you need to go back and correct
6 those weaknesses, and then come back in and tell us
7 how it affects the result. It's just a tool for you,
8 rather than having had to have discovered that
9 yourself.

10 CHAIRMAN APOSTOLAKIS: But I think that
11 part of the question was the weaknesses are okay, but
12 what if in another place, the left column says these
13 are great, what would the staff do? Would the staff
14 do a spot check, or something? You know, I think the
15 answers will be clear there. You still view it as
16 your responsibility to evaluate the quality of --

17 MS. DRUHAN: We may not review it, but we
18 would always -- you know, we are open to doing audits
19 on it.

20 MEMBER ROSEN: Well, what is the
21 alternative to doing peer review? I think what the
22 staff has done is looked at the alternatives, and said
23 they can't do it, which is to provide a safety
24 evaluation of each PRA. It's not possible with the
25 resources currently deployed, so this is an

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1 alternative. The industry does not offer it as an
2 alternative to SERs for every PRA. It offers it only
3 in the sense that it's trying, the industry is trying
4 to raise the bar internally, and to do some peer
5 emulation and improvement. All of those are good
6 things.

7 It follows, for instance, INPO process
8 where the same sort of peer review tends to over the
9 time raise all the votes.

10 MR. HOLLAHAN: If I could make two points.
11 Mary mentioned a new regulatory guide that's being
12 developed. There's also a companion standard review
13 plan. Okay? So we're developing guidance to the
14 staff, including the subject of how to use PRAs in the
15 decision-making process.

16 I'd also like to go back to our earlier
17 discussion where we talked about giving the Committee
18 some examples of risk-informed applications. You
19 know, we do take advantage of the peer review process.
20 And I think if we pick some examples, we can
21 illustrate how the peer review process was used in
22 some examples, and that probably will be more helpful
23 than just a general discussion of the issue.

24 CHAIRMAN APOSTOLAKIS: I'd like to reserve
25 some time for Mr. Petrangelo, so are there any new

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1 issues that anyone wants to raise with the staff?

2 MS. DRUHAN: Can I bring up an old one?

3 CHAIRMAN APOSTOLAKIS: Sure. Yeah.

4 MS. DRUHAN: I just want to make sure I'm
5 very clear on this point, and it goes back to the
6 level of detail, and rigor, and the sources of risk in
7 your PRA. I understood what the Committee said, that
8 when you look at your base PRA, not the one that's
9 looking at the delta, that's looking at the change in
10 the risk, but the base PRA that is calculating risk
11 should be full scope. And what you mean by that, that
12 probabalistically, using Category 3 of the ASME and
13 ANS standards, to be done to that level of detail.

14 CHAIRMAN APOSTOLAKIS: And if bounding
15 estimates of the risk contribution from plant was not
16 rigorously used, justification should be provided.

17 MS. DRUHAN: So although your application
18 might be over in the seismic area, you still would
19 expect a fire PRA under Category 3.

20 MEMBER ROSEN: And a low power and
21 shutdown PRA, because seismic events could happen when
22 you shutdown too.

23 MEMBER FORD: I have a question. In
24 reading the revision to the 1.174, and also the SRP,
25 and seeing what changes have been made in terms of

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1 either improving the safety aspect analysis, or
2 reducing the burden, it seems to me that the balance
3 comes out on reducing the burden on the staff and the
4 licensees.

5 Is there some formula that you have? I
6 mean, those are two cornerstones that you have from
7 the Committee. How do you balance those two things?
8 And they're not necessarily -- can be quantified?

9 MR. GRIMES: If I could make an
10 observation. The objective is not to balance them.
11 It's to look for opportunities to improve any one of
12 the four cornerstones independently. If there is new
13 information that can improve our ability to maintain
14 safety, we're obliged to do that. If there's new
15 information that improves our efficiency and
16 effectiveness, we should pursue that. But there isn't
17 an objective that says whenever you do something,
18 you've got to make sure that you give equal credit to
19 every one of the four cornerstones. So it just so
20 happens that this revision ended up with a
21 preponderance of improvements that reduced unnecessary
22 burden.

23 MEMBER FORD: Because on that issue, I
24 couldn't find any changes which improved the safety.

25 MR. HOLLAHAN: Well, I would suggest that

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1 the concept of using the PRA and, in fact, requiring
2 the licensee to provide PRA information on a submittal
3 that already meets all the regulations is a new safety
4 concept. And it's certainly not there for burden
5 reduction. It's there to assure safety.

6 MEMBER FORD: But the statements that were
7 made in the revision essentially softened all those
8 areas which related to the quality of the PRA. That
9 is making it easier for them to jump over the hoop,
10 and therefore, use it, the PRA. Not necessarily a
11 good PRA. Is that a fair statement or not?

12 MR. HOLLAHAN: That's not my impression of
13 what the revision does.

14 MEMBER FORD: Okay.

15 MR. HOLLAHAN: I don't think it was
16 intended to lower the quality of PRAs, and I -- if
17 there's examples that you think do that, I think we
18 should look at them.

19 CHAIRMAN APOSTOLAKIS: I guess it's like
20 the impression you got from our letter, because I got
21 that impression too, that we were relaxing a lot of
22 things. I think we should really go on and give Mr.
23 Petrangelo a chance to address it, so thank you very
24 much. This was very helpful, I hope. Okay. Tony.

25 MR. PETRANGELO: I've got to get organized

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1 here.

2 CHAIRMAN APOSTOLAKIS: Too many notes.

3 MR. PETRANGELO: Too many notes, right.

4 Well, thanks very much for the opportunity to talk to
5 the Subcommittee this morning.

6 First, let me say that we were not shocked
7 by your letter. Okay? We were somewhat surprised
8 that apparently the Committee was not aware of the new
9 regulatory guide that will endorse the ASME PRA
10 standard, as well as the industry peer review process,
11 and process for addressing the Category 2 requirements
12 in the ASME standard.

13 That has been a significant effort that
14 we've had a lot of dialogue and interaction with, with
15 the staff, both RES and NRR over the past year or so,
16 and even further back on development of the standard.
17 Our understanding is that new regulatory guide, draft
18 regulatory guide will be issued any day now. There's
19 a public workshop next week. We've had our Risk
20 Assessment Task Force pour over that, helping to
21 develop both the tools for using the results of the
22 industry peer review to see whether you meet the
23 Category 2 requirements of the standard. We're also
24 proposing a self-assessment process to address the
25 deltas between the technical elements in the ASME

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1 standard and the peer review criteria in NEI-002. So
2 we think the whole package will get us to a point
3 where we can say we meet the Category 2, or Grade 3
4 criteria in the peer review. So I think that was
5 directly addressed in your letter as something you'd
6 like to see, and that's going to happen shortly, so I
7 think that's a very good thing.

8 MEMBER ROSEN: Well, I think we haven't
9 seen the regulatory --

10 CHAIRMAN APOSTOLAKIS: No, we have not.

11 MEMBER ROSEN: Not even in draft.

12 MR. PETRANGELO: Okay. I suggest you come
13 to the workshop next week that the NRC is having, as
14 a good way to --

15 MEMBER ROSEN: Perhaps we could get a copy
16 to the Subcommittee.

17 CHAIRMAN APOSTOLAKIS: We will have it at
18 some point. Why are we so far behind?

19 PARTICIPANT: The staff was going to do it
20 in October, but they requested that it be delayed.

21 CHAIRMAN APOSTOLAKIS: Okay.

22 MEMBER ROSEN: Well, can you provide us
23 each with a copy of the draft at this time?

24 MR. NEWBURY: Yes. Scott Newbury. We'd
25 be happy to, as soon as it's available.

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1 CHAIRMAN APOSTOLAKIS: Okay. So it will
2 not be available to the public before the public
3 workshop?

4 MR. NEWBURY: There's a race underway
5 between its availability and the date for the
6 workshop. Yes.

7 CHAIRMAN APOSTOLAKIS: Okay.

8 MR. PETRANGELO: First let me say that the
9 letter we sent you, although it was under NEI
10 letterhead, was very much an industry letter. We had
11 discussed your letter to the Commission with our risk-
12 informed regulation working group at length, and then
13 penned the draft letter up, sent it out for comment,
14 got several comments back from the industry. So the
15 final letter that went in was very much an industry
16 perspective on your letter. And to be honest, I think
17 we agreed with most of what you have in the letter.

18 We think that we're very much in the
19 middle of an evolution of PRA methods, rigor and
20 scope, and that that evolution needs to continue.
21 Certainly, this new regulatory guide that's going to
22 come out squarely addresses public confidence issue,
23 in terms of the rigor of the analysis used to support
24 applications, so I just think that's a major step in
25 our evolutionary process that shouldn't be lost.

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1 Quite frankly, we're more concerned with
2 the NRC Staff's reaction to your letter, than we are
3 concerned with your letter itself. Okay? And I think
4 the question that Mary was trying to pose for you is
5 the right one. Do you need a full scope PRA before
6 further changes are made to the licensing basis? We
7 think the answer is no. Okay?

8 We think Reg. Guide 1.174 addresses all
9 sources of risk and modes of plant operation, but it
10 does not say that you need quantitative risk analysis
11 before you make any further changes to the licensing
12 basis. And your letter does not say that. And as you
13 pointed out correctly this morning, George, when you
14 say you need justification of the bounding estimate,
15 we fully agree with that.

16 In fact, the industry has many screening
17 tools that are used when your delta CDF is so small -
18 all right - and you can use these screening tools,
19 like five in SMA to determine that the impact from
20 those other sources of risk are minimal. I mean,
21 that's what Reg. Guide 1.174 calls for. It's already
22 addressed in there, so I don't see what the big policy
23 issue is here. I thought your letter was very clear
24 in that regard. And I hope that answers your
25 question. I know you're trying to get a square answer

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1 on that.

2 There are other parts of the letter
3 though. We did a -- we're a little bit concerned. It
4 appeared that the Committee was questioning whether
5 Reg. Guide 1.174 was encouraging improvements in the
6 scope and rigor of PRA across the industry. We sent
7 out a, once we saw your letter, an email to all of the
8 owners' groups to try to get some feedback on what
9 kind of work was being done over the last several
10 years since Reg. Guide 1.174 was issued. And I've got
11 to tell you, we got a laundry list of things. I'm not
12 going to go through the whole list now, but they
13 address many of the issues you raised in your letter.

14 For example, model uncertainty. We saw
15 many licensees, you know, updating their RCPC models,
16 updating their Atlas models, updating their common
17 cause failure treatment of that. I mean, all sorts of
18 things that I think the Committee has been concerned
19 about were being addressed by licensees, and mainly
20 these came about as a result of the peer review, and
21 the facts and observations that came out of the peer
22 reviews. And in a lot of cases what licensees have
23 been doing are devoting their resources to address the
24 weaknesses that were found in the peer review, so I
25 think it's happening.

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1 And as our letter tried to point out,
2 rather than use the stick to require a certain level
3 of PRA, I think the staff approach has to been to use
4 a carrot. And we firmly agree with that. I think
5 improvements in the scope and rigor of PRA are best
6 encouraged and demonstrated by successful applications
7 and standards development. That's kind of the crux
8 for us.

9 When there's an application where you can
10 use the tool, that's an incentive for a licensee to
11 further develop the rigor of the tool they're using,
12 to be able to successfully achieve that application.
13 And the standards development goes hand-in-hand in
14 that. It's going to be hard for somebody to go out
15 and sign a check to invest resources in something
16 where the methods being used as being questioned. And
17 I think that to the extent that the standards
18 development will help provide some stability and
19 certainty to that area, that will even further
20 increase the pace of evolution to the tools that we're
21 using for PRA.

22 And again, and I think our final paragraph
23 in our letter states this. We really think 1.174 has
24 fostered the development, not discouraged it. And we
25 really took issue with the concern that somehow this

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1 publication of Revision 1 would somehow send the wrong
2 message to licensees. We don't think that's the case
3 at all. 1.174 has encouraged development. We're
4 seeing it. I think the staff is seeing it. I thought
5 the idea of to have you look at some actual 1.174
6 applications is a good one, because quite frankly, all
7 you're seeing here are some power uprates where it's
8 being used subtly, and perhaps in license
9 renewal on the SMAE analysis, which has also been a
10 driver of Level 2 and Level 3 development. So again,
11 it's the application that drives the development of
12 the tools.

13 CHAIRMAN APOSTOLAKIS: That's it?

14 MR. PETRANGELO: Let me look at my notes
15 again.

16 CHAIRMAN APOSTOLAKIS: I think, while
17 you're looking, maybe the Subcommittee at least should
18 get to know a little better what the peer review
19 process is, and how in some instances it resulted in
20 the improvements that you've just mentioned,
21 especially in the area of model uncertainty. That
22 would be certainly -- and just as Mr. Hollahan
23 proposed that, you know, we see some actual
24 applications from the staff, maybe we should see some
25 actual peer reviews, and then, you know, somebody from

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1 the owners' groups can perhaps say that as a result of
2 this, this is what happened. The Committee would --

3 MR. PETRANGELO: Yeah. I thought one ACRS
4 member, or staff, or --

5 CHAIRMAN APOSTOLAKIS: It was a staff
6 member who attended and came back with very good
7 words, but I'm going beyond that now, you know.

8 MEMBER ROSEN: I think we need to
9 distinguish between that process, which is going out
10 and watching the peer review, and the results of the
11 peer reviews in general. I think it's the results of
12 the peer reviews in general that Tony is talking
13 about, that we haven't had good access to, and the
14 presentation by NEI or --

15 MR. PETRANGELO: I think each owner's
16 group would step right up --

17 MEMBER ROSEN: Would really be useful.

18 CHAIRMAN APOSTOLAKIS: Yes, it would
19 really be useful.

20 MR. PETRANGELO: Okay. We can arrange
21 that.

22 MEMBER POWERS: Let me ask you a question.
23 First of all, I'm very excited about this evolutionary
24 character that you described, because I think that's
25 the -- all things are incremental, and maybe I have

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1 expressed my concern about a wall that says thou shalt
2 improve quantitatively suddenly. But then on the
3 other hand, let me ask you this question. We have, as
4 you correctly said, seen primarily supplemental
5 information from PRAs coming before us.

6 MR. PETRANGELO: On power uprates.

7 MEMBER POWERS: Power uprates notably, but
8 in a lot of contexts, we see these supplemental
9 informations. And we don't see a very careful
10 uncertainty analysis, or any uncertainty analysis at
11 all. And usually my colleagues to the right rail
12 about that quite a bit. I say --

13 CHAIRMAN APOSTOLAKIS: I wonder how many
14 colleagues you have to your left?

15 MEMBER POWERS: And none of those rail.
16 Can you tell us about the evolution in that direction,
17 so I don't have to listen to this cacophony that
18 appears.

19 MR. PETRANGELO: Well, we're actually
20 preparing some papers on that, and I think we're going
21 to get to that in the context of the Option 2 guidance
22 on NEI-004. I think one thing we've learned is that
23 absent the context of an application, you can talk
24 about these issues in the stratosphere and not get
25 anywhere. But when you're in an application, and you

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1 know how the results are going to be used, it really
2 brings some light to the discussion that you can get
3 a better understanding of what you're talking about.
4 So in the context of Option 2, we are preparing
5 something.

6 MEMBER POWERS: Well, let me ask you - you
7 mentioned writing a check when methods are ill-
8 defined. My colleagues to the right, when they wail
9 about uncertainty analysis, usually they bring up two
10 types, one of which is parameter uncertainty. And one
11 can presume that just looking at standards and looking
12 at the tools you have for PRA, that that's fairly
13 straightforward, and my colleagues acknowledge that's
14 straightforward. But then they bring up something
15 that's a little more ephemeral, and they call model
16 uncertainty. Doesn't that impose a challenge to your
17 check-writing friend who says gee, not only are the
18 models not developed, but now you're asking me to
19 question those models and pay for it.

20 MR. PETRANGELO: I think in part that's
21 addressed by the facts and observations in the peer
22 review, as well as looking at them against the
23 Category 2 criteria and the ASME standard, that will
24 get at a lot of those model uncertainties through that
25 process. So I hope that in part -- and that does

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1 require check-writing. I mean, most of the resources
2 developed to address those facts and observations are,
3 in large part, addressing these model uncertainty
4 questions.

5 CHAIRMAN APOSTOLAKIS: I would, for one,
6 be very interested in seeing what the owners' groups
7 come along with.

8 MR. PETRANGELO: Okay. We can arrange
9 that.

10 CHAIRMAN APOSTOLAKIS: Anything else?

11 MR. PETRANGELO: No, I think that's it.
12 We welcome the Committee's intent and goal to further
13 progress in risk-informed initiatives.

14 CHAIRMAN APOSTOLAKIS: Yeah. Even though
15 progress is best achieved in an evolutionary way, you
16 do need those guys to the right of my colleague on the
17 left to screen and require more, because that gives a
18 momentum, a thrust to the whole process, you know, And
19 some great things have been achieved with a bloody
20 revolution, by the way.

21 MR. PETRANGELO: Yeah. And one last
22 comment, I mean --

23 MEMBER POWERS: But the Reign of Terror
24 often involves the termination --

25 CHAIRMAN APOSTOLAKIS: Let's have Mr.

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1 Petrangelo --

2 MEMBER POWERS: You don't want to kill the
3 goose that's laying the golden egg here in the name of
4 revolution.

5 MR. PETRANGELO: I saw the staff slide
6 that we went over on the policy technical.

7 CHAIRMAN APOSTOLAKIS: Yeah.

8 MR. PETRANGELO: This is based on their
9 understanding of your letter. I don't see any policy
10 issues coming out of this, that require tremendous
11 stakeholder involvement. We've got a good frame work
12 document in 1.174. We believe that Revision 1 should
13 be issued, mainly to address the question you were
14 raising, about staff being able to ask questions about
15 non-risk-informed applications, where they could be
16 some risk impact. We support that, so I think
17 Revision 1 should be issued.

18 We're very much more interested, though,
19 in the new regulatory guide that gets us up to the
20 ASME standard, and that's very, very important.

21 CHAIRMAN APOSTOLAKIS: And we want to see
22 that too.

23 MR. PETRANGELO: Right. But I don't see
24 the need to stop what we're doing and re-assess from
25 a policy standpoint. I don't see that. And again, I

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1 said earlier, I was concerned about the staff's
2 interpretation of your letter. We've seen recently,
3 and I raised this with staff directly, the
4 interpretation of your letter, like full scope PRA is
5 needed to do anything else. And your letter doesn't
6 say that. And again, you've seen products come out of
7 the staff that go more than imply that, are basically
8 saying that's the reason why we're stopping work, or
9 we need you to go address these full scope PRA issues.
10 So I think it's been misinterpreted.

11 I mean, the Commission couldn't even have
12 issued a policy statement change to get more reaction
13 from the staff than what your letter has done.

14 MS. DRUHAN: Well, in a sense, that was
15 the purpose of the letter.

16 CHAIRMAN APOSTOLAKIS: No, no.

17 MEMBER ROSEN: Yes, it was. I'll remind
18 you of some of the discussions we had. We originally
19 set out to talk about a white paper. The ACRS would
20 write a white paper about what our issues were on
21 PRA. We talked and bandied about several meetings
22 and then we decided no, we'd take the opportunity of
23 Reg. Guide 1.174 revision to lay some of the concerns
24 out.

25 CHAIRMAN APOSTOLAKIS: That's true.

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1 MR. PETRANGELO: But again, I think the
2 reaction to it has been based on a misinterpretation
3 of your letter. Many in the industry had the same
4 misinterpretation.

5 CHAIRMAN APOSTOLAKIS: I'm glad we had
6 this meeting then today.

7 MR. PETRANGELO: Thank you very much.

8 CHAIRMAN APOSTOLAKIS: Thank you, Tony.
9 Any other issues or questions that members would like
10 to raise?

11 MEMBER POWERS: I have a question, to
12 understand where the ACRS is coming from on a couple
13 of these issues. In the letter itself it says, gee,
14 if you can justify a bounding analyses for some modes
15 of operation, that's okay. Then you're dealing with
16 the absolute axis in 1.174. And now you switch to the
17 delta axis, and in many cases, in fact I'm willing to
18 bet in every case when the licensee comes forward with
19 a risk-informed application, the delta that he's going
20 to be looking at is a very small delta. But if he has
21 done a bounding analysis on fire, seismic, shutdown
22 and whatnot, he has -- no component of that delta is
23 reflecting changes in those operations.

24 CHAIRMAN APOSTOLAKIS: I think our
25 statement about the bounding analysis applies in the

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1 calculation of delta too. They have to demonstrate
2 that their calculation is a reasonable one. We are
3 not limiting it in the letter to the baseline. We
4 just made the argument today that if, for example, the
5 change has a significant impact on the response to a
6 seismic event, then perhaps that approach would be
7 unacceptable, even in calculating the delta CDF.

8 MEMBER POWERS: I get into a logical
9 conundrum here that would bring up -- we invent PRA
10 because the systems are too complex for us to
11 intuitively understand how changes affect everything.
12 And I can't think of PRAs that I've ever looked at
13 that I anticipated how systems were inter-connected
14 and affected things. If I didn't under -- if I can't
15 look at things that way intuitively, how do I know
16 that the change I made that seems on the face of it to
17 only affect power operations, does in fact have no
18 impact on fire risk?

19 CHAIRMAN APOSTOLAKIS: Well, that's what
20 we're asking. The burden should be on the licensee.
21 And if you're unconvinced, you are unconvinced. But
22 we cannot say at this level of development that they
23 should submit a rigorous analysis every time.

24 MEMBER KRESS: But I think Dana has a
25 really good point. In order to say that this change

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1 is not going to affect the fire PRA, for example, you
2 have to have some concept in mind about what all the
3 sequences are in the entire PRA, and whether or not
4 this change impacts those sequences. So how you can
5 intuit that, I'm not sure. I would have trouble
6 intuiting it also.

7 CHAIRMAN APOSTOLAKIS: We are not saying
8 intuit it. We're saying justify. Justify, you know

9 -

10 -

11 MEMBER KRESS: But the only way I can see
12 to justify it is to actually have some sort of -- at
13 least some sort of a basic fire PRA.

14 MEMBER POWERS: Well, I guess I draw
15 comfort from the fact that George and the Committee,
16 not just George, but the Committee has said justify.
17 They didn't say prove. If they had said prove, then
18 I think I'm trapped and I cannot get out, but they
19 said justify. And I think that's the saving grace.

20 CHAIRMAN APOSTOLAKIS: For a moment there
21 when Dr. Powers was speaking, I thought he was going
22 to end up his comments by saying I withdraw my comment
23 at the end of the letter. But then he said it was no.
24 Well, you are imposing an additional burden now, I'm
25 sure.

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1 Any other comments from the staff, members
2 of the public?

3 MEMBER POWERS: Well, I will comment that
4 it's important to recognize that it's justification
5 and not proof.

6 CHAIRMAN APOSTOLAKIS: It is. Yes. Okay.
7 Thank you all. Thank you, Tony, for coming. And we
8 will recess until 10 minutes to 11.

9 (Off the record 10:34:34 a.m.)

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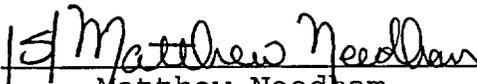
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Meeting

Docket Number: N/A

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ACRS Issues with Risk- Informed Regulatory Activities

Discussion with Advisory Committee on Reactor
Safeguards Subcommittee

September 9, 2002

PURPOSE

- To initiate dialog with the Committee regarding their recommendations on Regulatory Guide 1.174
- To fully understand the Committee's concerns
- To come to a common understanding on a path forward

STAFF'S UNDERSTANDING OF COMMITTEE'S CONCERNS

(Based on letter, Commission briefing, and Committee meeting)

- **Two types of concerns:**
 - ▶ **Policy/Technical Issues**
 - ▶ **Public Confidence Issues**

SUMMARY OF COMMITTEE CONCERNS

(Staff understanding based on letter, Commission briefing, and Committee meeting)

- **Policy/Technical Concerns:**
 - ▶ Regulatory guidance incomplete in addressing all sources of risk of nuclear power plants
 - ▶ Uncertainty not adequately addressed
 - ▶ Risk metrics incomplete

- **Public Confidence Concerns:**
 - ▶ “Rigorous” PRAs are needed for public confidence

NEXT STEPS.....

- Continue dialog with ACRS
- Hold stakeholder public meetings
- Revise regulatory guidance where appropriate