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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

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METALLURGY AND REACTOR FUELS SUBCOMMITTEE

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TUESDAY

MARCH 22, 2016

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:31 a.m., Ronald G. Ballinger, Chairman, presiding.

COMMITTEE MEMBERS:

RONALD G. BALLINGER, Chairman

DENNIS C. BLEY, Member

MICHAEL CORRADINI, Member*

DANA A. POWERS, Member

JOY REMPE, Member

GORDON R. SKILLMAN, Member

JOHN W. STETKAR, Member

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DESIGNATED FEDERAL OFFICIAL:

MAITRI BANERJEE

ALSO PRESENT:

STEVEN BLOSSOM, STP

C.J. FONG, NRR

STEPHEN GEIER, NEI

JOSEPH GIITTER, NRR

DONALD HARRISON, NRO

WAYNE HARRISON, STPNOC

ERNIE KEY, Public Participant*

JESSICA KRATCHMAN, NRR

STEVEN LAUER, NRR

LARRY NARON, Exelon

STEPHEN SMITH, NRR

*Present via telephone

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P R O C E E D I N G S

8:31 a.m.

1
2
3 CHAIRMAN BALLINGER: This is a meeting
4 of the Metallurgy and Reactor Fuels Subcommittee of
5 the Advisory Committee on Reactor Safeguards. I'm
6 Ron Ballinger, Chairman of the Metallurgy and
7 Reactor Fuels Subcommittee.

8 ACRS members in attendance are Dick
9 Skillman, Dana Powers, Dennis Bley, John Stetkar,
10 and the inestimable Joy Rempe, who is conflicted to
11 some extent. You're going to announce it? Not on
12 this one? Okay. Ms. Maitri Banerjee is the
13 Designated Federal Official for this meeting.

14 Today, we have members of the NRC staff
15 to brief the subcommittee on their development and
16 finalization of Regulatory Guidance 1.229, its
17 final finalization, a risk-informed approach for
18 addressing the effects of debris on post-accident
19 long-term core cooling.

20 During our November 3rd, 2015 meeting,
21 we received a briefing on the subject as it related
22 to the proposed 10 CFR 50.46c rulemaking. The
23 staff has incorporated comments from the public
24 nuclear industry and NRC offices, and it's getting
25 ready to finalize and issue the regulatory

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1 guidance. We also have Mr. Larry Naron
2 representing NEI to provide us with the industry
3 view on the subject regulatory guide.

4 The rules for participation in today's
5 meeting were announced in the Federal Register on
6 March 8th, 2016. The meeting was announced as an
7 open-to-public meeting. No requests for making a
8 statement to the subcommittee has been received
9 from the public.

10 We have one bridgeline established.
11 Oh, and I should say that I believe that Mike
12 Corradini is on the line or will be -- he is on the
13 line. Okay. To minimize disturbance, the public
14 line will be kept in a listen-only mode. The
15 public will have the opportunity to make a
16 statement or provide comments at designated times
17 toward the end of this meeting.

18 I now invite Joe Giitter, Director of
19 NRR Division of Risk Management, to introduce the
20 presenters and start the briefing.

21 MR. GIITTER: Thank you. Yes, I am Joe
22 Giitter, the Director of the Division of Risk
23 Assessment in NRR. This morning, you will hear a
24 presentation from the staff on a regulatory guide
25 that supports a risk-informed approach for

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1 addressing the effects of debris on post-accident
2 long-term core cooling. The staff has worked hard
3 and long to develop this regulatory guide, and we
4 believe it is ready for use by licensees who
5 utilize a risk-informed approach to address a GSI-
6 191.

7 Ideally, this draft reg guide would
8 have included more realistic methods, which
9 appeared in an earlier version of the draft reg
10 guide. The Office of Research and NRR have formed
11 a working group which is tasked with resolving some
12 of the issues that were raised with the more
13 realistic approach. I'm hopeful that this working
14 group will have completed its efforts by the end of
15 the year. However, the current version of the reg
16 guide is available for use now and is based on
17 tried-and-true methods that have been demonstrated
18 to be effective in applications.

19 We are hopeful that you will endorse
20 the use of this reg guide as part of the regulatory
21 guidance supporting the 50.46c rule. I appreciate
22 the effort of the ACRS.

23 I will now turn the meeting over to
24 C.J. Fong, Steve Laur, and Stephen Smith of the
25 staff who will go into more detail on the draft reg

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1 guide. And I did want to point out before we do
2 that, on my left is Jessica Kratchman, who is the
3 50.46c project manager. Thanks. C.J.?

4 MEMBER POWERS: Before Mr. Fong gets
5 started, I just had a question. You emphasized in
6 your description that the methods are available for
7 use and that they have, and I highlight the word
8 demonstrated, to be effective. I wonder if you can
9 explain that because it seems to me the most
10 striking feature of this whole reg guide is that it
11 has not been demonstrated under realistic
12 conditions to be effective.

13 MR. GIITTER: That statement, for
14 example, the reg guide borrows from other proven
15 methods. So an example is, and C.J. will go into
16 more detail on this, but it's based, in part, on
17 Reg Guide 1.174; Reg Guide 1.82, which deals with
18 head loss; NUREG-1855, which deals with
19 uncertainties. All of those methods have been
20 incorporated into the method in this draft reg
21 guide.

22 MEMBER POWERS: Well, I mean, that's
23 all well and good, but the real question is
24 demonstrated strikes me as one of the, if I'm
25 looking for a flaw in this whole thing is nothing

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1 has been demonstrated on anything that is what you
2 would call prototypic conditions.

3 MR. FONG: We'll get into that. That's
4 a fair question. I have a couple of slides that
5 can talk about that, Dr. Powers.

6 MEMBER POWERS: It seems to me that, at
7 this stage, we need to sit down to look at this in
8 the terms of what can possibly go wrong here? You
9 know, what are we leaving out and things like that,
10 and I'll try to bring up one or two things that
11 came to mind.

12 MR. FONG: Dr. Powers, again, I think
13 we'll certainly get into that, but I would say one
14 other thing, in addition to Joe's comments, we do
15 have a pilot that we've been working on for quite
16 some time. Like any reg guide, the first time it's
17 rolled out, it's hard to say that it's been 100-
18 percent demonstrated because there's a first time
19 for everything. But I am confident that the reg
20 guide is usable based on the staff's insights
21 gained from the pilot review.

22 MEMBER POWERS: I guess I have a great
23 deal of confidence that people can use the reg
24 guide, a great deal of confidence in that. What I
25 am concerned about is that when, in fact, we have

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1 to check and see if these analyses have, in fact,
2 resulted in a system that's function, that it is,
3 indeed, functional.

4 MR. LAUR: If I could just build on
5 what C.J. and Joe said, maybe it was stated too
6 strongly. This reg guide builds upon existing reg
7 guides. Obviously, there's new material in it. In
8 other words, how you apply the risk-informed
9 approach to this specific application. But I think
10 what Joe was trying to say is that the Reg Guide
11 1.174 gives us a framework for risk-informed
12 changes to the licensing basis and the other reg
13 guides give us ways of calculating the
14 deterministic aspects.

15 This particular reg guide doesn't
16 conflict with those. It enhances those. And to
17 the extent practicable and or practical or one of
18 those words, it enhances places that don't have
19 enough detail for this particular application.

20 The one thing that, I guess, prompted
21 me to turn the mike on is this is the risk-informed
22 process, so we have not only the risk insights but
23 also the safety margins and defense-in-depth
24 aspects. And that's one where Reg Guide 1.174 has
25 seven very general things to consider. We try to

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1 provide more specificity here. Their thing is it
2 has performance measurement as the fifth key
3 principle in Reg Guide 1.174, and here we say it's
4 necessary to monitor after this change is made and
5 ongoing to make sure there aren't unintended
6 consequences and that the consequences we hope to
7 get, the intended consequences, are achieved.

8 MEMBER REMPE: So I was looking at the
9 reg guide and, again, perhaps this got discussed
10 because some of this started before I even joined
11 ACRS. But I was a little puzzled about how
12 containment accident pressure is treated in this
13 reg guide versus 1.82. Was there some agreement
14 made that it's allowed now in this reg guide where
15 I thought 1.82 basically didn't, it discouraged the
16 use of it.

17 And so could you talk about that?
18 Maybe you've already planned it in your slides,
19 although I didn't see it brought up in the slides
20 when I looked at them. But can someone refresh my
21 memory on it?

22 MR. SMITH: So the intention would be
23 that Reg Guide 1.82 would continue to be applied
24 when this reg guide is being, you know, when this
25 reg guide is being implemented. Some plants have

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1 can credit containment accident pressurce, so if
2 it's already in their licensing basis we wouldn't
3 take that out.

4 MEMBER REMPE: But if it's not, you're
5 not going to let them use it?

6 MR. SMITH: If it's not, they would
7 have to justify or they would have to get a
8 license, it would have to be part of their license
9 amendment request to allow the use of containment
10 accident pressure for --

11 MEMBER REMPE: Okay.

12 MR. FONG: Okay. I'm going to suggest
13 that we start the slides, and we can continue the
14 dialogue as we go. All right. So we have three
15 objectives. The first is to provide a status of
16 the reg guide and let you guys know where we are.
17 Second, I'm going to highlight some changes that
18 have taken place since the last time we spoke in
19 front of this subcommittee. There have been a few
20 discussions in front of the full committee on the
21 reg guide and also the rule itself, but we're going
22 to highlight the deltas between the reg guide that
23 was discussed on November 4th of last year and the
24 reg guide as it stands today.

25 We've seen some questions from various

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1 stakeholders on the difference between the so-
2 called detailed approach that's in Appendix A and
3 the simplified approach in Appendix B. So we're
4 going to discuss that a little bit and hopefully
5 clarify the difference between those two
6 approaches.

7 So where are we today? Well, when we
8 last spoke in front of the subcommittee, Reg Guide
9 1.229 was still in the internal concurrence
10 process, and there were still a variety of changes
11 that either were made, you know, around the time of
12 the meeting and subsequent to the meeting. And so
13 I wanted to highlight a big difference where we are
14 today versus where we were back in November.

15 Today, the reg guide has completed the
16 concurrence process, has received a finding of no
17 legal objection from the Office of General Counsel,
18 has stabilized. As you see here, the concurrence
19 was achieved on February 8th. No changes since
20 then, so the version that was sent to the ACRS
21 Subcommittee a little over 30 days prior to this
22 meeting, that's it, that's the version.

23 Obviously, changes can still occur. If
24 the Commission tweaks the rule or, you know, other
25 changes are necessary, we certainly can do that.

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1 But I want to be very clear that this is not a reg
2 guide that started in flux or that there's a bunch
3 of ongoing changes. This is, we believe this is
4 our best shot. We believe this reg guide is ready
5 for use, and this is a stable and usable version.

6 To highlight a couple of the changes, I
7 first wanted to mention that there was a minor
8 change to the reg guide necessitated by a change to
9 the rule itself. And this was discussed, just to
10 refresh your memory, Mr. Chairman, back in the
11 February 4th full ACRS meeting. And then we
12 changed the rule language a little bit to clarify
13 that not every single change to the analysis would
14 require a licensee to come back to the NRC staff
15 with a LAR. The rule, as originally written, could
16 be interpreted that way, and we wanted to clarify
17 that, certainly while some changes, particularly a
18 significant change to a method, switching to a
19 seismic PRA from a margins analysis, changing, you
20 know, drastically changing the LOCA frequencies
21 that were allocated, something like that, would
22 require a change. But minor changes we felt the
23 licensee should handle. So the rule language
24 itself was clarified in Part E.3, and we made a
25 simple conforming change to the reg guide to

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1 reflect that reality.

2 The more substantive changes that have
3 taken place since November of last year are really
4 found in Appendix C. And if you think back to
5 November, Appendix C originally had three methods
6 for partitioning a plant-wide LOCA frequency on
7 individual occasions, and this is something that
8 has been discussed quite a bit in the last several
9 meetings. But just as a reminder, originally we
10 had three methods of so-called bounding approach,
11 what we called a conservative partitioning, and a
12 semi-quantitative partitioning. And so those kind
13 of go in order of realism, in a sense. The
14 bounding tends to produce the highest delta CDF
15 results, conservative partitioning is kind of in
16 the middle, and, in method three, semi-quantitative
17 partitioning tends to produce lower results.

18 As we went through the internal
19 concurrence process, we really had a tough time
20 getting full alignment on methods two and three.
21 And so we made a decision that we would move the
22 reg guide forward only retaining method one.
23 Although it's a little conservative, we thought it
24 was usable based on information we received from
25 the pilot, and the decision was made, as Joe

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1 mentioned, to continue to work on methods two and
2 three.

3 MEMBER STETKAR: So because you
4 received information from South Texas, which looks
5 like no other plant in the country, then only the
6 conservative method applies for every other plant
7 in the country?

8 MR. FONG: Well, I'd point out, Mr.
9 Stetkar, it's a reg guide, so licensees are free to
10 come forward with alternate methods if they see
11 fit. We felt that only method one was ready for
12 prime time at this point, and we're going to
13 continue on our own working on methods two and
14 three. But, of course, licensees, if they feel
15 that method one doesn't suit their needs, they're
16 welcome to propose other methods, as well.

17 CHAIRMAN BALLINGER: I just got an
18 email from Mike Corradini. He'd like to ask a
19 question. He said he's on mute.

20 MEMBER CORRADINI: Can you hear me?

21 CHAIRMAN BALLINGER: Yes, hear you
22 fine.

23 MEMBER CORRADINI: Okay. All right.
24 So my question is following up Mr. Stetkar's
25 question. My feeling is, unless I misunderstand

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1 Appendix C, that the staff is going to have to go
2 in with a number of individual case-by-case
3 exceptions to the Appendix C guidance because it
4 doesn't seem to follow what I remember to be what
5 you use, I guess, assume is the pilot. Am I
6 misunderstanding?

7 MR. FONG: Well, Dr. Corradini, I don't
8 think the staff needs to start doing a bunch of
9 one-offs. We feel that method one, again, while it
10 tends to be a little on the conservative side, is a
11 usable method that licensees can use right now.
12 It's simplified.

13 MEMBER STETKAR: My point, C.J., is you
14 use the term here on the record a little bit on the
15 conservative side. My question is what basis do
16 you have for a little bit on the conservative side?
17 Because you only have one partial analysis for one
18 plant that doesn't look like any other plant in the
19 country in terms of their conditional core damage
20 frequency, the number of trains of equipment they
21 have, and so forth and so forth and so forth. So
22 why do you know that it's a little bit conservative
23 for everybody else in the country who might use
24 this?

25 MR. FONG: Right. So there's two

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1 things that we've done.

2 MEMBER STETKAR: It might be a lot, a
3 lot, a lot conservative, and I'll take that
4 approach.

5 MR. FONG: It's going to depend on the
6 plant absolutely.

7 MEMBER STETKAR: Okay. Well, then why
8 don't you allow other plants in the regulatory
9 guidance to use more realistic approaches that the
10 staff has thought through, without going into, as
11 Mike said, this sort of one-off, everybody gets a
12 separate evaluation because everybody needs to use
13 some little trick that --

14 MR. GIITTER: Dr. Stetkar, let me try
15 to speak to that. I think the staff intended to
16 include all three methods in the reg guide. And in
17 the concurrence process, we were unable to get
18 concurrence from one of the offices involved in
19 reviewing it. And an assessment was made based on
20 the extent of the comments that it would be more
21 expedient for us to move forward with the one more
22 conservative method and continue to work on
23 refining and addressing the comments on the
24 remaining two methods.

25 MEMBER STETKAR: Well, could you -- I,

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1 unfortunately, wasn't at the subcommittee meeting
2 last fall where I understand this was discussed at
3 some depth. What type of comments and concerns did
4 you get on those other two methods in the former
5 version of Appendix C? What were the concerns?

6 MR. FONG: Sure. I'll give you an
7 example. So the kind of overarching comment we got
8 was that methods two and three have merit, but
9 they're not quite ready for regulatory use. And so
10 here's one example. Method three leverages
11 information from risk-informed ISI, and it assigns
12 a high, medium, or low relative magnitude for each
13 location based on ISI insights. And what some
14 folks pointed out was that risk-informed ISI
15 doesn't include all the plant locations that are
16 important to a GSI-191 analysis. For example, if
17 you have a program, those locations are scoped into
18 that specialized program and aren't looked at in
19 risk-informed ISI space or aren't assigned a high,
20 medium, and low. So there's a couple of gaps --

21 MEMBER STETKAR: But if I was a plant,
22 couldn't I go out and look at those locations and
23 do that assignment?

24 MR. FONG: That's what we do, sure.

25 MEMBER STETKAR: Well, okay.

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1 MR. FONG: So that was the point that
2 the whole method, it's not that the method is
3 invalid. We just had some details that needed to
4 be filled in before the method could totally be
5 used, and that's what we're working on right now.

6 MEMBER STETKAR: Go on, Mike.

7 MEMBER CORRADINI: I'm sorry, I'm
8 sorry. But then the intent is that this is, that
9 the Appendix C is a living document, that we're
10 going to see additions to it?

11 MR. FONG: I wouldn't call it a living
12 document. I would call it a -- right now, it's the
13 best available method that we have, and we're going
14 to augment it with, hopefully, at least one or two
15 additional methods by the end of the year.

16 MEMBER CORRADINI: Okay. Then the
17 timing of doing it now versus doing it in a year is
18 what? Why push forward now if you're not ready?

19 MR. LAUR: This is Steve Laur. There's
20 a couple of things here. One is it looks like, you
21 know, schedule pressure because it's tied to
22 50.46(c) rulemaking. But in actual fact, there's a
23 lot of good information in this regulatory guide
24 beyond just how -- this is obviously a key part --
25 but beyond just what's in Appendix C. There's all

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1 the parts about the monitoring program, the
2 defense-in-depth, how you evaluate that, how you do
3 the head loss, debris transport, etcetera. All
4 that is in there, and most of that has been based
5 on an experience from a pilot program.

6 So, you know, we can hold off until we
7 have a perfect Appendix C with technically
8 justifiable methods, which is what we're really
9 lacking now, in my opinion, is the technical basis
10 for methods two and three. It turned out to be not
11 an easy fix but a little more thorny problem, so
12 we're hoping with this working group between
13 research and our office to have something for a
14 revision to this reg guide hopefully, as Joe said,
15 by the end of the year. But to hold the entire reg
16 guide with all the other guidance in advance until
17 then didn't seem to be the proper thing to us.

18 MEMBER CORRADINI: So just to clarify,
19 so you are going to look for a change, so that
20 means certain licensees are going to use this in
21 this interim time period of the next nine months
22 that they need to see this and get started?

23 MR. FONG: Yes. And just to be clear,
24 we have only one docketed submittal right now,
25 which is the South Texas project you'll hear from a

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1 little bit later. We do have preliminary
2 information from public meetings and other sources
3 on some of the first non-pilot plants, and so this
4 was not done in a vacuum just to look at one
5 licensee. We took all the information we had that
6 was available to us at the time when we made the
7 decision to move forward with just method one.

8 MEMBER CORRADINI: Okay, all right.
9 What strikes me is, I think it goes back to Dr.
10 Powers' point that there's a pilot that's in
11 process. And unless I misunderstand -- and there's
12 a lot of good stuff in the reg guide. But as I
13 understand, it's fashioned basically with that
14 knowledge of that pilot, which is yet to be
15 finished. So I'm still struggling to understand
16 the need to push forward at this point since some
17 of these things seem, John uses a bit conservative,
18 I can't tell, but it's one pilot that hasn't been
19 completed.

20 So I'll stop. Thank you. And I'll go
21 back on mute.

22 MR. D. HARRISON: This is Donnie
23 Harrison from the staff. I would just point out,
24 and pardon me if I'm wrong, C.J. and one of the
25 Steves, but the non-pilot plants are more aligned

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1 with the simplified bounding approach. So that's,
2 so it's not that that approach was developed for
3 the South Texas pilot. It's actually kind of a
4 reverse. It's actually the approach that the 13 -
5 14 non-pilots plan to use, and then we're
6 conforming South Texas to it at this point.

7 MR. FONG: Okay. We talked about some
8 of this already, but the path forward on Appendix
9 C. Again, we believe that the current reg guide is
10 ready to be used, and the bounding method that
11 we've talked about is suitable for the pilot. Of
12 course, we're going to evaluate experience as we go
13 and complete the pilot, and we'll revise the reg
14 guide as necessary. And, as Joe mentioned and we
15 talked about before, we're currently working on
16 some additional methods to go into a revised
17 version of Appendix C.

18 Just some detail on what that looks
19 like. We had a meeting between NRR and research
20 back in February and an agreement to augment
21 Appendix C with more realistic methods. So we have
22 a written project plan on how to do that. We've
23 identified the key staff that will be working on
24 that effort. They've put together a series of
25 milestones and key actions that need to take place.

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1 And as Joe mentioned, we're going to attempt to
2 complete that by the end of the year or possibly
3 early next year.

4 Now I'd like to shift gears a little
5 bit and talk about the difference between the
6 detailed approach in Appendix A and the simplified
7 approach in Appendix B. Appendix A, the detailed
8 method, what you're going to see is different basic
9 events that are added to the PRA model. For
10 example, a basic event for strainer failure, loss
11 of NPSH of the strainer, and a basic event for core
12 blockage. And you'll see a variety of models that
13 are used to estimate a failure probability for
14 those basic events based on what happens on the
15 debris generation and transport phase, and you'll
16 see a probability that's assigned based on a
17 variety of different conditions.

18 And so I think a key element to that
19 approach, if you're looking for a delta between the
20 two, is that in Appendix A you're going to see a
21 correlation of time versus head loss, correlation
22 that's used to derive the probability of these new
23 basic events; whereas in the simplified approach in
24 Appendix B, what you're going to see is what I call
25 go-no-go test, so there's going to be a comparison

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1 of the degree, for example, at the strainer
2 compared with an existing test data. And you'll
3 see a conditional core damage probability of zero
4 if the debris that's calculated, its generating
5 transport, is below that threshold or 1.0 if that
6 degree amount is above the threshold.

7 So you don't have a time versus head
8 loss. You don't have a probability. Just go-no-go
9 for each break scenario.

10 MEMBER STETKAR: C.J., I have a lot of
11 questions on the reg guide. You guys don't have a
12 lot to present here. Okay. You're apparently done
13 with this, so I can ask all my questions. You
14 mentioned Appendix B says go-no-go. That implies
15 that if something, if go means I have less than
16 2.77736 and I calculate that I have 2.7735, I pass;
17 if I have 2.7737, I fail, whatever that is.

18 How do I account for uncertainties in
19 all of this? Now, you very clearly say that
20 whenever I calculate LOCA frequencies, I have to
21 account for uncertainty. How do I account for all
22 of the other uncertainties when I do this
23 simplified approach, like uncertainties in the
24 amount and types of debris, uncertainties in the
25 transport, uncertainties in actually what will

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1 plug? Because everything else is as, if the
2 wonderful deterministic folks know what those
3 numbers are after those six significant figures or
4 whatever I babbled, so how do I account for all of
5 those other uncertainties?

6 MEMBER POWERS: Yes, that is not the
7 problem.

8 MEMBER STETKAR: That is not the
9 problem?

10 MEMBER POWERS: The deterministic guys
11 may well know things out to significant figures.

12 MEMBER STETKAR: They think they know
13 that.

14 MEMBER POWERS: What they don't know
15 are the phenomena that appear under realistic
16 conditions and at these simulated or not
17 anticipated.

18 MEMBER STETKAR: I characterize all
19 that as part of my uncertainty about whether I pass
20 or fail.

21 MEMBER POWERS: The uncertainty is the
22 issue. The really catastrophic uncertainty are
23 those things that don't get simulated when we do
24 experiments to validate the deterministic analysis.

25 MR. SMITH: The staff is aware that

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1 there is a significant amount of uncertainty in the
2 calculations that are done strictly to determine
3 how much debris gets to the strainer and how much
4 head loss that that debris is going to cause. So
5 we have a reg guide, Reg Guide 1.82, and it
6 incorporates a lot of things through reference, but
7 our conclusion when we developed that reg guide was
8 that it was significantly conservative to make up
9 for a lot of these uncertainties.

10 So that is, that is the way that we
11 deal with those types of uncertainties, not the
12 break frequency uncertainty. These plants that are
13 using the simplified approach are following the Reg
14 Guide 1.82 guidance, and this is the same guidance
15 that we apply to plants that are not using a risk-
16 informed resolution. And we believe that those
17 plants are, you know, they're dealing with --

18 MEMBER STETKAR: We believe that plants
19 were safe from fires because everybody followed or
20 thought they were following Appendix R. We found
21 in risk assessments that isn't true when people
22 look at more things more thoroughly and account for
23 uncertainties. So I guess I'm challenging the
24 staff about how this whole process accounts for
25 uncertainty. Just simply saying that, well, you

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1 have to account for uncertainty in the LOCA
2 frequency because I can look up in a table in
3 NUREG-1829 -- and those folks have to own those
4 uncertainty distributions. You don't. Nobody else
5 does. They're there for me, so I've got them. I
6 don't get it.

7 MR. SMITH: The way that we're
8 combining the two aspects of this --

9 MEMBER STETKAR: You're presuming --

10 MR. SMITH: -- resolution --

11 MEMBER STETKAR: -- that a point
12 estimate for debris generation, debris transport,
13 debris accumulation on the strainers, chemical
14 effects, strainer pass-through, debris accumulation
15 on the core, you're presuming that all of that
16 stuff is somehow conservatively bounding without
17 ever having assessed the uncertainties.

18 MR. SMITH: That's correct.

19 MEMBER STETKAR: Okay, thank you.

20 MR. SMITH: And I think that that's,
21 you know, we've been in front of this committee
22 with our deterministic resolutions, and I believe
23 that it's been accepted by the committee, you know,
24 the methodology that we use. And I think the way
25 that we're combining the deterministic methodology

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1 with the risk-informed methodology is just building
2 on, you know, previously-accepted methods, and I
3 don't see that we've left a gap in there where we
4 don't treat uncertainty.

5 MEMBER STETKAR: I didn't do this last
6 week. I'll do it during the break. I'll do a word
7 search on Reg Guide 1.82 and see if the word
8 "uncertainty" pops up in there anywhere. I'm not
9 sure whether it does or not.

10 MR. FONG: Do you want me to move
11 forward, or do you have an additional question that
12 you wanted to ask --

13 MEMBER STETKAR: I have a lot of
14 questions on the reg guide, and, since your next
15 slide says conclusions, I can either wait for you
16 to finish that, if you'd prefer to do that. Why
17 don't you do that?

18 MR. FONG: Sure. Just four
19 conclusions. You've heard me state them a little
20 bit earlier. We think the reg guide is ready to
21 go, and it's completed the concurrence process.
22 You've heard Joe talk about how it utilizes and
23 relies on existing tried-and-true processes. And
24 as I said earlier, we are working on developing
25 some additional methods in Appendix C for one

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1 specific area, for LOCA frequency allocation. But
2 as Steve Laur mentioned earlier, we think there's a
3 lot of really good guidance in the reg guide that's
4 ready to go. We didn't want to hold up all this
5 other useful guidance just for this one step. And
6 so we want to move the reg guide forward and get
7 that guidance out to the industry where they can
8 use it.

9 MEMBER STETKAR: I did my word search.
10 The word "uncertainties" does crop up, so I can't
11 say it doesn't. But I don't know how they're
12 treated. Okay. If I do the simplified approach,
13 according to Appendix B, and I conclude that the
14 change in risk is acceptable, do I then need to
15 change my base PRA to include those scenarios that
16 I determine are assigned to core damage or, you
17 know, assigned 1.0 conditional core damage
18 probability or 1.0 conditional large early release
19 frequency? Do I need to do that, yes or no?

20 MR. FONG: Well, we had a lengthy
21 discussion, the staff had a lengthy discussion
22 about meeting a base PRA. We believe the base PRA
23 the as-built, as-operated plant represented
24 realistically so --

25 MEMBER STETKAR: Good. That's my

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1 interpretation. So now that we agree on that term,
2 do I need to change that thing?

3 MR. FONG: Yes. I think, at any given
4 time, it's your best estimate, it's the licensee's
5 and the NRC's best estimate of what's really going
6 on at the plant.

7 MEMBER STETKAR: That's not clear to me
8 in the guidance. I read through the guidance in
9 several places, and it never told me that I need to
10 go change my PRA after the submittal is accepted or
11 approved, you know, so that those scenarios that
12 were assigned to core damage or large early
13 release, according to the simplified method, are
14 not part of my PRA for the as-built, as-operated
15 plant. I could read the guidance to say I don't
16 need to do that. That's why I asked the question.

17 MR. FONG: Yes, I certainly understand
18 the question. I think we were trying to be careful
19 here because we wanted to write a reg guide on how
20 licensees calculate the portion of risk
21 attributable to debris. There's guidance out there
22 on what needs to be in your PRA for a given
23 application, whether it's doing a significance
24 determination process evaluation, a license
25 amendment request. We want to be careful we let

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1 that guidance do what it needs to do.

2 For example, for what needs to be in a
3 PRA, there's Reg Guide 1.200, and that's the PRA
4 standard. We didn't want to try to cross over into
5 that world. We wrote a reg guide specifically for
6 this application.

7 MR. LAUR: Just to add to that, but I
8 think a reading of the reg guide would lead you to
9 believe or you should be able to infer from the reg
10 guide or maybe it's explicit that the licensee has
11 to maintain the risk-informed assessment of debris
12 over time.

13 MEMBER STETKAR: Yes.

14 MR. LAUR: You're right it is mute on
15 whether or not you have to update that into the PRA
16 because I think where you're going with this is
17 that this is going to be grossly conservative in
18 most cases, it will be a lump that you add to the
19 base PRA that would be useless. In most of your
20 calculations, it would never show a delta, unless
21 you did the Appendix A method where you actually
22 have it in the model. But it is important that the
23 licensee update this specific analysis, even if
24 it's the simplified approach, periodically to
25 ensure that they meet the acceptance criteria.

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1 MEMBER STETKAR: No, Steve. What I'm
2 concerned about is that if they don't update their
3 PRA -- and I'll get away from this notion of base
4 versus whatever. It's the PRA of the plant. If
5 they choose to take this risk-informed approach and
6 say, well, we're going to do a simplified
7 conservative analysis of this particular issue, the
8 same way as I do a simplified conservative analysis
9 of a lot of other issues in the PRA, this just
10 happens to be one of them, if I do that then here
11 are the implications in my PRA today of doing that
12 analysis. And some sequences in my PRA then get
13 assigned to core damage and perhaps direct large
14 early release. Fine. You know, I do that with a
15 lot of things in my PRA.

16 If something comes up later that I then
17 need to use my PRA to address, whether that's a
18 risk-informed application for some other issue or
19 whether it's some sort of episodic event that I
20 need to use the PRA to argue with the staff about
21 what's the delta risk of this particular event or
22 whether it's significance -- whatever I'm going to
23 use my PRA for, ought not those sequences be in
24 that PRA?

25 MR. LAUR: Yes, I think C.J.'s answer

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1 was on point there.

2 MEMBER STETKAR: Okay. And as I said,
3 it's not clear to me reading, there's a big long
4 section of part of Section C.1D that says, well, if
5 you're consistent with the rule, you can use the
6 simplified approach and you got to go do these
7 things. It leads me to believe that I don't need
8 to do anything else --

9 MR. LAUR: Each other application has
10 either Reg guide 1.174 and/or a specific reg guide
11 for that application.

12 MEMBER STETKAR: Is the use of my PRA
13 to answer a question about the significance
14 determination process or answer a question about
15 some episodic event that has happened in industry a
16 risk-informed approach that applies under one of
17 those other reg guides?

18 MR. FONG: Strictly speaking, no.

19 MEMBER STETKAR: Thank you.

20 MR. LAUR: But then, again, there's no
21 requirement to update the PRA, unless you have --

22 MEMBER STETKAR: Yes, if I tried to use
23 my PRA for one of those things and I didn't
24 evaluate loss of off-site power, would you have a
25 problem with that, even though there's no

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1 requirement that my PRA has to meet Reg Guide
2 1.200?

3 MR. LAUR: Yes, I'd have a problem with
4 that, but I'm failing to make the connection here.

5 MEMBER STETKAR: Your point is that my
6 PRA ought to be my PRA. Some of the things in my
7 PRA are more realistic, some of the things in my
8 PRA are more conservative. But it's my PRA, and
9 I've got to live with it, and I've got to live with
10 it from this point forward, for whatever reason I
11 want to use it, whether it's just discussions with
12 the staff or whether it's an actual risk-informed
13 application under some other regulatory guidance.

14 And as I said, as I read this
15 regulatory guidance, I could come to the conclusion
16 that all I have to do is some one-off calculation,
17 say I'm fine, keep my PRA unchanged, and then four
18 years later look at it and do the same one-off
19 calculation and say I'm still fine.

20 MR. LAUR: Right. And if you never use
21 the PRA for anything else, that would be acceptable
22 for this application. I guess, in my opinion, this
23 is not the reg guide where you would put that --

24 MR. FONG: That's what I was saying.
25 There is guidance out there for the different ways

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1 in which PRA is used: changes to a licensing basis,
2 looking at inspection findings, MSPI. And there's
3 a lot of different applications for PRA, and
4 there's application-specific guidance out there
5 that's already in play. And so we didn't try to go
6 out and re-write the rules for all those other
7 applications. I don't think that would have been
8 appropriate for us to do that here.

9 CHAIRMAN BALLINGER: Before we get to
10 the next question from John, I've got an email from
11 -- I'm trying to do parallel processing here --
12 from Mike. He says, "Dana feels that they are
13 missing a phenomena," with an exclamation mark, as
14 he hinted what is missing, chemistry effects. So I
15 guess it's a question for you. I'm just reading
16 from the -- you know, what would you like me to do?
17 He's listening. He may not be able to talk, but
18 he's listening.

19 MEMBER POWERS: That's the best
20 possible situation.

21 CHAIRMAN BALLINGER: He's fine. He's
22 sending me emails back and forth here.

23 MEMBER POWERS: I'd be happy to point
24 out lots of things they have not considered, but
25 anything that gets considered, by definition, can

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1 get addressed. It's the things, it's the famous we
2 don't know what we don't know kinds of things that
3 bother me.

4 Now, when I say they have not tested
5 under productivity conditions, for instance no
6 radiation field. Does radiation field affect
7 filtration performance and things like that? Yes,
8 it turns alkenes into ketones, ketones can
9 polymerize. So it can affect things. Now, is that
10 going to be a huge effect? I don't know. If I
11 were doing the deterministic analysis, I would say,
12 you know, if I'm a staff member working, oh, it's
13 probably a small effect. But I don't know, and you
14 have to recognize that you don't know.

15 But those things, I can take account of
16 those things. It's the things that I don't think
17 of that we really need to worry about. And what
18 I'm asking about is have we carefully considered
19 how things can go agley, as they say here, in
20 formulating this reg guide and thinking that it's
21 somewhat conservative. Is it in fact, and could we
22 design some strategy where we can validate this?
23 That's very difficult.

24 I mean, I keep hoping for a plant in
25 Iran to fail, but it's not going to have all the

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1 systems there and it's not going to be instrumented
2 and there's just going to be one accident when it
3 does. So it's less than a perfect test, and that
4 will always be the case. I mean, that's one of the
5 strongest motivations I can think of to go to a
6 risk-informed kind of approach here is because you
7 will never have perfect information on this system,
8 even if it's incorporated in a plant and that plant
9 undergoes an expected accident. That will still be
10 one data point.

11 And so that's what I'm asking about is
12 how big is that we don't know what we don't know
13 portion of this pertinent to this particular reg
14 guide and how do we cover ourselves on that?

15 MR. SMITH: I guess I can't disagree
16 that we don't know what we don't know.

17 MEMBER POWERS: Yes. I mean, there's
18 always going to be something, right?

19 MR. SMITH: I'm just going to kind of
20 repeat what I said before. We have deterministic
21 guidance, which is, you know, acceptable to the
22 NRC, which we are using in this reg guide, and I
23 think the way that we're using it, we haven't, we
24 haven't eroded any of the conservatism that's built
25 into that.

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1 So I don't really know, you know, other
2 than going back and revising our deterministic
3 guidance, taking another look at that, which we are
4 always looking at that, you know. When we find out
5 new things, we try to take those into
6 consideration. I don't know what we would do, you
7 know, within this reg guide to resolve that kind of
8 issue.

9 But, you know, the people who evaluate
10 this, we think we have a pretty good framework for
11 doing the evaluation that has conservatism built
12 into it, and we understand that there are unknowns.
13 For example, you know, we've been through a lot of,
14 we've looked at the chemical effects and radiation
15 effects and things like that. Of course, we don't
16 --

17 MEMBER POWERS: I haven't really seen
18 anybody look at the radiation effects in what I
19 would call a systematic fashion. Again, if I were
20 working for you and you asked me to look at that,
21 I'd probably come back and tell you, well, it's
22 probably a small effect. The grosser chemical
23 effects, what I would call thermal chemical
24 effects, we've kind of looked at and we don't
25 really understand, but we've kind of looked at. We

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1 have, I hate to call it an intuitive feel, but we
2 have something in an experimental feel for how
3 weird it is. We have semblance that we're kind of
4 comfortable with. You know, I would put it, if I
5 were you, put in user needs that, God, if you ever
6 find out anything more about what's in the sumps at
7 Fukushima, for God's sake, tell me because, you
8 know, that's the kind of prototypic data that you'd
9 really like to know to know how good things are.

10 MR. FONG: I think one other important
11 -- that's a great answer.

12 MEMBER POWERS: If you do have somebody
13 that's looked systematically -- I mean, I won't
14 worry about these chemical transformations that
15 occur in radiation fields a lot, especially with
16 organics. So if somebody has looked at that in a
17 systematic fashion, I'd sure like to see it
18 because, otherwise, I haven't.

19 CHAIRMAN BALLINGER: Are you arguing
20 for a conservative approach to account for that?

21 MEMBER POWERS: Well, no. I think, as
22 I've said explicitly, I think a risk-informed
23 approach is the only way to address these kinds of
24 concerns because you will never know what you don't
25 know. Never. I mean, it's a tautology.

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1 MR. FONG: And one thing I wanted to
2 add, Dr. Powers, is, of course as you know, a key
3 part of the risk-informed approach is having a
4 defense-in-depth strategy. So if you look at what
5 the reg guide does, it has the licensees identify
6 what sequences are going to lead to core damage and
7 quantify those, but we don't stop there. We also,
8 to account for unknown unknowns, as Reg Guide 1.174
9 has us do, we have the licensees define a defense-
10 in-depth strategy that looks at what if we're wrong
11 and one of these scenarios happens.

12 MEMBER POWERS: Yes, it's, it would be
13 good if the licensee did exactly that, which is how
14 can this system fail? You know, what does it do to
15 cause this system not to work? But that's not what
16 they do when they do defense-in-depth. When they
17 come to that part of 1.174, they string together a
18 bunch of lists of things that bolster their
19 conservatism. I would be much more comfortable if
20 they would come in and say this thing all works
21 unless there's kryptonium in the solution and then
22 kryptonium screws it all up or something like that.

23 I am reminded of once being in a
24 position of having to identify ways of preventing
25 refinement of radiated reactor fuel, and I spent a

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1 week with people that do that at Rocky Flats, and
2 they assured me in no uncertain terms that their
3 refinement techniques would work on any kind of
4 fuel I would deliver to them of any sort. It went
5 on at elaborate lengths. I thanked them very much,
6 and, on the way out, the guy says, "Well, make sure
7 you don't put any silicon in that fuel. Our
8 columns can't tolerate salicylic acid." This is
9 what I was looking for all the time. It's those
10 things that surprise you, and you know, as well as
11 I do, as soon as you get the surprise, oh, of
12 course I knew that. So many times it happens.

13 MEMBER SKILLMAN: I'd like to jump in
14 here for a second, and I want to build on John
15 Stetkar's questions. The way this document, this
16 reg guide is written, on page 17, an entity seeking
17 to use this approach is required to submit an
18 application. I spent a lot of time at sites, and
19 when a site makes its mind up that it's going to
20 make a major change and it's going to produce a
21 license amendment, that is a big deal. It's also
22 an expensive deal. It's time consuming and almost
23 always means consultant resources, as well as
24 probably some of the finest analytical resources in
25 the organization.

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1 So when a utility decides or an owner
2 decides to go down this path, it necessarily begins
3 to build another analysis that looks like it's PRA,
4 but it's really a GSI-191 dedicated PRA, correct?
5 It's a dedicated GSI-191 PRA. Simple.

6 MR. FONG: Which approach are we
7 talking, the detailed or the simplified?

8 MEMBER SKILLMAN: I'm on number nine of
9 your reg guide, and I'm a licensee and I'm reading
10 this and I'm saying, hey, if we want to use a risk-
11 informed approach, we've got to submit a license
12 amendment request and we've got to do a special PRA
13 just for this 191, at least a calculation that
14 looks like a PRA. Is that right?

15 MR. FONG: Well, it's up to the
16 licensees how they would want to do that. I mean,
17 I think we would expect that a licensee would try
18 to start with an existing PRA model they had,
19 unless it's built something completely from
20 scratch. But we'll review whichever, whatever the
21 licensee submits to us.

22 MEMBER SKILLMAN: And what's your
23 expectation?

24 MR. FONG: That they would start with
25 an existing model, modify it as necessary to

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1 calculate the risk attributable to debris.

2 MEMBER SKILLMAN: So would they end up
3 with two counts or just one count?

4 MR. FONG: Well, they would have, I
5 think, two counts, one for in-vessel, one for
6 strainer. Two basic events is what we've typically
7 seen licensees talk about doing.

8 MEMBER SKILLMAN: Isn't that what John
9 was talking about? Here you have this main PRA for
10 the unit, and now you have this calculation that is
11 the calculation for Reg Guide 1.229. And the
12 reason I'm asking this question is because it seems
13 to me that it raises some either configuration,
14 some documentation and analytical configuration
15 control challenges or some harmonization questions.
16 And what can be a burden on the licensee is
17 ensuring that the GSI-191 calculation and the main
18 PRA for the unit remain consistent, aligned, and
19 accurately true to each other. How does this make
20 sure that happens? How does this make reg guide
21 make sure that that consistency remains?

22 MR. FONG: So, I mean, what you're
23 bringing up and I think what Mr. Stetkar brought up
24 earlier is a broad question that we face in PRA all
25 the time. We've seen licensees come forward, for

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1 example, provide information for us in the
2 significance determination process, and they'll
3 say, "Well, we don't want to use our 805 PRA. We
4 have a different PRA."

5 So this kind of thing happens.
6 Licensees sometimes have different PRAs for
7 different purposes, and I don't think it's the job
8 of this reg guide, unfortunately, to solve that
9 broadly. I think if a licensee goes forward and
10 they create, say, two new basic events used to
11 calculate the risk attributable to debris for this
12 analysis, your question is a very fair and
13 reasonable one. What happens to those basic events
14 going forward for, say, mitigating strategies
15 Fukushima PRA or something? I don't think we can
16 solve that with this reg guide. There's guidance
17 out there on risk-informed laws, SDPs, all the
18 various applications of PRA that licensees need to
19 follow.

20 MR. LAUR: Yes, I don't know if this
21 will help or not, but, okay, let's assume we're
22 using a simplified approach. We do a test, which
23 has a lot of uncertainties but hopefully some
24 conservatism in it, and we say that's our go-no-go.
25 We use conservatism maybe in how we put the entire

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1 LOCA frequency on one weld that's the smallest,
2 whatever the simplified approach says. You could
3 do that portion of it without your PRA at all.
4 What you're doing is an estimate of the risk
5 attributable to debris, and you show that it's
6 small and consistent with the Commission's Safety
7 Goal Policy Statement, which means you've met one
8 of the five key principles that are in Reg Guide
9 1.174, and that will be it. If you never intended
10 to use your PRA for anything else, we would have no
11 hook to require you to update the PRA, and this
12 analysis would stand on its own.

13 Now, as C.J. pointed out, when you come
14 in for some other application, Reg Guide 1.174 has
15 got the total plant risk on one axis and the delta
16 plant risk on the other axis, this would have to be
17 added in there, which I think the issue we're
18 debating or talking about here is the fact that
19 this bounding approach, in my opinion, other than
20 the deterministic part which I can't speak to, it's
21 very bounding potentially, it's very conservative.
22 That has the potential of maybe skewing your total
23 risk number. You're going to have this large break
24 LOCA that's a larger term than it would be if you
25 didn't have debris, and we don't know how much

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1 larger it is.

2 But, yes, to answer your question, this
3 reg guide does not really talk about the baseline
4 PRA model to the extent that -- it really talks
5 about how you calculate the risk, the change in
6 risk for this application. I don't know if that
7 helped.

8 I guess your other question is about
9 the application, and I guess I didn't understand
10 that one about requiring an application. That's
11 not really required here. That's required in the
12 regulations --

13 MEMBER STETKAR: No, sir. No, sir,
14 it's required here, page 17, item nine. It's in
15 your reg guide.

16 MR. LAUR: Yes, but the reg guide
17 doesn't require it. It's 50.46(c) that will
18 require it, or, if that never becomes a rule, it's
19 the fact that this is an exemption that requires
20 it. But this reg guide is merely repeating a
21 requirement that's elsewhere.

22 MEMBER STETKAR: Okay. That helps.
23 Thank you.

24 MR. D. HARRISON: This is Donnie
25 Harrison of the staff. I just want to clarify most

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1 of these plants have a basic event in their PRA
2 model that's a black box. It just says sump clogs.
3 It's given a ten to the minus six failure rate. So
4 when someone decides that they want to use this
5 risk-informed approach, they are going to need to
6 change that basic event to reflect what the actual
7 condition of the plant is when they're done.
8 You're no longer going to have a black box event
9 that says ten to the minus six sump clogging. It's
10 going to be here's my model for debris and, if you
11 do the simplified go-no-go, it's going to be a lot
12 of, for this scenario it's 1.0.

13 So they are going to have to do that to
14 make that work. Otherwise, their PRA base model
15 won't be correct. It won't be reflecting the as-
16 built plant. So I hear Dr. Stetkar's point. It's
17 worth noting and going forward. It was a debate we
18 had a few months ago about the terminology in the
19 existing reg guide at that time about what is a
20 base PRA.

21 So I think we've taken the note. It
22 might be worth considering if we should at least
23 put a note into the reg guide or somewhere the
24 expectation that you would update your base PRA to
25 reflect what your current plant configuration looks

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1 like after you do this analysis. That way, it
2 doesn't get lost going forward. I think it's worth
3 noting.

4 CHAIRMAN BALLINGER: That's very
5 helpful. Thanks.

6 MEMBER STETKAR: Let me try, since
7 we're talking about base PRA, I'm going to come
8 back to uncertainty. We have two and a half hours
9 left, I think. If I look at the guidance in
10 Appendix B now, if I'm going to do the simplified
11 approach, Section B.1 tells me what I need to do
12 from Appendix A, the detailed approach. And by
13 omission, it tells me what I don't need to do from
14 Appendix A. And one of the things that I don't
15 need to do from Appendix A is PRA model changes,
16 Section A.3. That's omitted from what I need to
17 do.

18 So, okay, I don't do any PRA model
19 changes. But Section A.3 talks about some really
20 reasonable stuff because, in my PRA, I've got three
21 trains. Let me call myself South Texas. Any one
22 of those three trains is success, but, as we know,
23 it makes a difference whether I have A and only A,
24 B and only B, C and only C, A and B, A and C, B and
25 C, or all A, B, and C running, and whether I've got

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1 spray running in conjunction with that.

2 So there's a lot of different
3 combinations of things that I can have going on in
4 my PRA that will affect debris transport to screens
5 and affect that number that I'm going to calculate.
6 So if I don't change my base PRA to account for
7 those things, how am I going to use what's in my
8 base PRA to have any reasonable assessment of
9 debris transport and debris deposition on screens
10 so that they can come up with that number?

11 MR. SMITH: The way that that is
12 treated, at least in the pilot in the simplified
13 method -- and if other plants come in with
14 different methodologies, we'd have to look at it --
15 they have basically maximized the debris transport,
16 they've taken the design basis assumption that two
17 trains are in service. So they've maximized the --

18 MEMBER STETKAR: No, no, wait a minute.
19 Design basis assumption doesn't, nature doesn't
20 know about law, okay? So I can have A and only A,
21 B and only B, C and only C, A and B, A and C, B and
22 C, or A, B, and C. Those are a -- if I have zero,
23 that's core damage already, so I'll give you that
24 one.

25 MR. SMITH: They've bounded, they have

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1 taken the maximum transport that could occur,
2 assumed it went to two strainers, and then they
3 also did sensitivity studies that assumed only one
4 train was running and the maximum transported
5 debris to that single train strainer. So the way
6 that the pilot plant did it --

7 MEMBER STETKAR: Okay, Steve, let me
8 stop you there. Good for them. I don't see
9 anything in this regulatory guidance that leads me
10 to try to do that kind of an analysis. I don't see
11 anything that says if you're going to take this
12 simplified approach and you're not going to modify
13 your base PRA to account for all of those myriad
14 configurations that I can have, then here is what
15 you should do. I don't see anything in here that
16 says that.

17 MR. LAUR: I don't think you need to
18 modify the base PRA to get those various
19 combinations. If you're going to do a detailed
20 approach in Appendix A, in which case you're going
21 to have different flavors of basic events depending
22 on whether it's train A, train B, train C, and, in
23 fact, the pilot identified, I forget, 512 or
24 something permutations because they've got three,
25 you know, containment spray, three whatever, three

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1 high head, three low head. So they had 512 which
2 they've mapped into 64 by symmetry, then they pared
3 down to five.

4 So in a detailed approach, yes, you
5 would need to add logic to a typical PRA where you
6 say large break LOCA and you don't ask, you just
7 know it wouldn't work for the success, right? They
8 actually modified the tree to put all the various
9 branches.

10 But for the simplified approach, if you
11 can somehow, without modifying the PRA, determine
12 the transport for the various combinations, you
13 don't need to modify the PRA. And that's what they
14 did. They didn't consider the case of all three
15 working. They said the case of two sumps working
16 is conservative for the three, and then they
17 considered the single case. They did use a PRA to
18 determine a split fraction of being in one state or
19 the other --

20 MEMBER STETKAR: Steve, that's my whole
21 point. Good for them. They did a lot of work on
22 their particular plant. And after they did all of
23 that good work to come up with that information
24 about which of these configurations might be the
25 most bounding, then they said, okay, I'm going to

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1 use this simplified approach and put some numbers
2 in. This regulatory guidance is being written for
3 everybody else, not them, and I don't see the
4 regulatory guidance saying you ought to do
5 something like that, whether it's actually
6 something --

7 MR. SMITH: In Appendix B.

8 MEMBER STETKAR: In Appendix B. It
9 says I need to do that in Appendix A. In Appendix
10 B, all it says is I don't need to make any changes
11 to my base PRA model, and I have to determine a
12 threshold value for each debris type below which
13 the debris cannot adversely affect -- it doesn't
14 say that I have to go look for the most
15 conservative configuration of all of my operating
16 systems in the plant, not design basis, not
17 licensing basis, not assumed for an FSAR, but the
18 most conservative configuration, and then do my
19 debris transport and deposition under those
20 conditions. It doesn't tell me to do that. It
21 just says I don't need to make any changes and do
22 some magic and come up with a number.

23 MR. FONG: It does say if you don't
24 evaluate a particular scenario, you've got to take
25 a CCDP of 1. So --

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1 MEMBER STETKAR: The scenario doesn't
2 exist. Let's take a simple place where I've got
3 two injection pumps and two spray pumps, okay? And
4 I have I think four combinations of those things
5 running. It doesn't tell me to take the most
6 conservative of those four combinations. All I
7 know in my PRA is that I've got at least one
8 running, and maybe I haven't even evaluated spray
9 because it's only for core damage and I don't care
10 about spray.

11 MEMBER BLEY: Conservative in terms of
12 transport.

13 MEMBER STETKAR: In terms of transport.
14 In terms of transport. You're not modeling
15 transport here.

16 MR. LAUR: Let me just reiterate what
17 C.J. said, B.3C, it says plant space and
18 configuration not explicitly treated in a
19 simplified approach and which would not screen out
20 under B.1 should be assembly to core damage. Maybe
21 what you're saying is it needs to be clearer, but
22 it's not the PRA model that needs -- I mean, that
23 may be one way of determining these plant states.
24 But in a simplified approach, if you had to take a
25 two-train plant, they can consider both trains

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1 working or one train working.

2 MEMBER STETKAR: Does it make a
3 difference if I have both trains of injection, both
4 trains of spray, all four pumps running, any
5 combination of those four pumps running? It might
6 make a difference for core damage. It might make a
7 difference for delta LERF.

8 MR. LAUR: Certainly. But the PRA
9 model isn't what's going to tell you that, unless
10 you modify the PRA model.

11 MEMBER STETKAR: My whole point.

12 MR. LAUR: But you can tell that
13 without the PRA model.

14 MEMBER STETKAR: Yes, I can do a PRA,
15 in principle, on an Excel spreadsheet with enough
16 permutations and combinations. People don't try to
17 do that because it gets real complicated.

18 MR. LAUR: But we're talking about
19 debris transport under different pump running
20 configurations.

21 MEMBER STETKAR: Yes.

22 MR. LAUR: What does it have to do with
23 the PRA? That's all the phenomenological part that
24 GSI-191 has raised, I guess.

25 MEMBER SKILLMAN: So let me jump in.

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1 This is exactly the issue that I perhaps ineptly
2 was trying to point to. Like John said an hour
3 ago, the plant has one PRA. It's one huge calc.
4 And what we're talking about here is, actually,
5 based on the gentleman who spoke a few minutes ago,
6 a sub-routine within this huge big calc is
7 extraordinarily important to the conclusion of that
8 calc. And the calc that I refer to is a capital C
9 calc. It's the plant's PRA. And I'm thinking
10 there ought to be one, not two. It ought to be
11 integrated so that all of the other things that are
12 going on concurrently are identified.

13 So I'm kind of stuck on this idea that
14 this reg guide presumes that you can make a license
15 amendment request for use of this methodology for
16 treating GSI-191 when the validity of this is only
17 as good as its place in the overall plant PRA.
18 Maybe I'm coming at this -- I'm the guy that hiked
19 down and found chicken wire as the screen in some
20 of the emergency sumps. I'm the guy that watched
21 Davis-Besse learn that if you took the take-off to
22 cool the recirculation pumps to the side of the
23 casing instead of the top of the casing, the pump
24 would survive. If that change was not made, the
25 pump would not survive. There are so many fine

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1 details that are out in the field that affect this
2 that maybe I'm affected from the practical
3 perspective. But from my practical perspective,
4 the sub-calc has got to fit into the bigger calc,
5 and it all has to work. So I'm stuck on that idea.

6 MR. LAUR: I don't know if this will
7 help or not, but I'll let one of my colleagues try.
8 For the detailed approach and what South Texas, as
9 the pilot, originally started out to do had a very
10 complex phenomenological model feeding into a PRA,
11 if you will. They identified, if I recall, seven
12 failure mechanisms involving the screens and/or the
13 core, different parts. Mechanical failure, you
14 know, deposit section, etcetera. And they put
15 those into two basic events, two primary basic
16 events in the model.

17 But because of what Member Stetkar was
18 saying, the different, you know, if you had one
19 train working, no train working, all trains
20 working, you get different debris loadings and
21 everything. They had to look at a huge number of
22 combinations, which they were able to move down
23 into five, let's say representative types of
24 thermal hydraulic situations.

25 So for each of these two basic events,

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1 they had five flavors, five different failure
2 probabilities, depending on where you were in this
3 sequence, okay? That's a typical PRA approach.
4 You've modified the PRA to have these, so you can
5 differentiate between one pump and two pumps
6 because we'd normally do that. And so they can put
7 these basic events in, and then, for the initiating
8 event frequency, they have the typical LOCA
9 frequencies. When you get out, you hopefully will
10 get a new CDF number and a new LERF number that
11 show you the effects of debris.

12 Now, the phenomenological part was very
13 complex. We couldn't understand parts of it. We
14 were not sure about other parts of it. How you do
15 the uncertainty through that parametric uncertainty
16 is difficult to understand if you're averaging
17 things properly, which is, I think, one reason that
18 they came up with their simplified approach, which
19 is a little different than what we have here but
20 similar. Okay.

21 That is modifying the PRA.

22 Now, if all I'm interested in is the
23 delta risk, I understand some of this stuff feeds
24 into the PRA model, but if I didn't even have a PRA
25 model I can do the simplified approach. I can take

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1 these deterministic approaches to figure out how
2 much debris is generated and transported under
3 whatever, under 50, you know, 511 combinations if I
4 wanted, and for each one of those I could then go
5 to each potential LOCA location, get a frequency
6 for that individual weld, you know. That's part of
7 the debate we're having. But I can do that and
8 say, okay, this one, when it's all transported
9 under this scenario with one sump running instead
10 of two, I get this much debris, go-no-go. It's a
11 go.

12 Next scenario, next weld. Go through
13 all the welds, go through all the possible
14 scenarios, assign a conditional core damage
15 probability of 1.0 if it's above this hopefully
16 conservative number, no core damage if it's low,
17 and I'm going to get a delta risk. I haven't
18 touched a PRA model.

19 Now, it's true if you're going to say,
20 well, what's the chance I'm in one sump versus two
21 sumps, you're going to go to your base PRA model.
22 But that hasn't anything to do with the debris,
23 that has to do with pumps starting and stopping
24 and, you know, failing to start or failing to run -
25 -

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1 MEMBER STETKAR: I guess, Steve, you
2 know, my mind glazes over when I hear people say,
3 well, I'm a PRA guy, I'm not a deterministic guy,
4 so I don't understand about that debris transport.
5 So I'll say I don't understand anything. My
6 simple-minded approach is there's some likelihood
7 of being in each of the possible configurations of
8 the plant, and there is then some conditional
9 likelihood, given that configuration, that a
10 certain amount of debris from location A will be
11 transported to the screens and the core, and there
12 is some conditional likelihood, given that, that I
13 win or lose. And I'm not talking about
14 deterministic stuff. All I'm saying is that's my
15 understanding of the world.

16 So I don't want to partition this up
17 into, well, the PRA guys do this and the
18 deterministic guys do that. That's the way the
19 world works.

20 And now you're saying, well, I'm making
21 conclusions about the delta risk. Well, the delta
22 risk accounts for all of those likelihoods. Maybe
23 I account for them conservatively, whatever that
24 means. Maybe I account for them realistically,
25 whatever that means. But the delta risk somehow

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1 has to account for those likelihoods.

2 So what I'm asking is how does the
3 guidance for the simplified approach tell me that I
4 somehow need to account for those likelihoods, and,
5 if I don't account for all of those relative
6 likelihoods, at least search for the most limiting
7 combination of running and not running the
8 equipment and debris generation for each location
9 such that I can then do what is determined, is
10 called a bounding assessment? I don't see it
11 telling me to do that.

12 If you're saying I can do it outside of
13 the PRA, yes, I can have a spreadsheet where I have
14 all of those likelihoods and all those 512 South
15 Texas combinations and do all of those little side
16 calculations. Okay. Well, to me, that smells a
17 lot like a PRA, but, you know, you might call it
18 something different, give it a different name. But
19 it doesn't tell me to do that. It just tells me to
20 define scenarios, and I don't know how I define
21 those scenarios if I -- me, if it were me, I'd
22 change the PRA model because that gives me those
23 likelihoods, but I'll admit I can do it on the
24 side. It doesn't tell me what I need to be careful
25 about when I define those scenarios.

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1 MR. SMITH: That's why we referenced to
2 Reg Guide 1.82 to define the debris generation and
3 transport part of this. And that's not in Appendix
4 B, but it's up front, and that's why we talked
5 about it. It's in the regulatory position section
6 where we talk about that.

7 So that was the meaning of doing that,
8 and I know I'm not answering your question about
9 how this ties into a PRA, but that's how we tried
10 to tell people that they need to use conservative
11 methods to determine their deterministic parts.

12 MEMBER STETKAR: Yes, but it still gets
13 back to this notion of likelihood and delta risk.
14 Reg Guide 1.82 doesn't --

15 MR. SMITH: It doesn't talk about that.
16 Absolutely.

17 CHAIRMAN BALLINGER: I had a question
18 from Mike Corradini. He says that that Joy could
19 do it as well as I did. At the top of page two of
20 Reg Guide 1.229, we see bold words. This reg guide
21 describes acceptable methods and approaches for
22 addressing 10 CFR 50.46(c)(e), alternative risk-
23 informed approach for addressing the effects of
24 debris on long-term cooling and applicable portions
25 reporting corrective actions, da, da, da. Then

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1 here's the bold part, "While the general risk-
2 informed approach of this reg guide may be applied
3 to any reactor designed within the scope of 10 CFR
4 50.46(c), many of the specific approaches, e.g.
5 WCAP 16 530 MPA, for chemical effects and
6 acceptance criteria, were developed for the current
7 fleet of pressurized water reactors. Entities,
8 licensees, or applicants using this guidance should
9 justify that the application for each approach or
10 method used meets the intent of this guidance."

11 And here's his question, "I'm not sure
12 what this means. Does it mean that the staff does
13 not expect BWR licensees to use this reg guide
14 since it will pass the deterministic approach?"

15 MR. FONG: So I'll field that one.
16 First, I guess, since the font is not bold, I guess
17 Dr. Corradini means the words themselves are bold,
18 so I'll be careful here.

19 CHAIRMAN BALLINGER: Well, okay. He
20 said see bold words. I was looking for the top of
21 page two, and I couldn't find it so . . .

22 MR. FONG: What that means is this:
23 when we set out to write this reg guide, we started
24 by looking at PWRs, BWRs, SMRs. People said what
25 about large light water reactors? What we found is

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1 this, there's so many different analyses that need
2 to be done. You've got to look at coatings.
3 You've got to look at debris. You've got to look
4 at different ECCS configurations. It was extremely
5 challenging to try to envision what that might look
6 like for an SMR or even a BWR because we didn't
7 have a pilot.

8 We also solicited feedback at a variety
9 of public meetings from the industry and said, hey,
10 anybody in the SMR community looking to use this?
11 How about you guys? We didn't hear any feedback
12 from a member of the industry saying we want this.

13 So given the challenge of trying to
14 envision all these different specifics without a
15 pilot and given the lack of demand for detailed
16 guidance for another design, we chose to limit the
17 reg guide, at least the things like WCAPs and
18 referencing certain topical, to the information we
19 had: existing PWRs looking to resolve or respond to
20 Generic Letter 2004-02.

21 We also think that's consistent with
22 the direction we received from the Commission in
23 two staff requirements memoranda where they said
24 modify 50.46(c) to allow licensees to GSI-191,
25 which, of course, is operating PWRs. But we didn't

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1 want to give the impression that somebody else
2 couldn't come in later and provide additional
3 information and use the method, like, for example,
4 in AP-1000.

5 So we wrote the guidance for the
6 information we had today. But, again, it's a reg
7 guide. Licensees can come forward and propose
8 alternate methods. And if they are BWR, SMR, they
9 would probably need to do that.

10 CHAIRMAN BALLINGER: Mike is off mute.
11 Do you have any more things to say, Mike? I
12 thought it was off mute.

13 MEMBER CORRADINI: Can you hear me now?

14 CHAIRMAN BALLINGER: Yes.

15 MEMBER CORRADINI: Okay. So what I
16 hear as the answer is that BWRs are probably not
17 going to use this.

18 MR. FONG: I can say that me,
19 personally, and having asked the question in
20 several public meetings, I have not heard a BWR
21 licensee say that they want to use this. I can't
22 tell you that, you know, you'll hear from the
23 industry after us. Maybe they have a different
24 perspective but --

25 MEMBER CORRADINI: Okay. All right.

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1 Then I'll wait on the question. That's a fair way
2 of putting it. We can get industry's -- I knew
3 that they were going to say something. We'll wait
4 until they come up then. Thank you.

5 But from your perspective, given the
6 public comments and your public meetings, this reg
7 guide and this approach was designed specifically
8 to resolve a PWR generic issue, end of story?

9 MR. FONG: Yes.

10 MEMBER CORRADINI: Thank you.

11 MR. LAUR: This is Steve Laur. Just to
12 add to that. The big-picture steps in Section C of
13 the reg guide, not the appendices and not all the
14 references to specific testing and other -- they
15 follow the proposed rule that's up with the
16 Commission now I guess, and those steps would apply
17 to anybody. I mean, they talk about looking at the
18 various scenarios that can be affected, how you,
19 you know, looking at debris generation and
20 transport, etcetera, the trust program is done
21 under the monitoring program. Those things, I
22 think, are generic. It's just that when we got
23 down into all of these references, we don't have
24 the experience for the other type of reactors. So
25 that's why that caveat is up at the beginning.

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1 MEMBER CORRADINI: So let me ask a last
2 question, and then I'll wait for the industry's
3 reaction to this. So at least as we sit now, there
4 is no issue for this sort of long-term cooling that
5 would have BWRs starting, BWR licensees, excuse me,
6 to worry about this. So from a completeness
7 standpoint, is it that there would be just, they
8 would essentially not need to show long-term
9 cooling via this what I'll call 50.46(e) approach?
10 They would essentially show that their debris
11 loading is such that they don't have an issue?
12 Because now it's part of the rule.

13 MR. SMITH: That's right. They would
14 use deterministic methods to determine their
15 licensing basis.

16 MEMBER CORRADINI: Okay. And their
17 licensing basis is not 15 grams per assembly.

18 MR. SMITH: No. Well, some PWRs, which
19 this could apply to them if they chose, do have 15
20 grams per fuel assembly as their licensing basis.
21 They have adopted that.

22 MEMBER CORRADINI: Okay, okay, all
23 right, all right. Thank you.

24 MEMBER BLEY: I'd just toss in one
25 comment. A lot of what John discussed, I think,

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1 Steve, I went back and read the regulatory position
2 part again, and I think they're probably covered.
3 But what strikes me is being less than specific in
4 Appendix B. It seems to me this kind of puts you
5 in a spot where you're much more likely, when you
6 review any applications of this type, to end up
7 with a lot more RAIs and a more extended review
8 process and some dissatisfaction on both sides, and
9 I think clarity could really help in that area.

10 MEMBER STETKAR: Let me go back to the
11 topic of uncertainty. I said I wasn't going to let
12 it die. If I read Section B.2 about impact of
13 debris, it says that, basically, I have a pass/fail
14 criterion. If the assessed amount of debris on the
15 strainers is more than X, I fail. If it's less
16 than X, I pass.

17 It says these threshold values are
18 derived from testing that demonstrates that long-
19 term cooling will be maintained under those debris
20 loads. Well, I'm now not a deterministic expert on
21 this testing or the analyses. I've sat in on a
22 bunch of subcommittees that have discussed those
23 issues, and, to me, there seems to be reasonable
24 amounts of uncertainty about that threshold value
25 and, yet, this is simply a pass/fail.

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1 So then I go and look at things that
2 say, well, we accept methods in Reg Guide 1.82
3 because they're considered to be adequately
4 conservative. So we're going to use those as our
5 so-called consensus models in the sense of NUREG-
6 1855.

7 Now, the interesting thing, it says the
8 NRC considers the accepted deterministic methods to
9 be conservative enough to compensate for
10 uncertainty. In addition, portions of the analyses
11 using NRC staff-accepted deterministic methods do
12 not require quantification of uncertainty model or
13 parametric.

14 Well, I'm sorry, a consensus model, if
15 I establish a consensus model, according to NUREG-
16 1855, I don't need to account for model
17 uncertainty. There's nothing in NUREG-1855 that
18 says I don't have to account for parametric
19 uncertainty within that parametric, within that
20 consensus model. It just says I don't need to
21 account for model uncertainty. That is the model
22 that everybody agrees is the good model.

23 If there's huge variability in the
24 parametric portion of that model, huge uncertainty,
25 NUREG-1855 doesn't give me a pass on that part of

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1 the analysis. So I'll say to comply with the
2 guidance in NUREG-1855 -- I'm sorry. We don't
3 comply with guidance. To follow the guidance in
4 NUREG-1855, I'm led to believe that even if I have
5 a consensus model, I have to account for at least
6 parametric uncertainty within that consensus model.
7 This tells me I don't need to do that. I'm curious
8 about that. So why is that?

9 MR. FONG: I think, I'm thinking of the
10 consensus models that were, that we've seen so far,
11 and they tend to deal, they're derived largely from
12 deterministic calculations. For example, the zone
13 of influence is a sphere with a certain set
14 diameter.

15 I'm struggling to think of what
16 parameter you would bury in those models.

17 MEMBER STETKAR: I'm talking about
18 amounts and types of debris and transport of that
19 debris and deposition of that debris and the
20 effects of chemicals and particulates and fibers in
21 that debris. Those are parameters in these models.

22 MR. FONG: And they're pegged high for
23 this --

24 MEMBER STETKAR: How do you know that
25 they're pegged high? They can't get any worse? Do

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1 you know that? Or is there some information --
2 this gets back to where I'm eventually going to
3 close the loop here. This gets back to what Dana
4 is talking about. Do we know that it can't be any
5 worse than what's in those calculations, or are
6 they, as is characterized here, conservative
7 enough?

8 MR. SMITH: When we, when we wrote this
9 Reg Guide we didn't think it would be appropriate
10 to create a higher or a more conservative model for
11 the people implementing the risk-informed
12 methodology than those implementing the
13 deterministic methodology which we have accepted in
14 the past.

15 MEMBER STETKAR: And I don't care what
16 you've accepted in the past. I'm talking about now
17 a risk-informed decision making process. I'm not
18 advocating a more conservative model, I'm
19 advocating the examination and consideration of
20 uncertainties within that model that's been used.
21 And not uncertainties regarding that model versus
22 somebody else's model because I'm going to give you
23 the fact that we have a consensus model. But there
24 are parametric uncertainties in terms of quantities
25 of debris generated.

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1 Given that established spherical zone
2 of influence there is uncertainties about the
3 transport of that debris, the timing of the
4 transport of the debris, the types of the debris
5 and how the debris affects either the strainers or
6 anything downstream from the strainers.

7 MR. SMITH: There is a lot of
8 uncertainty. And, you know, we've studied these,
9 these phenomena for years. And there's still a lot
10 of uncertainty. And, you know, and the cost to
11 eliminate or reduce the uncertainty has not, you
12 know, we just haven't seen the need to do that
13 because of the way we have implemented the
14 deterministic model.

15 MEMBER STETKAR: And don't get me
16 wrong, I don't care what the deterministic people
17 have done, they have to live with and the staff has
18 to live with what they've done. I'm now talking
19 about these applications.

20 If we admit that there is a lot of
21 uncertainty we ought to address that in a risk-
22 informed decision making process. In other words,
23 we talk about in the risk-informed decision making
24 process, do I meet my safety margins? Well, it
25 sounds like it's a strict pass/fail. It's either

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1 black or white. I'm either absolutely above the
2 line or I'm absolutely below the line.

3 The uncertainty might tell us, well,
4 you know, there's a 3 percent chance that I'm above
5 the line but I'm willing to accept that. Or a 7
6 percent chance or a 73 percent chance if it's a
7 really strange looking distribution. And if I take
8 that approach, it can address, I think, I hope,
9 some of Dana's concerns about the unknown unknowns.
10 How big could they be? And have I thought about
11 them in this concept of looking at the uncertainty
12 in my available safety margins.

13 And I don't see any of that type of
14 discussion other than, well, you have to have an
15 uncertainty distribution for the LOCA frequency.
16 No, it's just part of the calculation and it may be
17 the smallest uncertainty for all I know.

18 MR. SMITH: Yeah, but the safety
19 margins are really in addition to, you know, the
20 delta CDF. And it's another thing, the defense in
21 depth is on top of what we're calculating as a
22 potential failure. The safety margins are what we
23 base our failure on.

24 So if we say that the structural
25 failure's going to occur at 10 psi, that was

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1 calculated using an ASME code. It's probably going
2 to fail at 20 psi. So that's a safety margin. I
3 mean, I think the safety margins, there's none of
4 those lost in the methodology we use here.

5 MEMBER STETKAR: Probably should have
6 not used the term "safety margins" because I, I'm
7 not an attorney. Let me just use the term a risk-
8 informed decision about whether or not my plant is
9 acceptable. Even the term "acceptable" might get
10 me in terms, in trouble with an attorney.

11 I'm trying to make a point here that
12 when making decisions on a risk, based on a risk-
13 informed approach. And those decisions are being
14 made by people, the staff, the Commission, that
15 this plant is either safe enough given what we
16 understand about its debris, or it needs to do
17 something to address debris under certain
18 conditions.

19 And without an evaluation of all of the
20 uncertainties, and I'm not necessarily talking
21 about a detailed quantitative evaluation of every
22 parametric uncertainty, but at least examining
23 those. And maybe you can quantify them, providing
24 that information so a decision maker says, well,
25 yeah, you know there's a 97 percent chance that we

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1 meet the acceptance criterion. And, you know, a 3
2 percent chance or some small chance based on some
3 sort of qualitative evaluation of uncertainty that
4 we don't. But I'm willing to accept that risk.

5 There's no discussion in here about
6 that type of uncertainty evaluation, especially
7 with regard to what you guys are calling the
8 deterministic part of the calculation.

9 MR. GIITTER: Dr. Stetkar, let me just
10 add I think what the staff is trying to do here is
11 to come up with a methodology that can be easily
12 applied. Granted it's not perfect. But, you know,
13 our measure is reasonable terms of adequate
14 protection, not absolute assurance.

15 And, you know, you have to strike a
16 balance between the degree of effort and complexity
17 that goes into something versus something that can
18 be used and usable. And I think what the staff did
19 is they tried to account for the major areas of
20 uncertainty. And we took a conservative approach,
21 granted. It may not have accounted for all the
22 uncertainties but, you know, given that what we're
23 trying to do here is to come up with a method
24 that's reasonable and relatively reasonable to use
25 and it will allow the staff to make a decision

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1 without a lot of effort on our part or on the part
2 of the licensee. I think it's a reasonable
3 balance.

4 MEMBER STETKAR: I'm just going to let
5 that stay on the record because it's on the record.

6 Without assessing uncertainties, people
7 have made really bad decisions in the past.

8 CHAIRMAN BALLINGER: More questions?

9 MEMBER STETKAR: I do, on different
10 topics. I don't know if anybody else wants to talk
11 about uncertainty.

12 But that's my whole point was if we're
13 following the guidance in Reg Guide 1.174, that
14 guidance says that in a risk-informed approach I
15 should consider it and evaluate uncertainties. And
16 that evaluation of uncertainties as part of a
17 decision making process isn't just the uncertainty
18 in the LOCA frequency. With some sort of assertion
19 that everything else is so conservative that it
20 doesn't, the uncertainty doesn't matter, especially
21 if I know there are large uncertainties and that
22 everything else.

23 Okay. Now, different topic. Scope of
24 the analyses. Is this process intended to only
25 address debris generated by only LOCAs?

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1 MR. FONG: No.

2 MEMBER STETKAR: Okay, I'm glad to hear
3 that because there's so much discussion of LOCA
4 frequencies and what LOCA frequency I should use
5 and what LOCA scenarios I should develop, I kind of
6 lost that. So is the staff's expectation, for
7 example, in a pressurized water reactor that I
8 should look at all transient events that can lead
9 to feed and bleed cooling, for example?

10 MR. FONG: Well, I think our
11 expectation is that LOCAs would probably contribute
12 the most. But any --

13 MEMBER STETKAR: What? Wait, wait.
14 I'll stop you right there.

15 MR. FONG: Okay.

16 MEMBER STETKAR: Because you're making
17 an assertion. How do you know that?

18 MR. LAUR: Well, I guess the real
19 answer is yes. If you look at, if you look at
20 Section C of the Reg Guide that's how it starts
21 out.

22 MEMBER STETKAR: It does start out that
23 way.

24 MR. LAUR: Well, no, and there's an
25 interesting little transition sentence in there

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1 somewhere that says because LOCAs are, as C.J.
2 mentioned, are, you know, it's not that they're
3 necessarily dominant -- it turns out that they are
4 based on the pilot -- but because they're
5 problematic in terms of having to assign
6 frequencies, all these things we've been talking
7 about that we removed from Appendix C.

8 MEMBER STETKAR: Steve, I looked up my
9 notes in a meeting that we had with the pilot, and
10 I actually asked them, Gee, have you thought about
11 debris that could be generated when the ruptured
12 disk on the pressurizer relief tank blows after a
13 feed and bleed cooling scenario?

14 He said, Gee, no, we haven't thought
15 about that. We'll get back to you.

16 I asked him, Have you thought about the
17 amount of debris that could be generated by a steam
18 liner feedwater line break that would then devolve
19 into a feed and bleed cooling scenario? Maybe not
20 so important for their 3-train plant, but a lot
21 more important for a 2-train plant.

22 They said, No, we haven't thought about
23 that. But the steam line breaks aren't very
24 important to us.

25 So I'm not sure how the pilot study has

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1 addressed those because they told me they hadn't.

2 MR. LAUR: Well, okay, but they have.
3 See, because of your excellent question when we got
4 the license renewal request they not only
5 considered those --

6 MEMBER STETKAR: Oh good.

7 MR. LAUR: -- but they had a very -- in
8 fact you'll see a screening in the Reg Guide that
9 was generated as a result of what the screen they
10 used -- but in fact if you look at our RAIs, we
11 have some beta seismic event, with a seismic event
12 and that dislodged insulation.

13 MEMBER STETKAR: You're one step ahead
14 of me.

15 MR. LAUR: Some plants, yeah, we'll
16 steam line, feed line this into our licensing
17 basis. We said, that's not how we do this.

18 So, yes, it's everything. But they're
19 allowed, and the Reg Guide says it's allowed up
20 front to do screening, just as the standard allows.

21 MEMBER STETKAR: But you're not allowed
22 to screen on frequency of LOCA. You have to
23 consider every LOCA, even if the frequency is 10 to
24 the minus 18th because of the way you've
25 partitioned it down, down to locations.

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1 You're not allowed to screen on
2 frequency of LOCA. That's clearly said up front.
3 But apparently you're allowed to screen on
4 frequency of these other things?

5 MR. LAUR: Well, if it's the whole
6 plant. The LOCA being location-specific. That's
7 why we put that specific --

8 MR. FONG: Caveat.

9 MR. LAUR: -- caveat in there about the
10 LOCAs because we don't want things slicing and
11 dicing so fine that they're all below truncation or
12 something like that.

13 But the, but no, the answer to the
14 seismic question, which I thought would be some
15 sort of one-paragraph response, turned out being
16 for fragilities and --

17 MEMBER STETKAR: Well, no, I mean the
18 seismic stuff is a lot more interesting, if we want
19 to start talking about that, because it's part of,
20 it's part of my three or four questions on the
21 scope of the evaluation.

22 The seismic stuff, when I read the
23 guidance, leads me to believe that I need to look
24 at seismic-induced failures of reactor coolant
25 system stuff, seismic-induced LOCAs. Seismic

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1 events are kind of interesting because the
2 conditional likelihood of requiring feed and bleed
3 cooling after a seismic event, given that I don't
4 have offsite power, given that I don't have main
5 feedwater, and I don't know what else is going on,
6 diesels might have failed and things like that,
7 could be relatively high.

8 Now, that isn't a seismic-induced break
9 of any piece of piping.

10 MR. LAUR: Right.

11 MEMBER STETKAR: Nothing I saw. Okay.

12 However, lower acceleration seismic
13 events, much lower accelerations than might fail
14 any of the piping in a plant, might dislodge a
15 whole lot of stuff inside the containment.

16 MR. LAUR: Right. We asked that
17 question. And I think the answer was no.

18 MEMBER STETKAR: It won't? Okay.

19 MEMBER BLEY: No for the plants you
20 asked about?

21 MR. LAUR: Sorry?

22 MEMBER BLEY: No for the plant you
23 asked about.

24 MR. LAUR: Right.

25 MEMBER BLEY: Yes.

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1 MR. LAUR: Specifically each plant's
2 going to have to go -- that's why the thing starts
3 out with identifying all scenarios for which
4 recirculation could be a mitigating act or failure.

5 MR. SMITH: Specifically for debris
6 generated by a seismic event, a lot could be
7 generated but it would not be generated in the form
8 that would result in transport and head loss of the
9 strainer. It's going to come off in big pieces.

10 MEMBER BLEY: Do we know that for sure?

11 MEMBER STETKAR: Do we know that?

12 MR. SMITH: I, well, I guess you could
13 project there's not going to be a lot of -- I think
14 you could do a study on that and --

15 MEMBER STETKAR: Dust and dirt?

16 MR. SMITH: Well, there would be a lot
17 of dust and dirt. But that, that's a very small
18 amount of debris compared to what's generated by a
19 LOCA.

20 MEMBER BLEY: But your hunks are
21 falling 50, 80, 100 feet.

22 MR. SMITH: Yeah. They're --

23 MEMBER BLEY: They won't be hunks.

24 MR. SMITH: It's like a pillow falling.
25 That's how the -- only much tougher. That's these

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1 --

2 MR. LAUR: But also subsequent LOCA or
3 the feed and bleed, you don't have anything to wash
4 it there anyway.

5 MEMBER BLEY: Sure. You're got to get
6 to a research scenario. But as Don's saying --

7 MR. LAUR: I'm talking the research
8 scenario which is --

9 MEMBER BLEY: -- the seismic event is
10 going to be, we suspect, more likely to get you to
11 a feed and bleed --

12 MR. LAUR: Yeah, you're right.

13 MEMBER POWERS: In the aftermath of the
14 limited set of earthquakes that I've experienced,
15 everything is covered with dust.

16 MR. LAUR: Yeah.

17 (Simultaneous speaking.)

18 CHAIRMAN BALLINGER: A LOCA is a local
19 event, one break so to speak. But a seismic event
20 shakes the daylights out of everything. So I'm
21 just wondering whether this dust might be a little
22 more than dust.

23 MEMBER POWERS: Yeah.

24 CHAIRMAN BALLINGER: And might be a lot
25 more than a little.

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1 MEMBER STETKAR: The concern I had is
2 that when we talk about -- and you're going to
3 eventually get me to the site-specific part of the
4 thing -- but the site-specific stuff talks about
5 direct and indirect seismically-induced LOCAs.
6 That's all it talks about. It doesn't talk about
7 any of this other stuff. I couldn't find it. I
8 was looking for it on here.

9 MR. LAUR: Their stuff I think is in
10 C.1.

11 MR. FONG: We have four criteria for
12 including a particular scenario in the analysis:
13 generates debris, transports debris, live on
14 recirculation, and wouldn't otherwise be a core
15 damage event. And I think those four capture --

16 MEMBER STETKAR: That's good as long as
17 applicants understand the expectation of what they
18 need to look at. Because as I said, the vast
19 majority of this guidance -- and I didn't do a word
20 count -- focuses on LOCAs, LOCAs, LOCAs, LOCAs.

21 And the problem is that if a staff
22 reviewer looks at the guidance and it says LOCAs,
23 LOCAs, LOCAs, LOCAs, and an applicant comes in and
24 says LOCAs, LOCAs, LOCAs, LOCAs, it's not at all
25 clear that we're meeting the expectation, that

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1 broader expectation -- and I like those four up in
2 C -- the broader expectations of the entire
3 assessment.

4 Or, if a staff reviewer looks at that
5 and says, Hey, wait a minute. You didn't tell me
6 about 10 to the minus, you know, 3 seismic events
7 that might require feed and bleed cooling with
8 recirculation, and you haven't assessed the amount
9 of debris that would be available during that. An
10 applicant will say, Well, we didn't interpret the
11 guidance that way because all it says was seismic
12 LOCA, seismic LOCA, direct or indirect.

13 CHAIRMAN BALLINGER: So you're arguing
14 for stronger words?

15 MEMBER STETKAR: I'm arguing for a
16 clarity in the regulatory guidance such that people
17 who are going to perform assessments according to
18 this regulatory guidance can submit them to the
19 staff for review. And the staff reviewers who are
20 going to use this regulatory guidance to look at
21 those applications are on the same page in terms of
22 understanding the scope of what they need to look
23 at.

24 MR. FONG: I think we have pretty good
25 language. I'm certainly open for improvements but

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1 I mean we say up front that the systematic risk
2 assessment should consider all hazards, initiating
3 events and plant operating modes. It should not be
4 limited to design-basis accidents, licensing-basis
5 events, specific plant operating modes, or specific
6 initiating events such as LOCA.

7 MEMBER STETKAR: Right.

8 MR. FONG: I mean we did say that up
9 front, you can't just limit it to LOCA or design
10 basis.

11 MEMBER STETKAR: It says -- that's,
12 that's, C.J., I agree that the introduction stuff
13 up front says all of that stuff. But then you get
14 into things like screening. And the screening,
15 other than telling me that I can't screen out LOCAs
16 based on frequency, doesn't tell me much about what
17 else I can screen out or how I can screen that
18 stuff out.

19 So I could easily walk myself, as an
20 applicant, into screening out all of those
21 transients because everybody knows that LOCAs are
22 only, the only important thing, and screening out
23 seismic events that can result in transients other
24 than a LOCA, because the seismic, the site-specific
25 seismic guidance in here points me to seismically-

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1 induced LOCAs.

2 So, okay, I'll worry about seismically-
3 induced LOCAs and say they're small in frequency
4 compared to the other stuff or whatever that may
5 be.

6 MR. LAUR: Well, we've referred to the
7 standard, and I thought we referred to 1855 for
8 some reason, because I didn't look into that as
9 much as you did. But we refer to the standard,
10 it's the standard -- standard -- it's the typical
11 PRA screening as set forth in the standard and the
12 guidance in NUREG-1855.

13 So we, I guess we could have repeated
14 it here but. And I would hope our reviewers, well,
15 I mean if you look at the RAIs, if you ask a pilot
16 plant, this was one of the topics. I mean we --
17 although they did submit an original submittal had
18 here's all the initiating events we thought about
19 and here's how we screened them. That's where we
20 got those four bullets basically.

21 And we said, Well, what about seismic?
22 And I forget what else we asked. But so.

23 MEMBER STETKAR: Well, if you think --
24 again, I read this as a someone who would like to
25 take this guidance and do the absolute minimum

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1 possible to satisfy an NRC staff review. And I, I
2 tried to read the guidance to say what could I not
3 do?

4 And I will agree that a strict
5 interpretation of the introductory material in
6 Section C would tell me that I can't get away with
7 a lot. But I will tell you that most of the
8 guidance seems to indicate that I can get away with
9 quite a bit.

10 MR. LAUR: That's a good, good insight
11 for us.

12 MEMBER STETKAR: So that all I'm saying
13 is that in the guidance there's a lot of discussion
14 of how one might do things. And, for example, in
15 the site-specific seismic stuff there could be
16 similar, just anecdotal guidance about don't forget
17 to consider these types of things. You know, or
18 our expectation is that you will consider these
19 types of things.

20 Whether that goes in the screening part
21 or whether that goes in the site-specific part,
22 because a lot of these things are site-specific
23 obviously, the whole thing is site-specific.

24 Just so it's real clear what the
25 expectations are so that I'm as much concerned

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1 about a staff reviewer, after somebody's done a
2 reasonable amount of analysis, bringing up these
3 issues and, as Dennis said, initiating a long
4 litany of RAIs that could extend into fairly
5 substantial discussions, if not re-analysis, as I
6 am that neither party, neither the applicant nor
7 the reviewer thinks about these other issues.

8 MR. FONG: This is something we thought
9 about quite a bit. And, in fact, this was an early
10 public comment. We got a public comment saying,
11 Hey, can't we just limit this to Mode-1 and LOCAs?

12 We said, no, it's all Modes, it's all
13 hazards. For a specific plant if you do an
14 analysis and show that the key driver is Mode-1
15 LOCAs, fine. But it's up to the licensee to make
16 that argument.

17 So this is certainly a very good issue
18 and something that's come up before. And I think
19 we've been pretty clear about what we want
20 licensees to do. And we can certainly go back and
21 see if there is some additional clarity to add
22 throughout the guidance, but.

23 MEMBER BLEY: My impression is a bit
24 like John's. But I see you have the right words in
25 various places, but especially when you get back to

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1 the appendices, the focus is all there.

2 And for this concern we've had for many
3 years that began with a steam rupture experience in
4 another country, to not make it maybe more clear.
5 The shift from the introductory discussion to the
6 here's how we do it, really is where I see it
7 slipping to heavy emphasis on LOCAs, although it
8 does happen to both to some extent.

9 And 1855 is cited in the main body a
10 few times in kind of general ways. Of course where
11 it shows up in the appendices is just on the pipe
12 ruptures, I believe.

13 CHAIRMAN BALLINGER: Next question?

14 MEMBER STETKAR: Actually, in the
15 interest of time, I don't -- I mean I have a lot
16 but I don't have any more -- those are the big ones
17 that I wanted to get on the record.

18 CHAIRMAN BALLINGER: Well, in the true
19 spirit of an MIT faculty meeting, we have used up
20 all the available time in spite of the fact that
21 we've nominally finished early on this. Can we, I
22 think we should take a break for, till 25 of. And
23 then for the next -- if that's okay.

24 We'll adjourn.

25 (Whereupon, the above-entitled matter

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1 went off the record at 10:20 a.m. and resumed at
2 10:39 a.m.)

3 CHAIRMAN BALLINGER: Okay, we're back
4 in session.

5 Next up is the industry presentation.

6 MR. GEIER: Good morning. I'm Steve
7 Geier and I'm with NEI. And we're here to talk
8 about their industry perspective on the draft Reg
9 Guide.

10 And I'm just going to give some
11 introductory remarks and then turn it over to
12 really the industry experts. We have Larry Naron
13 here from Exelon for the BWR perspective and kind
14 of overall; and then Wayne Harrison from STP, the
15 pilot, the pilot plant.

16 And basically, you know, from the NEI
17 perspective, you know, when we look at a Reg Guide
18 such as this we really want to ensure the
19 information is provided to make sure it can be
20 officially implemented without having the
21 substantial consumption of resources. Really
22 looking at efficiency here and effectiveness.

23 And we also want to make sure that it's
24 appropriately written so that it will assist,
25 assist the plant or at least not impact on the

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1 ability to close the issues and address the issues
2 that they're using this, this risk-informed
3 approach for.

4 And then just over all just a
5 reemphasis, you know, on the efficiency standpoint
6 is the industry does have several initiatives under
7 way to ensure that we could be cost-effectively
8 moving forward in resolving these issues
9 implementing the regulatory guidance, such as
10 cumulative effects of regulation, of course the
11 NRC's own program Project Aim 2020, and then NEI's
12 Delivering Nuclear Promise. We have several
13 initiatives under way just looking at being as
14 efficient as possible with the limited resources
15 we have so that the plants can continue to
16 be competitive, continue to be operating safely
17 and reliably.

18 And with that I will turn it over to
19 Larry Naron to give the industry perspective.

20 MR. NARON: Good morning, everybody.
21 Thanks for having us here.

22 It has been an interesting discussion
23 so far. And actually, a lot of the, a lot of the
24 points I wanted to make have already been made.
25 This slide, for instance, was just discussed. So I

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1 thought that that was a good discussion. Don't
2 really have anything to add to that.

3 Although we didn't -- we touched on new
4 plants a little bit in the discussion, but that,
5 wanted to make sure that we brought that up that,
6 you know, that may be interesting in new plants
7 evolving for instance to use this approach.

8 Next slide.

9 MEMBER REMPE: Well, it was discussed.
10 I think Professor Corradini mentioned that it
11 doesn't address this. But since you're from the
12 BWR industry what would you like to see done here?

13 MR. NARON: Well, what we looked at in
14 reviewing this and from the BWR side was this
15 guidance, did it preclude us from doing anything?
16 Was it -- would we be able to take the guidance and
17 would it help us to approach a risk-informed
18 resolution for this if we chose. And we didn't see
19 anything that precluded us from doing it. Although
20 the question came up, I don't know of any BWRs
21 right now that are intending to use this.

22 MEMBER REMPE: So you don't have any
23 recommendations on what you would like to see done
24 to improve it is what I'm hearing from you?

25 MR. NARON: You know, I'm going to touch

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1 on a couple. But in general there's some
2 improvements that, you know, we feel could be made
3 based if we started down, say a pilot would be
4 develop -- be doing more.

5 MEMBER REMPE: Okay.

6 MR. NARON: So next slide.

7 There are, there were some prescriptive
8 portions of the Reg Guide. For instance, we
9 discussed earlier, you know, break location, can
10 you screen just low frequencies. And the
11 frequencies being sort of prescriptively pointed
12 toward the arithmetic mean rather than geometric
13 mean.

14 There is wording in there that will
15 allow you to justify it. But, again, that would
16 create more interaction, more time and resources to
17 justify using other than the arithmetic mean. I
18 thought that was too prescriptive.

19 Next slide.

20 And then there was some parts of the
21 Reg Guide that weren't very prescriptive. And the
22 threshold for reporting defense in depth and safety
23 margin changes, for instance, you know, it left for
24 interpretation that any change, however small,
25 would be reportable. And I don't think that was

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1 the intent.

2 CHAIRMAN BALLINGER: That was a -- I
3 think that was addressed at least nominally in the
4 latest version; right? The reporting issues, the
5 thresholds for reporting?

6 MR. NARON: It seemed still vague to me
7 that I saw, if there was a change. I don't see it.

8 CHAIRMAN BALLINGER: Okay.

9 MR. W. HARRISON: And I would agree
10 with what Larry is saying there. The threshold for
11 reporting on defense in depth and safety margins,
12 which are non-quantitative things that are being
13 put in our application, I'm not sure if from a
14 regulatory perspective how we would evaluate
15 reporting degradation of defense in depth and
16 safety margin with respect to, with respect to
17 this.

18 Now, if we could, personally I would
19 prefer to see, well, if you can quantify in some
20 way an effect on the risk maybe that would be a
21 better metric for use in reportability or doing
22 report rather than these softer issues.

23 MR. NARON: And along the same lines,
24 the 48-month update requirement that, having the
25 requirement that's just calendar-driven rather

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1 than, you know, what changes have been made that
2 would warrant updating. Again, updates are costly
3 and to have it just driven by time doesn't seem
4 appropriate.

5 Next slide.

6 MEMBER STETKAR: I'm just curious. If
7 it were time-driven and you hadn't made any
8 substantive changes, what would be involved in that
9 update?

10 MR. NARON: And that, that was another
11 comment that it's not clear what, you know, what
12 the scope of an update would require.

13 MEMBER STETKAR: Yeah. It strikes me
14 if nothing changed the update is the original one.

15 MR. W. HARRISON: I think I agree with
16 what Larry's saying there. We'd probably like to
17 have more dialog on this.

18 Oh, thank you. I didn't realize we had
19 a button to push there.

20 I said we would probably like to have
21 more dialog from the staff on that reporting.
22 South Texas currently has an update -- excuse me,
23 it's not on reporting but on the updates -- South
24 Texas currently has a requirement in our updated
25 final safety analysis report for updating that was

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1 based on our pilot exemption request that
2 resembles the 50.69 special treatment requirements.

3 But if you read what's in the
4 regulation for 50,69, it talks about updating as
5 well but it doesn't have specific time limits for
6 updating our requirements. So, you know, there's
7 some, that was some precedent for that that we
8 might refer back to.

9 MR. NARON: So there was a lot of
10 discussion earlier about the inputs that are
11 deterministic in nature such as strainer behavior,
12 debris transport. And all of these I guess from
13 our view introduces conservatism and it's
14 cumulative. And the more that we add these
15 conservatisms from the deterministic inputs, the
16 further that we get away from realism.

17 So that's, that's a concern that we may
18 be overstating the risk based on implementing the
19 deterministic.

20 MEMBER STETKAR: Larry, let me pulse
21 you on that because you've heard me talking about
22 uncertainty and things like that. I, of course, in
23 my comments was approaching the concept of
24 uncertainty and not fully examining where those
25 deterministic values are in the overall uncertainty

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1 distribution so that you better understand margins
2 that may be available using those values.

3 Are you advocating the use of
4 uncertainties throughout those analyses so that you
5 understand if they are conservative, how
6 conservative they are? Or are you advocating using
7 different values? And if so, what different values
8 do you use?

9 MR. NARON: I think the way I view it
10 is in order to get, you know, take those
11 conservatisms out it would take a lot of effort, a
12 lot. And in order to get closer to realism with
13 these inputs would be very, very difficult and
14 costly. So it's more of a recognition that the
15 more the deterministic inputs, the more the trying
16 to refine, it just increases the cost, increases
17 the resource. And at a certain point it makes --
18 it's too complicated.

19 MEMBER STETKAR: Well, but I'm asking
20 you what are you proposing as an alternative? I
21 mean if you say, well, the deterministic inputs are
22 too conservative and it requires a lot of effort to
23 address the issue, given those deterministic
24 inputs, what's the alternative? Do I use
25 probabilistic inputs? And will that somehow

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1 simplify the effort and reduce conservatism, which
2 is your concern?

3 MR. NARON: And I guess this will come
4 out of the pilot. I don't really come here with a
5 fix, more of a recognition that there will have to
6 be worked through in order for this to be a useful
7 approach.

8 MR. W. HARRISON: I'll comment on this
9 from a regulatory perspective.

10 The South Texas project started out
11 with a detailed approach. And after a while we
12 determined that we would probably be better, better
13 served with a simplified approach would be done in
14 basically about a year ago. And our simplified
15 approach it isn't counting assessment, it's based
16 on a successful test that we performed. And then
17 any break that generates more debris than we
18 passed in that -- in any more fibrous, fine fiber
19 debris than we passed in that test we assume goes
20 to failure. And then we apply NUREG-1829 break
21 frequencies to determine what's the probability of
22 generating that amount of debris that it sees what
23 we tested.

24 So this is a, I would consider this a
25 bounding risk assessment. We don't use our PRA

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1 model to do this. We -- Laur talked about that.
2 We, again, we look at how much debris is generated
3 and what's the break size that generates that much
4 debris, and applied NUREG-1829 to determine what
5 that, what that is. That's our application of our
6 PRA. Basically the only thing we're using our PRA
7 for is to compare that risk to the -- our baseline
8 risk in our PRA to see what region we are in Reg
9 Guide 1.174.

10 So, we talked about do we intend to
11 change the base PRA for this? And our purpose in
12 doing this was to respond to generic letter
13 2004-02 and assess the impact of risk on STP and
14 to close that generic letter. And that was also
15 part of this focus as a Reg Guide.

16 So we know, so we came up with a
17 satisfactory calculation of risk which puts us in
18 Region III. We used the geometric mean to do that.
19 We're in Region II with the arithmetic mean. But
20 we would not propose to change our base PRA.

21 And I think we talked about, this was
22 discussed at some length a little bit ago. From a
23 regulatory perspective and licensing perspective I
24 don't, I look at this as a PRA calculation. But
25 what we will do is put this process and this model

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1 and the assumptions that went into this evaluation
2 into our updated final safety analysis report. So
3 it's part of our licensing basis now, along with
4 the exemptions that went along with it and the
5 evaluation that was performed by the NRC.

6 So if we make a change to the plant,
7 then we have to go back and look at what did we
8 change in the UFSAR and are we still aligned,
9 aligned with that. So it's not that we go back and
10 look necessarily at the "PRA" and re-do the base
11 PRA. We have to look and see how did we affect our
12 licensing basis?

13 They may require us to go back and do
14 some eval, PRA evaluations. But fundamentally it's
15 how did we affect the licensing basis that we just
16 implemented?

17 MEMBER SKILLMAN: Wayne, let me ask you
18 to back up a slide, please, to six.

19 I think I understood what you just
20 said. With the, with your SER the way it's written
21 and with your PRA count with the GSI-191 subcount,
22 if you'd like to call it that.

23 MR. W. HARRISON: Uh-huh.

24 MEMBER SKILLMAN: Do you have
25 difficulty with reporting, which is C.8 of this.

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1 MR. W. HARRISON: Let me look at C.8.

2 MEMBER SKILLMAN: Yeah.

3 MR. W. HARRISON: Read it.

4 MEMBER SKILLMAN: I would think based
5 on what you said, any change that you might find is
6 pretty much the same process at your plant as you
7 would have if you found a condition for which
8 reporting was required. If you found yourself in a
9 tech spec situation or you found yourself in an
10 operability determination and said, Hey, we better
11 -- we've got a 5072, a 5072 report, I know that
12 you're people do that --

13 MR. W. HARRISON: That's correct.

14 MR. SKILLMAN: -- regularly. That's
15 not an issue. Why wouldn't that be the same for
16 this?

17 MR. W. HARRISON: We have in our
18 application a proposed change to the technical
19 specifications that have for emergency core coolant
20 system and containment spray a debris-specific
21 action for, well, a debris-specific action that if
22 we identify a condition where there is more debris
23 than what was evaluated in, in what we evaluated in
24 this -- or in this analysis --

25 MEMBER SKILLMAN: The assumptions for

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1 those analyses.

2 MR. W. HARRISON: -- assumptions for
3 those analyses, then we would be in a -- we would
4 enter our technical specification.

5 And then we would follow our corrective
6 action program and reporting process to determine,
7 well, is that a reportable condition? How long
8 were we there? Was it really inoperable? Do I
9 have, do I have margins in my safety margins that
10 account for that?

11 There's a, you know, there's a process
12 that we accepted for doing that reportability for
13 the effect of that debris.

14 MEMBER SKILLMAN: So it sounds like at
15 least for your plant the proposed change to C.8 is
16 of no real significance. That's not an increase in
17 work; you would be doing that anyways?

18 MR. W. HARRISON: Well, I think what I
19 was talking about back on C.8 is I'm not sure how
20 in that process that we would address reduction in
21 defense in depth or safety margin. Because that's
22 not a -- that's a softer issue to address. I mean
23 because it involves other, other equipment, maybe
24 non-safety related equipment. And how long was
25 that? And how does that really affect my safety

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1 margin? Does it make a significant effect?

2 I don't -- that's a new area for us to
3 go into. We really haven't had much experience
4 doing this.

5 MEMBER SKILLMAN: What I hear you
6 saying is you're good with the concept of
7 reporting. The difficulty is the metrics
8 specifically for defense in depth and safety
9 margin. It's the metrics that would cause you --

10 MR. W. HARRISON: Yes, sir, that's
11 correct. That's a good way to say that.

12 MEMBER SKILLMAN: Okay, thank you.
13 That helps. Thanks.

14 MR. W. HARRISON: And on the comments
15 that I was making about the UFSAR and the licensing
16 basis and the question on -- to me, that's a
17 different question than what I would expect to see
18 in the Regulatory Guide. I would not have expected
19 C.J. to put that direction or that explanation in
20 this regulatory guide. That's a different area.

21 MR. NARON: Okay, let's turn to the
22 last slide now.

23 So in conclusion, you know, I pointed
24 out some areas that could be enhanced, like the,
25 feel like the Reg Guide when we looked at it from

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1 the plants, the pilot plants and some others that
2 are looking at using this, we had them review it.
3 And they felt that the guidance was useful and
4 acceptable and could, they could continue the way
5 they were going without any changes to the Reg
6 Guide. Although it is, as we've discussed, kind of
7 narrow in scope. It's focused on Reg Guide 191 for
8 PWRs, existing PWRs.

9 And the other point that we discussed
10 is that in allowing for flexibility it also would,
11 could result in many different approaches which
12 would take many, you know, more time to review and
13 more resources on both sides, both staff and
14 utility.

15 MR. W. HARRISON: From the pilot
16 plant's perspective I agree with what Larry is
17 saying. Our pilot application, the content of our
18 pilot application lines up pretty well with what's
19 in the Regulatory Guide. I think it does establish
20 a process structure for the licensees and the staff
21 to follow.

22 There was a lot of dialog from the ACRS
23 subcommittee itself with respect to the specific
24 requirements in that Regulatory Guide. And I would
25 anticipate those same, that same kind of dialog to

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1 occur between the licensee and the staff in the
2 implementation of that. So that doesn't -- we
3 still need to resolve a number of those things,
4 which will probably be done on that basis. But it
5 still has us, I would say that it still has us
6 talking about the right things to get us to where
7 we need to be.

8 MR. NARON: Yeah, and I don't want to
9 not recognize that the staff has worked with us in,
10 you know, in creating this. And the pilot process
11 is working. And the interaction we've had with the
12 staff has been very constructive. And we would
13 expect that to continue.

14 CHAIRMAN BALLINGER: Questions?

15 Can we get -- I understand that there
16 are at least four people on the public line. So
17 while we're waiting -- Oh, excuse me. Corradini
18 first.

19 Is there anybody in the audience who
20 would like to make a statement?

21 (No response.)

22 CHAIRMAN BALLINGER: Hearing none.

23 Are you there yet, Mike?

24 MEMBER CORRADINI: No. I just sent you
25 a note.

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1 CHAIRMAN BALLINGER: Just sent me a
2 note. You're talking.

3 MEMBER CORRADINI: Okay. You didn't
4 acknowledge.

5 Let me ask the industry folks a
6 question. So when I asked the staff about Appendix
7 C and the fact that they had two additional things
8 they were looking at which would be completed by
9 the end of the calendar year, is it your feeling
10 that some of the licensees want to move forward now
11 and then wait on the Reg Guide to, what I'll say,
12 give more realistic, realistic analysis, and
13 Appendix C is not necessary and you want to move on
14 this and get it published now?

15 What is the industry's view on that?

16 MR. W. HARRISON: This is Wayne
17 Harrison speaking.

18 You know, we're the pilot and we're not
19 depending upon the Reg Guide for our application.
20 So I don't know that I can speak for the rest of
21 the industry.

22 At some point I think there will be
23 some other plants following on that need to refer
24 to the Regulatory Guide. And I'm not sure when
25 those, those applications will follow, whether they

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1 will follow after the rule or after the STP
2 application is approved.

3 So schedule-wise, I see it's to their
4 benefit to have a Regulatory Guide, to have more
5 clarity. Besides the STP docketed information and
6 the staff's safety evaluation I think, you know,
7 the Reg Guide does provide an outline for that. So
8 there is an advantage to having that in front of
9 them as well.

10 MEMBER CORRADINI: Sure.

11 MR. W. HARRISON: But that's all I
12 could say schedule-wise.

13 MEMBER CORRADINI: Well, what I'm
14 interpreting you to say is sooner than -- sooner
15 rather than later is good for industry at this
16 point, even though there will be modifications to
17 the Reg Guide?

18 MR. W. HARRISON: Yes, I think so.

19 MEMBER CORRADINI: Okay, thank you.

20 MR. GEIER: This is Steve Geier from
21 NEI. Just to, you know, make a quick comment.

22 Gaining industry comments on this
23 process I think, as you said, their being, they're
24 the pilot and some of the plants are looking to
25 follow on after that. But from an urgency

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1 standpoint, you know, we don't know of anybody
2 that's waiting for additional guidance to really
3 kind of fall into line behind the pilot project.

4 MR. W. HARRISON: I believe that's
5 correct.

6 MR. GEIER: So again, sooner rather
7 than later but, you know, it's not -- I think it's
8 worthwhile to put this out on the street and then
9 have the remainder follow up on that later this
10 year.

11 CHAIRMAN BALLINGER: Okay, is the other
12 line open? If you're, if anybody is out there on
13 the line would you please identify yourself.

14 MR. KEY: This is Ernie Key. I'm
15 representing the public.

16 And I just want to mention I have been
17 involved for some time on this problem, as some of
18 you know. And one observation I'd like to kind of
19 throw out because there's a lot of discussion about
20 the relationship to the PRA of the risk that is
21 evaluated -- and this is all in the public domain
22 from the GSI-191 effort itself -- is that it's --
23 the right way to think about what we call the risk
24 would be an initiating event frequency as opposed
25 to a, you know, like a basic event that shows up at

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1 the PRA.

2 That's the way the recent application
3 is devised.

4 Then, secondly, there was a lot of
5 discussion about uncertainty quantification. And
6 we get that. And, again, as Wayne mentioned, we've
7 attacked this from two perspectives. And we in the
8 first approach had included large uncertainties,
9 really long-tailed ones on several parameters. And
10 we sampled those very carefully.

11 And I don't believe -- this is just my
12 personal observation -- I don't believe that doing
13 that exercise was as helpful as actually
14 disclosing, looking at scenarios that you get out
15 of the risk analysis. So South Texas looked at
16 some scenarios that were informative. And others
17 have found the same value.

18 So I think actually this, an approach
19 that's not a classical uncertainty approach but is
20 more along the lines of a classic probabilistic
21 risk assessment approach where you tease out
22 scenarios is helpful. And I don't think that's
23 lost in anything in this Reg Guide.

24 And then, finally, there was discussion
25 as to inclusion of the risk assessment in the PRA

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1 and how was that updated. And what we've found is
2 that even with a simplified approach the magnitude
3 of the risk is on the order of 10 to the minus 7.
4 And in the more detailed approach it's even lower,
5 like 10 to the minus 8.

6 So really the -- with a typical PRA CDF
7 estimate of 10 to the minus 5th, this is very, very
8 small compared to that.

9 So anyway, I think the risk analysis is
10 capable, the way the Reg Guide is written, of
11 revealing some weaknesses in the design. And we
12 can -- and it's helpful in that regard.

13 Thank you.

14 CHAIRMAN BALLINGER: Thank you.

15 Anybody else out there?

16 (No response.)

17 Going once, twice. Done.

18 Thank you. Can we close that line?

19 MR. BLOSSOM: I've got a question.

20 Should we correct the record? I mean Ernie's
21 reading --

22 CHAIRMAN BALLINGER: Can you tell us
23 who you are?

24 MR. BLOSSOM: Pardon me?

25 CHAIRMAN BALLINGER: Who are you?

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1 MR. BLOSSOM: Steve Blossom from South
2 Texas.

3 CHAIRMAN BALLINGER: Get a little
4 closer to your mike, sir.

5 MR. BLOSSOM: I was curious whether we
6 should correct the record. Ernie's discussion,
7 he's really not representing the public, he's
8 representing industry. He might have called the
9 wrong number or something like that, but he's, I
10 don't know protocol-wise whether we should do that
11 or it doesn't matter?

12 CHAIRMAN BALLINGER: It's on the record
13 now.

14 MEMBER STETKAR: It's done.

15 (Laughter.)

16 MEMBER STETKAR: You will see that in
17 writing, verbatim.

18 CHAIRMAN BALLINGER: Okay, so the line
19 is closed. Can we go around the table and get
20 comments from members, particular recommendations
21 with respect to going forward? Dick?

22 MEMBER SKILLMAN: Yeah. I, let me be
23 careful what I say here. I'm impressed at what I
24 heard today.

25 What strikes me is, particularly from

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1 Steve Laur and from C.J. Fong, they were very clear
2 in saying, hey, recognize that this is, this Reg
3 Guide is pointing to a tool to quantify the risk
4 simply of one little piece of GSI-191. It's the
5 incremental risk from a break at a certain location
6 for debris. It's not, this is not an all-
7 encompassing, this Reg Guide is not intended to be
8 an all-encompassing quantification tool. It's very
9 surgically focused.

10 And once I began to understand that
11 that's what those two gentleman were communicating
12 I said to myself, okay, now this is like a small
13 slide rule, a small piece looking at one very, very
14 small segment of the overall PRA topic.

15 And so perhaps as we consider where
16 we're going to go in the full meeting, if we can
17 somehow make sure that the extent of applicability
18 to what these changes mean and the instructions for
19 how to make those changes from this Reg Guide, I
20 would find that very helpful. Speaking as one
21 member of the subcommittee.

22 Thank you.

23 CHAIRMAN BALLINGER: Dana?

24 MEMBER POWERS: No comment.

25 CHAIRMAN BALLINGER: Dennis?

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1 MEMBER BLEY: Yeah, just a couple
2 things.

3 I'm not as happy as I would have hoped
4 I'd be at this point. It's cleaned up a lot since
5 what we saw back in December; so I'm glad we waited
6 to look at this.

7 I kind of, I see where the staff points
8 up in the main body the caveats and things that are
9 important. I think the lack of specificity in the
10 appendices is going to make the review process
11 tougher. I would hope at some point they would
12 revise this document to include that. I don't know
13 that I would really push that it be done at this
14 point.

15 As they work on the alternative methods
16 for Appendix C, I trust they will remember the
17 discussions we had back in December. We haven't
18 looked at that in a long time. And take advantage
19 of what was said at that time.

20 Otherwise that's all.

21 CHAIRMAN BALLINGER: John.

22 MEMBER STETKAR: Yeah. I asked a lot
23 of questions and made a lot of statements. I kind
24 of to tie things together would like to sort of
25 summarize the three major points that I had.

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1 The first one, and I'll echo Dennis, is
2 that I think that the Reg Guide suffers a bit from
3 lack of clarity in terms of the expected scope of
4 the assessments which would be performed. And I,
5 you know, I gave the examples of bleed and feed,
6 and steam line breaks, and we talked about seismic
7 things. But making sure that both the applicant
8 and the staff reviewers have a common understanding
9 of the expectation of what should be addressed.

10 The second is this issue of "the PRA."
11 And I will just use that term because in my
12 simplistic mind there is "the PRA" for the plant,
13 not 27 different PRAs. How, how would that PRA --
14 what's the expectation for how that PRA or the
15 information in that PRA, or however you want to
16 characterize it, be used to support the simplified
17 analysis in Appendix B?

18 And again, the thing that we've talked
19 about a couple of times is would, after the
20 analysis is completed, whether it's a simplified
21 analysis or a detailed analysis, would that
22 evaluation then become part of the PRA going
23 forward as an assessment of the risk from debris?

24 And then the third issue is this whole
25 discussion about how uncertainty is treated beyond

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1 just the uncertainty in the LOCA frequency,
2 whichever, I don't care whether you use the
3 arithmetic aggregation approach or the geometric
4 mean aggregation approach, it's clear that I have
5 to pluck some numbers for those frequencies.

6 But how is the uncertainty in the so-
7 called deterministic consensus methods for debris
8 generation, transport deposition, and phenomena
9 addressed as part of the risk-informed decision
10 making process? Either quantitatively or
11 qualitatively, what sort of guidance is there for
12 making sure that people also address the
13 uncertainty in those so-called deterministic
14 analyses?

15 So those are my three big ones.

16 CHAIRMAN BALLINGER: Joy.

17 MEMBER REMPE: I don't have any
18 specific. Although there are a couple points that
19 I did want to mention.

20 One, several of my colleagues during
21 the discussion today there were several places
22 where some additional clarification, and I believe
23 the staff agreed that, well, maybe we could add
24 those things in. I'd like to encourage the staff
25 to do that and let us know that before the full

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1 committee meeting or at the full committee meeting.

2 But I guess I'm most persuaded by
3 industry saying, well, I mean we've talked today
4 about, yeah, it could be improved upon, but yeah,
5 go ahead and put it out on the street. Because
6 that was my question, why don't you just wait
7 because it doesn't sound like he was using it right
8 away. But if industry thinks it might help and the
9 staff have said, yeah, there's good stuff in this
10 Reg Guide to go ahead and put it on out, I'm kind
11 of persuaded, yeah, probably it should go ahead and
12 be released. But I hope that is adjusted.

13 CHAIRMAN BALLINGER: Mike Corradini,
14 are you still pliable up there? We're working on
15 it.

16 MEMBER CORRADINI: Hello.

17 CHAIRMAN BALLINGER: Hello.

18 MEMBER CORRADINI: You can hear me now?

19 CHAIRMAN BALLINGER: Yes, we can.

20 MEMBER CORRADINI: Okay. So I guess I
21 heard all the comments of the members. And Joy
22 actually brought up the one about, I'll use the
23 provocative way of saying it, I'm not sure what the
24 rush is. I'm hearing that the guide is really
25 probably not going to be used by the BWR community

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1 because they don't, they don't have anything that
2 needs to be solved at this point.

3 I'm hearing that on the PWR side,
4 although it would be good to get it out now, staff
5 is going through and is going to, I will say, put a
6 more complete Appendix C out for consideration.
7 And in that time period I'm not sure what's going
8 to be used, what this will be used for. So I'm not
9 sure what the rush is.

10 The other thing is -- and I thought
11 Dana was going to bring it up -- I still sense that
12 Dana is looking for a completeness discussion about
13 what have we thought about and has been discarded
14 just so at least for the moment we understand
15 what's complete. And the one thing he mentioned
16 was chemistry effects induced by radiation.

17 And I'm curious if the South Texas
18 people have been asked that and considered it and
19 then disposed of it. But I think the completeness
20 part of this is missing.

21 So if staff and industry want to see
22 this out on the street, that's fine. But I sense
23 we're going to be back here talking about this
24 again.

25 That's it for me.

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1 CHAIRMAN BALLINGER: Thank you. That's
2 actually a good lead-in because to sort of open the
3 question to the staff is, is it time to go to the
4 full committee? Given what you've heard so far and
5 what would likely appear in a letter basically
6 going to the full committee, is this the time to do
7 that?

8 MR. FONG: That's our position, yes.

9 CHAIRMAN BALLINGER: Simple enough.
10 Simple enough. Thank you. I guess --

11 MEMBER POWERS: It would be a
12 relatively complicated letter to write. But I
13 don't think there would be any -- I don't think it
14 would be an impossible letter to write.

15 CHAIRMAN BALLINGER: Impossible --
16 Never mind.

17 Okay, thank you. With that I think, if
18 there aren't any other questions or comments we are
19 adjourned.

20 MEMBER BLEY: Let me speak on that.
21 Oh, you already said it.

22 MEMBER POWERS: No, he didn't bang the
23 gavel.

24 MEMBER BLEY: He didn't bang the gavel.

25 I would hope at a full committee

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1 meeting the staff would explain to the full
2 committee the issue Mike raised about what's the
3 rush and why, why is it best to do it now in a
4 little more detail that you have today.

5 MEMBER POWERS: It seems to me that a
6 lot of the concern arose because you have South
7 Texas being a pilot, which is a distinct plant with
8 features peculiar to themselves. And you say, gee,
9 how does this extrapolate on? Well, there's no
10 better opportunity to find out how it extrapolates
11 on than have other people use it.

12 So I mean I think that almost answers
13 itself by saying, okay, we've got this thing. It's
14 not as complete as we'd like but it's useful. And
15 the only way we're going to know how to guide our
16 further completion on this is to have more people
17 use it.

18 MEMBER BLEY: I wouldn't disagree with
19 that at all except nobody is standing in line.

20 MEMBER POWERS: I don't think so.

21 But maybe this is a peculiar
22 opportunity that the staff has to actually be well
23 ahead of the game here and to guide their
24 subsequent work on the other alternatives, based on
25 what they episodically learn.

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1 MR. FONG: Can I add one comment to
2 that, Mr. Chairman?

3 CHAIRMAN BALLINGER: Sure.

4 MR. FONG: There are several licensees
5 in the queue, so to speak, to use this method. And
6 we expect, based on a draft schedule I was
7 provided, to review several of these in calendar
8 year 2016. So that there are other licensees, not
9 on the docket yet, but have told us, hey, we're
10 coming in in 2016, we want to use the risk-informed
11 method.

12 CHAIRMAN BALLINGER: But with regard to
13 the advice to the staff for the full committee,
14 should really go after these questions.

15 MR. FONG: Oh, of course. Absolutely.

16 And the other thing I'd add is that the
17 Commission's expectation on, the policy I should
18 say on the cumulative effects of regulation, guide
19 the staff to release implementation guidance like
20 Reg Guides for public use when the rule goes out.
21 So we've got a Rule 5046c that's going to the
22 Commission very soon.

23 CHAIRMAN BALLINGER: Has it gone up
24 yet?

25 MR. FONG: Not with the Commission.

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1 CHAIRMAN BALLINGER: Okay.

2 MR. FONG: It's now with SECY. And so
3 we'd like to get the guidance necessary for folks
4 to use that rule out on the street.

5 CHAIRMAN BALLINGER: Thank you.

6 Try number two. Okay, absent any other
7 comments, we are adjourned until I think 1:00
8 o'clock. Oh, we're adjourned. There's another
9 meeting going on.

10 So this subcommittee is adjourned.

11 (Whereupon, at 11:24 a.m., the
12 subcommittee was adjourned.)

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U.S. NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Regulatory Guide 1.229

Risk-Informed Approach for Addressing the Effects of Debris on Post-Accident Long-Term Core Cooling

Advisory Committee on Reactor Safeguards
March 22, 2016

Steve Laur, CJ Fong
Division of Risk Assessment
Steve Smith, Division of Safety Systems
Office of Nuclear Reactor Regulation

Objectives

1. Provide status of RG
2. Describe changes made subsequent to November 4, 2015 subcommittee meeting
3. Clarify difference between detailed approach (Appendix A) and simplified approach (Appendix B)

Status

- During November 2015 subcommittee meeting, RG 1.229 was still undergoing inter-office concurrence
- Substantive and editorial changes were made in response to feedback during concurrence process and minor changes to the rule itself
- Final concurrence and OGC no legal objection received on 2/8/2016
- Concurrence version of RG transmitted to ACRS subcommittee on 2/23/2016
- Staff believes RG is ready for use

Change to rule led to a minor change to the RG

(Discussed during February 4, 2016 full ACRS meeting)

- Rule language changed to clarify that *some (not all)* changes to methods require NRC approval
- Conforming change made to RG 1.229 Section C.9 requiring that the specific methods be identified

Insights gained from concurrency process

November 2015 version of RG 1.229 Appendix C contained three methods for allocating plant wide LOCA frequency onto specific break locations:

1. Bounding
2. Conservative Partitioning
3. Semi-Quantitative Partitioning

Changes to Appendix C

- Methods 2 and 3 were removed due to comments received during concurrence
 - Deemed to “have merit” but not ready for regulatory use
- Version discussed during December 2015 full ACRS meeting retained only the bounding method (“method 1”)

Appendix C, Path Forward

- RG 1.229 is ready for use now (concurrency has been achieved)
- Bounding method in Appendix C is suitable for pilot based on staff confirmatory calculations
- Staff will evaluate pilot experience and revise RG 1.229
- Staff currently developing additional LOCA frequency allocation methods for revised RG

Future revisions to Appendix C

- NRR, RES senior management met on 2/8/16; agreed to augment Appendix C with more realistic methods
- Project plan has been developed
- Key RES and NRR staff identified
- Target completion: late 2016 / early 2017

Detailed Approach (Appendix A)

- New strainer/core failure basic events added to PRA model
- Phenomenological model to estimate failure probabilities for those basic events
 - Debris generation and transport
 - Impact on strainers and core
 - Considers scenario-based parameter differences

Simplified Approach (Appendix B)

- “Go/no-go” debris threshold based on test
- LOCA sizes/locations compared to criteria
 - CCDP = 0.0 if debris generated & transported < threshold
 - CCDP = 1.0 otherwise

Conclusion

- RG 1.229 has completed concurrence process
- RG relies on existing, proven framework (RG 1.174, RG 1.82, NEI-04-07)
- Staff believes RG ready for use (based on STP pilot)
- Staff is developing additional methods for use in a future version of Appendix C

Industry Perspective on Draft RG 1.229

Stephen Geier

Senior Project Manager, Nuclear Energy Institute

ACRS Subcommittee on Metallurgy and Reactor Fuels

MARCH 22, 2016

Rockville, MD

NEI Perspective

- Introductory Remarks
- Ensure information is provided for efficient implementation substantial consumption of resources
- Assist in resolution of issues affecting PWRs and BWRs
- Need exists to maximize efficient implementation in concert with programs focused on improving efficiency:
 - NEI 'Cumulative Effects of Regulation Project'
 - NRC 'Project AIM 2020'
 - NEI 'Delivering the Nuclear Promise'

Industry Perspective on Draft RG 1.229

Larry Naron

Senior Manager-Exelon Risk Management
Vice Chairman-BWROG IRIR Committee

**RISK-INFORMED APPROACH FOR ADDRESSING
THE EFFECTS OF DEBRIS ON POSTACCIDENT
LONG-TERM CORE COOLING**

MARCH 22, 2016, ROCKVILLE, MD

Industry Perspective on Draft RG 1.229

High Level Generic Observations

- Introduction section notes the purpose is to present acceptable methods for addressing 10 CFR 50.46c “...effects of debris on long-term cooling”
- RG is almost exclusively tailored to resolving GSI-191 for existing PWR plants.
 - Silent on New Plants or BWR’s

Industry Perspective on Draft RG 1.229

High Level Generic Observations

- RG is prescriptive in some areas -likely requiring significant interaction between the licensee and staff reviewers
 - C.1.b“...no break location or LOCA scenario should be screened from the analysis strictly due to its assumed low frequency of occurrence”
 - C.2.b“...NUREG -1829 frequencies determined using arithmetic or mixed distribution is acceptable”

Industry Perspective on Draft RG 1.229

High Level Generic Observations

- RG is vague in some areas -likely requiring significant interaction between the licensee and staff reviewers
 - C.7 Scope and content of required 48 month update
 - C.8 Threshold for reporting reduction of defense in depth or safety margin

Industry Perspective on Draft RG 1.229

Risk Informed Culture

- Use of deterministic input to risk informed regulation has been problematic
 - RG requires deterministic input such as strainer behavior, debris transport, and chemical effects
 - This likely introduces conservatisms which are cumulative

Industry Perspective on Draft RG 1.229

Conclusion

- Effectively describes two acceptable approaches to addressing debris
- Is useful in identifying salient focal areas for analysis
- Is somewhat narrow in scope
- Allows flexibility, but may result in varied approaches increasing preparation and review resources