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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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RELIABILITY AND PRA SUBCOMMITTEE

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FRIDAY

JULY 27, 2012

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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 8:30 a.m., John W.  
Stetkar, Chairman, presiding.

SUBCOMMITTEE MEMBERS PRESENT:

JOHN W. STETKAR, Chairman

DENNIS C. BLEY, Member

HAROLD B. RAY, Member

JOY REMPE, Member

STEPHEN P. SCHULTZ, Member

WILLIAM J. SHACK, Member

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1 NRC STAFF PRESENT:

2 JOHN LAI, Designated Federal Official

3 BENJAMIN BEASLEY, NRR

4 STEPHEN DINSMORE, NRR

5 RAY GALLUCCI, NRR

6 DONNIE HARRISON, NRR

7 J.S. HYSLOP, NRR

8 ALEX KLEIN, NRR

9

10 ALSO PRESENT:

11 PAUL AMICO, SAIC

12 VICTORIA ANDERSON, NEI

13 RAY FINE, PWR Owners Group/FENOC

14 DAVID FINNICUM, PWR Owners Group

15 DENNIS HENNEKE, BWR Owners Group/GEH

16 ANIL JULKA, NextEra Energy

17 GERALD A. LOIGNON, JR., SCANA

18 GEORGE PINNELL, ARS\*

19 ROBERT RISHEL, BWR Owners Group

20 IRIR Chair/Duke Energy

21 VINNY RUBANO, NextEra Energy

22 LAURA SWENZINSKI, NextEra Energy

23 RICK WACHOWIAK, EPRI

24 KIANG ZEE, ERIN Engineering

25 \*Present via telephone

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TABLE OF CONTENTS

Opening Remarks	4
Industry Perspective	4
PWROG Peer Review	75
BWROG Peer Review	107
PRA Transition Issues (Note A)	163
ACRS Members Discussion	192

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

(8:29 a.m.)

1  
2  
3 CHAIR STETKAR: The meeting will now come  
4 to order. This is the second day of our meeting on  
5 NFPA 805 transition, and today we're going to hear  
6 from a variety of industry folks from NEI, EPRI, and,  
7 I guess, the Owners Groups.

8 So, we'll start off with -- any one from  
9 the staff? Alex, anything to say?

10 MR. KLEIN: No, nothing, not yet.

11 CHAIR STETKAR: I can't wait. With that,  
12 we'll start off with NEI. Victoria?

13 MS. ANDERSON: My name is Victoria  
14 Anderson. I'm a Project Manager for Risk Assessment  
15 with the Nuclear Energy Institute, and I'll be talking  
16 about sort of the broader industry perspective with  
17 respect to the NFPA 805 transition and fire PRA today.

18 The plants yesterday discussed some of  
19 their specific situations and challenges, and today  
20 again we're going to be discussing some industry-wide  
21 challenges and difficulties. We want to make sure we  
22 manage as best possible moving forward with the  
23 continued 805 transition and fire PRA development.

24 Specifically, I'm going to be talking a  
25 little bit about the interface between technology

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1 advancement for fire PRA and the regulatory process  
2 associated with NFPA 805. I know that there isn't  
3 much interest in the process issues, but I think it's  
4 important to discuss how some of those process issues  
5 are impacting potential for technology advancement, so  
6 I'll try to keep that to a minimum and discuss sort of  
7 the difficulties we're having with technological  
8 advancement.

9 For example, yesterday you heard about  
10 some of the uncertainties that utilities are facing  
11 with respect to their fire PRA development to support  
12 NFPA 805 applications, and we need to make sure we  
13 work to foster regulatory stability and continue  
14 technological advancement for fire PRAs.

15 So we'll discuss some of the hiccups we've  
16 been facing and some ways that we think we could  
17 improve and also a few aspects in which we've already  
18 made some improvements and had some good communication  
19 with the staff. After I finish up, Rick is going to  
20 talk about actually advancing the state of the art.

21 So, to start off, I think it's important  
22 to look at how an NFPA 805 has affected fire PRA  
23 development and potential technological advancements.  
24 As you heard yesterday, NUREG-6850 is used quite a bit  
25 in the development, application development and review

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1 process. For example, licensees are asked to identify  
2 difference between 6850 and the methods that they use  
3 in their fire PRA.

4 There are also -- they're being asked for  
5 sensitivity studies against 6850, so there's quite a  
6 bit of dependence upon NUREG-6850 right now in the  
7 review process, and there -- we understand that this  
8 staff is very familiar with NUREG-6850, and they have  
9 confidence in those methods, but there's -- I think  
10 there are some unintended results that we want to make  
11 sure we don't keep experiencing.

12 Again, it can be hard to make improvements  
13 and advance technology in the context of NFPA 805  
14 application space. You heard that yesterday that some  
15 of the utilities are -- you heard specifically from VC  
16 Summer they didn't really pursue much outside of sort  
17 of the 6850 box, so it's making advancement of  
18 technology a little bit difficult.

19 I'll talk a little more about how this  
20 impacts sensitivity studies and how maybe comparing  
21 results that you get using the method that was used in  
22 the fire PRA and the results you would get if you used  
23 6850, how those sensitivity studies might not be the  
24 most informative.

25 CHAIR STETKAR: Victoria?

1 MS. ANDERSON: Yes.

2 CHAIR STETKAR: Are you or maybe Rick  
3 going to be a little bit more specific about which  
4 particular features 6850 -- because 6850 is just  
5 condemning that large body of work. It seems a little  
6 bit unfair.

7 MS. ANDERSON: Well, I don't -- I think  
8 Rick's going to talk a little bit about some specific  
9 aspects.

10 MR. WACHOWIAK: I have one example that  
11 I'll talk about.

12 MS. ANDERSON: And I don't think anybody  
13 means to condemn it, and I'll get into this a little  
14 bit later, but for it to -- and it was sort of meant  
15 to be a living document, and Rick is going to talk  
16 about that.

17 MR. WACHOWIAK: Yes.

18 MS. ANDERSON: We can't have it stuck in  
19 space, and we're sort of stuck right now, and that's  
20 what the real problem is.

21 CHAIR STETKAR: Okay.

22 MS. ANDERSON: I'm not saying we should  
23 take it and set fire to it.

24 CHAIR STETKAR: No, I was just curious.  
25 One of the -- one of the reasons for this whole, you

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1 know, gathering of the multitudes is to try to  
2 identify if there are specific technical issues, not  
3 sort of broad-based things, because I think we're all  
4 aware of that.

5 MS. ANDERSON: Right.

6 CHAIR STETKAR: But if there are really  
7 specific technical issues that either the staff or in  
8 particular the industry sees as a, you know,  
9 fundamental impediment, we'd like to understand what  
10 those are. You know, that's why I raised the question  
11 about it.

12 MS. ANDERSON: Right.

13 CHAIR STETKAR: If there are specific  
14 elements of that 6850 process or elements of either  
15 the data or the recommended methods and so forth, we'd  
16 like to kind of understand, you know, what they are.

17 MS. ANDERSON: Yes.

18 CHAIR STETKAR: And if there are other  
19 parts that are sort of working okay, we'd like to  
20 understand that, too, so, Rick, if you can keep that  
21 in mind.

22 MR. WACHOWIAK: Yes, I have one example  
23 for that, and then we can -- we can talk about some of  
24 the --

25 CHAIR STETKAR: Thanks.

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1 MS. ANDERSON: And I think -- what I'm  
2 going to be talking about in a little bit more detail  
3 is where even if we could pursue the research and  
4 analysis necessary to work on improving those methods,  
5 where we're sort of running into some process  
6 difficulties with making some of those improvements.

7 So there's a point at which people aren't  
8 really going to be willing to pursue those  
9 technological advancements, because it can look like  
10 an exercise in futility if we don't have a really  
11 clear process for advancing it.

12 So, another concern is that we think that  
13 there's been a little bit of a removal of focus from  
14 the consensus standard for fire PRA technical  
15 adequacy, which we think is unfortunate, because a lot  
16 of work went into developing that standard.

17 That's not to say that it's not being used  
18 and that staff isn't paying attention to it, but I  
19 think we're just losing a little bit of focus on the  
20 standard being the figure of merit. So that's another  
21 concern we have.

22 As it's probably apparent from what I have  
23 noted with some of the difficulties we're having,  
24 there are some communication issues, and we have been  
25 working on those. I think we had a very productive

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1 meeting with the staff last month in June where we got  
2 a better understanding of what everyone meant when we  
3 were using, you know, different phrases and saying  
4 different things and what the staff was expecting.

5 We're getting better, but it's been  
6 difficult. You know, it's an evolutionary process.  
7 So some of the areas where we're having difficulty are  
8 well, what constitutes acceptance of a fire PRA  
9 method? What exactly is expected for a sensitivity  
10 study?

11 We're getting a better idea of that, but  
12 it's just been difficult, and for the lead 805 plants,  
13 you know, the ones who, you know, have applications  
14 that they're about to turn in, this is -- it's a  
15 little --

16 CHAIR STETKAR: I think any -- I suspect.  
17 I wasn't around. Bill probably was at the beginning  
18 of the license renewal process. I suspect there were  
19 probably similar difficulties in that process.

20 MEMBER SHACK: I was just sort of sitting  
21 here thinking, you know, people with core analyses use  
22 codes from the seventies, and they're never in any  
23 hurry to update them, as much as the ACRS members  
24 would like to see them use new modern transportation.

25 You know, it all depends on your

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1 perspective as to whether, you know, you like  
2 regulatory stability and notions of methods that are  
3 accepted or you want to go out and push the frontier  
4 a little bit, but it is always a little rough getting  
5 new methods through the NRC, but I don't know that  
6 it's any different for fire PRA than it would be for  
7 a new core analysis code. It's just how much data and  
8 how much support you have.

9 MS. ANDERSON: Right. So, one of the  
10 specific difficulties we've had are some short  
11 turnaround times for supplementary information,  
12 whether information is requested through the RAI  
13 process or as part of the license acceptance process.

14 Because we haven't really had a clear  
15 mutual understanding of what sensitivity studies are  
16 expected, some additional studies might be requested  
17 with a really short turnaround that can be difficult  
18 to deal with.

19 CHAIR STETKAR: Hereto, and I haven't had  
20 a chance to look forward too much, but I'd like to  
21 understand. You've mentioned sensitivity studies now  
22 three times on this one slide.

23 MS. ANDERSON: Yes.

24 CHAIR STETKAR: So I'd like to understand  
25 in particular what element of sensitivity studies,

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1 because people tend to throw sensitivity --

2 MS. ANDERSON: Right.

3 CHAIR STETKAR: There are sensitivity  
4 studies, varying parametric values, which is one  
5 notion of a sensitivity study. There are also  
6 sensitivity studies that we heard about yesterday in  
7 terms of comparing the results from a particular --  
8 I'll call it fire physics model to distinguish from  
9 other fire models, one fire physics model compared to  
10 another fire physics model, so if you'd help us to  
11 understand a little bit --

12 MS. ANDERSON: I have an example.

13 CHAIR STETKAR: -- what in that range of  
14 -- okay.

15 MS. ANDERSON: I have an example later,  
16 and we have people in the back who I have informed  
17 that they might need to back me up with some more  
18 data. Hopefully, they don't run out of the room.

19 So, as I said, in particular some of the  
20 sensitivity studies can be time-consuming, and so  
21 we're running into problems with very little time to  
22 resolve them. I think in the future this won't be  
23 quite as much of a problem, because the licensees who  
24 aren't due until, you know, 2014, 2015, they have a  
25 little bit more time to adjust and do the work, but

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1 some people are really up against the wall right now,  
2 and it's a little difficult for them.

3 I just want to note here before we move  
4 on, nobody is arguing against sensitivity studies when  
5 appropriate. I want to make sure that that's very  
6 clear. Sensitivity studies can give you good insights  
7 about where your method impacts your model.

8 There is no argument against having them.  
9 It's just that we need to make sure we're doing the  
10 best ones to give us the best information.

11 CHAIR STETKAR: That's right, and I  
12 suspect if we learn a little bit more about where  
13 those particular issues are, at this stage in the  
14 process you're also compiling, in some sense, you're  
15 compiling a catalog of those sensitivity studies such  
16 that one would hope that they don't need to be  
17 replicated, you know, 20 or 30 times as additional  
18 licensees come in, presuming that they're not using,  
19 you know, wildly different methods, but let's see in  
20 --

21 MS. ANDERSON: It's possible you could  
22 reference an SE. It's possible that you might not  
23 need to, but, actually, first, before we get to a lot  
24 of the detail on sensitivity studies, I'm going to  
25 talk about some of the difficulties licensees are

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1 facing with making advancements to the methods that  
2 are currently laid out in NUREG-6850. In particular,  
3 right now it's a very long and uncertain process,  
4 which is why many licensees are a little bit skittish  
5 about pursuing anything that's outside NUREG-6850.

6 So if you look at the process, you have  
7 the development process. You have whatever time you  
8 need to develop the method. That's probably going to  
9 be on the time frame of several months, maybe longer,  
10 depending on how intensive data analysis you need to  
11 do to support it.

12 Then there's the consensus review process.  
13 That can take up to a year. Sometimes it's faster,  
14 and then there is the NRC acceptance process, which we  
15 haven't -- we've just started that rolling. That can,  
16 you know, take up to another nine months.

17 So, you're looking at all that. You put  
18 all that together. Now, then you have to account for  
19 incorporating it into your fire PRA. You can do that  
20 before all of those steps are done, and, in fact, you  
21 need to for most of these methods when you're  
22 developing the fire PRA.

23 You're really sort of proceeding with a  
24 lot of uncertainty there, and so that's why people are  
25 reluctant to do this. So we need to make sure that we

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1 make -- we get some more certainty in these steps and  
2 have a better understanding of how everything will  
3 work there, and it's potentially unattractive to  
4 licensees with some really tight time limitations due  
5 to their 805 LAR deadlines.

6           Again, it would be easier if any of the  
7 review processes were faster. I don't think anybody  
8 can say that -- I don't think either the industry or  
9 the NRC can say, "Well, we reviewed it as quickly as  
10 possible."

11           I don't -- I think we could have been  
12 faster than a year, and we could have had a better  
13 communication regarding when we were going to hear  
14 back from everybody, but we could definitely make some  
15 improvements there. In particular, if the consensus  
16 review were maybe given a little bit more weight in  
17 this process, that might be helpful.

18           Okay. Now I'm going to talk about  
19 everybody's favorite topic, unreviewed analysis  
20 methods. This is -- you probably heard it mentioned  
21 a couple of times yesterday. Just a little bit of  
22 background so that we're clear on what we mean in the  
23 context of this discussion, I'm going to walk through  
24 what it is.

25           It's a type of fact and observation used

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1 in the peer review process. It's not the same thing  
2 as a method that is different from those described in  
3 NUREG-6850, so it's something that a peer review team  
4 would note in their evaluation of a fire PRA against  
5 the standard.

6 When this is used is when the review team  
7 is in the middle of their review of the fire PRA and  
8 they encounter a method that's used and they don't  
9 think that they have the collective expertise to  
10 assess it. So they're not saying this does or does  
11 not meet the standard. They're saying, "We don't  
12 possess the technical expertise to assess it."

13 I think that's a positive that we heard  
14 that back from reviewers. I think that speaks  
15 positively to the peer review process that we make  
16 sure there's a good level of technical fidelity there.

17 So this was our solution to handling the  
18 rapidly improving methods in the fire PRAs, because  
19 people had sort of groundbreaking methods in their  
20 fire PRAs, and reviewers didn't really have time to  
21 get up to speed on it before the peer reviews, so this  
22 ensured some consistency in the peer review process.

23 What happens if a utility gets a UAM -type  
24 F&O on the peer review? They send that method over to  
25 an industry consensus review panel run by EPRI. There

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1 has been NRC participation in the past, so that's sort  
2 of a way to ensure that there's consistency, because  
3 you have -- you bring together like the top experts  
4 from throughout the field, so you get some consistency  
5 there.

6 CHAIR STETKAR: Rick, are you going to  
7 talk about that panel?

8 MR. WACHOWIAK: No.

9 CHAIR STETKAR: Is it now operating?

10 MR. WACHOWIAK: It is -- it has completed  
11 its first phase, and we're adjusting the panel process  
12 to fold in lessons learned. The next piece that's  
13 going to come out of this panel is going to be done a  
14 little bit differently, so maybe I will touch on it in  
15 one of my points.

16 CHAIR STETKAR: Okay. I wanted to hear a  
17 little bit about it, because if you say some of the  
18 industry consensus evaluations could help the process,  
19 I'd like to understand where the industry is on  
20 facilitating those reviews.

21 MEMBER SCHULTZ: And I'd like to know what  
22 the schedule is associated with those reviews in the  
23 current experience base and what is planned for the  
24 future.

25 MR. WACHOWIAK: Okay. Well, I can touch

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1 on a couple of those things right now. About a year  
2 or so ago we started with four proposed methods to go  
3 into this, into the Review Panel.

4 What we -- and so we assembled a team, and  
5 I think it had six or seven different people with fire  
6 PRA background from the industry. We had a  
7 representative from NRR on there, and he brought a  
8 couple of other fire experts from within NRC and also  
9 their contractors to talk about these things.

10 We found initially that our first thought  
11 on this was that the team would come in and review a  
12 method proposed by someone, and it would be like an  
13 independent review. It didn't go that way.

14 What it turned into was there was a  
15 review. There were some issues with it, and then the  
16 team set out to fix the issues, so it turned into a  
17 development panel, a panel developing the method,  
18 rather than simply reviewing the method.

19 Okay, and so from that aspect, that  
20 changes the time frame from like a month to, as  
21 Victoria said, in one of the cases it was either a  
22 year or 13 months, something like that, to get through  
23 all of the issues.

24 We were looking at why some of the things  
25 were taking so long and what was there. There's a few

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1 issues associated with it, but mostly it's because  
2 we're trying to solve generic things.

3 I think with any of these if you had  
4 focused it on, "This plant has this problem in their  
5 fire PRA, and they need to use this to fix that  
6 problem," it probably could have been done in a month.

7 It didn't have to bring in all the baggage  
8 of, "What if it happened at this site with this kind  
9 of configuration? What if it happened at this site  
10 with this kind of configuration?" It just balloons  
11 into something that's quite unwieldy.

12 So, going forward, and I'll talk about  
13 this a little bit later, we need to recognize that  
14 there are multiple needs for this sort of thing.  
15 There are ones that are there to address a problem  
16 that a specific plant has with a specific fire  
17 scenario, and then there are others that are saying,  
18 "Okay, how can we do this better, faster, cheaper in  
19 the future."

20 There's two different panels or  
21 organizations that need to be set up to solve those  
22 two different problems, so that's one of the things  
23 that I learned in going through this process is that  
24 once we start combining those kinds of things, it  
25 becomes --

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1 CHAIR STETKAR: Well, it's a methods  
2 research development, rather than --

3 MR. WACHOWIAK: It's a method -- it  
4 becomes research, rather than review.

5 CHAIR STETKAR: Right.

6 MR. WACHOWIAK: So, okay, so that -- so we  
7 finished the first four that were in that phase. We  
8 do have another method as proposed by the BWR Owners  
9 Group that's going to go into our new development  
10 panel recognition because it's a generic method there.  
11 The schedule for that at this point is still being  
12 worked. We need to figure out what needs to be done.

13 Some of the work for that method was  
14 reviewed in one of the previous panels. There's a  
15 second piece where we're going to still need to go  
16 back through and look at data records from the  
17 database again, and that's a -- that's not a short  
18 process. So I can't answer the second piece of your  
19 question.

20 MEMBER SCHULTZ: No, but it gives a good  
21 perspective about the first two steps that --

22 MR. WACHOWIAK: Right.

23 MEMBER SCHULTZ: -- Victoria was  
24 describing, and it is in a short time frame. One  
25 wouldn't necessarily expect it to be unless you could

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1 lock those seven people in a room for two months and  
2 give particular guidance that would lead more toward  
3 a plant-specific assignment for review versus a  
4 generic methods development program.

5 MR. WACHOWIAK: Right, and in some of  
6 these cases when we were going through data records,  
7 if we locked the seven people in a room, we might only  
8 come out with five.

9 MEMBER SCHULTZ: Understand. Thank you.

10 CHAIR STETKAR: The ideal is one.

11 MR. WACHOWIAK: So, it's -- once we get  
12 into that sort of a research mode on these things, the  
13 schedules tend to self-destruct.

14 MEMBER SCHULTZ: Was there agreement at  
15 the outset that this process was going to -- how was  
16 it -- how was it expected to weave into an NRC review  
17 process associated with the methodology? There's NRC  
18 participation, as you mentioned, in the contractor and  
19 the --

20 MR. WACHOWIAK: Right.

21 MEMBER SCHULTZ: -- review process, but  
22 was that expected to take the place of subsequent  
23 staff review?

24 MS. ANDERSON: It would be -- it would be  
25 folded into the application, in the portion of the

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1 application where the open facts and observations of  
2 the peer review were discussed. What would happen is  
3 the licensee would say, "We had a UAM of 11.0, and  
4 here is the finding from this panel."

5 MR. WACHOWIAK: Right, so it was  
6 originally intended to fold in with the peer review  
7 process, and so the only question that would have been  
8 left open to this is not whether the method could be  
9 used but did the plant use it correctly. Our thoughts  
10 were that that piece of it would be handled by a  
11 focused scope peer review, and it wouldn't require  
12 further staff resources to go in and look in detail at  
13 that.

14 That was the thought at the outset, and we  
15 had some talk with Donnie Harrison, whose staff is the  
16 one that does many of these reviews, and we thought it  
17 was workable at the time, but that was with the  
18 presumption going in that the panel itself wasn't  
19 going to be reworking the method. So once we got into  
20 that mode, I think everybody's expectations kind of  
21 started changing as we were progressing.

22 CHAIR STETKAR: Are -- having not been  
23 involved with this at all, are some of the methods --  
24 you said you'd looked at four. Are they so different  
25 that --

1           You know, there's apparently among the  
2 collected experts a disparity of confidence, let's  
3 say, in the methods. Are they so different from  
4 what's been -- what other folks are using, the methods  
5 that are essentially endorsed under 6850 that, you  
6 know, they are diverging?

7           MR. WACHOWIAK: Yes and no.

8           CHAIR STETKAR: Okay.

9           MR. WACHOWIAK: So there were some that  
10 were just -- so, for example, on pump oil fires, okay,  
11 there's already a discussion in Supplement 1 of 6850  
12 that says, "This is how you treat main feed pump oil  
13 fires," and the method on pump oil fires was  
14 essentially saying, "Okay, let's do the same thing  
15 that we did for main feed pumps for all oil-filled  
16 pumps."

17           Okay, so there it's a, you know, it's a  
18 gradual evolution. It's not a -- it's not a complete  
19 change of anything, and the difficulty with that one,  
20 then, was to go through the data records and determine  
21 what the right split fractions were for the different  
22 pieces in that.

23           So, you know, there are different  
24 perspectives on what constitutes a large amount of oil  
25 in a fire. So that's an evolutionary sort of thing.

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1           There are -- the electrical cabinet  
2 severity factor method is really adding a -- by the  
3 time we were done, it was actually adding a scoping  
4 step into 6850, so in many of the cases of 6850 you  
5 have screening, scoping, detailed analysis.

6           In some of the areas like with the  
7 electrical cabinets we had screening and detailed  
8 analysis. That was it, and over the year of  
9 development with that method, what we -- what the  
10 panel came up with was essentially the intermediate  
11 step.

12           This is what you can do if you want to do  
13 screening, scoping, and detailed analysis so that you  
14 could cull down quite a bit of the detailed analysis  
15 when you're looking at electrical cabinet scenarios.  
16 So that's quite a -- that's adding a new -- it's still  
17 within the framework of 6850, but it's adding a new  
18 type of step.

19           CHAIR STETKAR: Okay.

20           MR. WACHOWIAK: So that one was a little  
21 more on the revolutionary rather than evolutionary  
22 scale of things.

23           CHAIR STETKAR: Okay. That helps.

24 Thanks.

25           MR. WACHOWIAK: It's a spectrum.

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1 CHAIR STETKAR: Okay.

2 MS. ANDERSON: All right. So, external  
3 consensus review is a key component of the treatment  
4 of the unreviewed analysis methods identified in the  
5 peer review process.

6 As I noted earlier, there is that next  
7 step is where the NRC review comes in. The time lines  
8 have been variable. Again, it can -- we had one where  
9 it was up to eight months. In some cases, we do hear  
10 back much more quickly.

11 There are also some -- there have been  
12 some concerns about the technical basis for some of  
13 the review conclusions. There was a sense that the  
14 electrical cabinet method that was submitted that we  
15 heard back on in June, there was a sense that it  
16 wasn't really evaluated on its own merits in the  
17 technical evaluation.

18 There was some discussion of, "Well, there  
19 might be other better methods." I guess that was one  
20 place where there was some frustration.

21 Finally, one complication we faced with  
22 unreviewed analysis methods is how these are going to  
23 be addressed in the LARs. When do they need to be  
24 mentioned? When do you need to do sensitivity  
25 studies?

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1                   When is the NRC review done?  When does it  
2                   -- does it need to be done if the panel has made a  
3                   finding?  How do you close out the F&O?  What exactly  
4                   do you do with this in the LAR?

5                   I think we're getting somewhere with that,  
6                   so that's being clarified, but it still a little bit  
7                   difficult for the licensees submitting this year.  The  
8                   end result is that you might wind up with some work  
9                   that you need to do in a very short amount of time.

10                  Speaking of work you might need to do in  
11                  a short amount of time, sensitivity studies, all  
12                  right, that everyone has been asking for.  Again, I  
13                  just want to emphasize we recognized that there needed  
14                  -- that they have to be done for risk-informed  
15                  applications across the board, but where we run into  
16                  difficulty is what the expectations are, and they  
17                  don't seem to be that clearly documented.

18                  There is some discussion of what  
19                  sensitivity studies are expected in Reg Guide 1.174,  
20                  key assumptions, and you need to look at reasonable  
21                  alternatives, but it's not really that specific or  
22                  informative for an 805 applicant.

23                  So there are, you know, questions of when  
24                  do you need to do a sensitivity study?  What type do  
25                  you need to do?  Again, do you need to do parametric,

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1 or do you need to compare to another method?

2 In some cases, expectations for comparing  
3 to NUREG-6850, particularly if a request comes in a  
4 short time frame, that can be pretty impractical, and  
5 there is some concern about how the results might be  
6 used.

7 Specifically, there is some concern that  
8 there might be some SE conditions that result from a  
9 review of a sensitivity study if the sensitivity study  
10 isn't really interpreted correctly or not presented as  
11 best possible. So that could be difficult with  
12 respect to timing and with possibly making some  
13 changes that aren't really optimal.

14 MEMBER BLEY: I'm just thinking if I were  
15 in your spot, in the licensee spot, if you -- if one  
16 were to get very clearly documented requirements for  
17 sensitivity studies, my guess is they'd be rather  
18 broadly inclusive.

19 Without those, it's up to the analyst, it  
20 would seem to me, to identify the areas where there is  
21 the most uncertainty in what they've done and develop  
22 specific sensitivity studies. Seems like you might be  
23 asking for something you really won't like if you get  
24 it.

25 MS. ANDERSON: Right. Right. I mean,

1 that is something we have contemplated, but the  
2 difficulty is right now people get requests for  
3 sensitivity studies that come just with such a short  
4 response time frame.

5 MEMBER BLEY: This is primarily due to the  
6 short time frame that was there for the whole, this  
7 whole effort. Is that right?

8 MS. ANDERSON: Right. That's part of it,  
9 but if you get a request for an additional sensitivity  
10 as part of the RAI process, you have a serious time  
11 limitation there, too.

12 MEMBER BLEY: Is that -- I'm just curious,  
13 because I haven't been involved in this. Where does  
14 that time limitation come from? Is it the already-  
15 existing schedule, or is it staff says, "You've got to  
16 tell us by a month from now?"

17 MS. ANDERSON: There's a -- I can't really  
18 speak to exactly how --

19 MEMBER BLEY: I'm just curious as to where  
20 that limitation comes from.

21 MS. ANDERSON: When you get a set of RAI,  
22 you have a specific time that you're allowed to  
23 respond. I don't know how much flexibility the staff  
24 has there.

25 MR. KLEIN: This is Alex Klein. With

1 respect to -- I want to make clear the terminology  
2 here, first of all. There is supplementary  
3 information, and then there are requests for  
4 additional information, two different processes.

5 The supplementary information is part of  
6 our LIC-109 process, and that has a schedule. We've  
7 got currently a three-month calendar schedule for the  
8 acceptance review, and I think that's probably where  
9 the industry is talking about a limited time span.

10 With respect to RAIs, there's a -- when we  
11 issue RAIs after we -- for example, after we're done  
12 with our site audits, there's a negotiation that we  
13 have with the licensee in terms of how long do they  
14 think they need to take. We have discussions with  
15 them. You know, "How long do you need to take for  
16 these RAIs?"

17 So, in some -- in some cases, we have RAI  
18 response dates out there that go 60 calendar days.  
19 Some are 90 calendar days and I think in some  
20 situations up to 120 calendar days.

21 So if the licensee provides us with a  
22 basis why they need to extend that time period, then  
23 we'll consider that, but, again, even within that RAI  
24 process we're in a LIC-101 process where we have a  
25 two-year review schedule, so the staff is also within

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1 this time limitation.

2 That two-year review schedule starts when  
3 that license amendment request is submitted to the  
4 NRC, so the clock is ticking from day one, basically,  
5 so, yes, there are some time pressures.

6 MS. ANDERSON: Right.

7 CHAIR STETKAR: Are most of, either of  
8 you, are most of these time-sensitive requests for  
9 sensitivity studies, which I think have been  
10 characterized as, you know, surprises or coming out of  
11 the blue, "Can you perform a sensitivity study on  
12 this?" --

13 Are most of those, are they broad-based,  
14 you haven't done sufficient sensitivity analyses as  
15 part of the LIC-109 review, or are they deriving out  
16 of specific issues that are identified during the --  
17 during the review process as a result of an RAI, for  
18 example? You know, I --

19 MR. WACHOWIAK: So one of the, I think,  
20 impractical ones that might be referring to on the  
21 slide here is that I guess there was one that I think  
22 was in the LIC-109, whatever the --

23 CHAIR STETKAR: It's the first part.

24 MS. ANDERSON: The supplementary  
25 information request.

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1 MR. WACHOWIAK: The process, and my  
2 information might be a little dated here, but in this  
3 process dated means, you know, three weeks old, so --

4 The utility used the electrical cabinet  
5 screening, scoping detailed analysis process, and the  
6 sensitivity came back, "Redo your analysis without the  
7 scoping part in the middle, so do all the detailed  
8 analysis and show us what the differences are."

9 I don't know what the ultimate resolution  
10 of that was, but to me that seemed like that would be  
11 an impractical sensitivity study to do, because it's  
12 essentially saying redo the analysis.

13 CHAIR STETKAR: Right, and that was during  
14 the early part of the --

15 MR. WACHOWIAK: Right, so I don't know  
16 what's happened since then, and so there may be more  
17 people in the room that understand that has happened  
18 in the negotiations since then, because something  
19 would have to happen there, and that particular  
20 request to me seems impractical and would not be able  
21 to --

22 MEMBER BLEY: That's a surprise to me,  
23 because that's a sensitivity study on process. I  
24 thought we were talking about sensitivity study on a  
25 couple issues.



1 CHAIR STETKAR: This is -- that's -- I  
2 guess it would be worthwhile if the staff and folks at  
3 -- you know, you talk about time pressures. If by  
4 1:00 we could get a little bit more understanding  
5 about issues like that, that's a bit --

6 MS. ANDERSON: Right.

7 CHAIR STETKAR: -- troubling, quite  
8 honestly.

9 MS. ANDERSON: And I think -- and that was  
10 -- there was a lot of time pressure there that came  
11 because it was part of the supplementary information  
12 request, but even with a 120-day RAI response period,  
13 I mean, that would be --

14 CHAIR STETKAR: And it was just -- make  
15 sure I understand it correctly. It was broad-based.  
16 Basically, go do it for all of the cabinets where you  
17 applied the -- essentially where you applied the  
18 scoping.

19 MR. WACHOWIAK: That's my understanding.  
20 I'm getting nods from the back.

21 MS. ANDERSON: Actually --

22 CHAIR STETKAR: Okay. Thanks.

23 MR. DINSMORE: Hi, this is Steve Dinsmore.

24 MR. WACHOWIAK: Hi, Steve.

25 MR. DINSMORE: Steve Dinsmore, senior

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1 reliability and risk analyst from APLA. I guess there  
2 was an understanding from the staff side, and I  
3 thought we had communicated to the industry, that if  
4 you used an unreviewed method in the development of  
5 your LAR, you would provide a sensitivity study with  
6 the LAR. There might have been some confusion about  
7 that. We realize that these sensitivity studies can  
8 take a long time.

9 MS. ANDERSON: I think that there was some  
10 misunderstanding. It wasn't that you needed to do it  
11 but what it entailed.

12 CHAIR STETKAR: I think -- I think we have  
13 to be careful here, because people tend to throw words  
14 like methods, models, sensitivity studies around  
15 pretty glibly, and, as Dennis pointed out, this is --  
16 I'd characterize this as a process, not an analytical  
17 method, if you will.

18 I'd certainly like to understand a little  
19 bit more about this issue, only because I'm aware of  
20 typically the importance of electrical cabinet fires,  
21 the amount of effort that's required to do an  
22 electrical cabinet fire evaluation for a plant, and  
23 having some confidence that going forward from where  
24 we are now in this process that there's a pretty clear  
25 understanding, because it could substantially affect

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1 the amount of effort that's required on the part of  
2 everybody coming in in the future.

3 You know, we're not talking here about a  
4 particular model for a plume temperature compared to  
5 another model for a plume temperature, which, you  
6 know, you can look at. This is a -- this is a  
7 methodology process type issue. Do you have other  
8 examples, or is this the --

9 MS. ANDERSON: The one example I have in  
10 the slide I just brought up is the electrical cabinet  
11 method.

12 CHAIR STETKAR: Okay.

13 MS. ANDERSON: It sort of walks through  
14 why it would be -- why it would take so much time to  
15 do such a sensitivity study. This method assigns a  
16 conditional probability to reflect the fraction of  
17 fires predicted to exhibit the behavior consistent  
18 with that that's described in NUREG-6850 based on a  
19 thorough analysis of available data.

20 The reason we selected this is that this  
21 was a method that we heard back from the NRC staff  
22 that they didn't accept the consensus review panel  
23 finding, so right now there would be an expectation  
24 that a licensee that used this, that they would do a  
25 sensitivity study.

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1           So, if you did a sensitivity study  
2 comparing the results you obtained using this approach  
3 with the results you obtained using the 6850 approach,  
4 it would be very time-consuming and cumbersome. I'm  
5 not saying impossible but extremely time-consuming.

6           You would be doing -- looking at doing  
7 reanalysis of fire modeling, growth, and suppression  
8 for a lot of scenarios. You're looking at a level of  
9 effort that could be up to 40 weeks.

10           CHAIR STETKAR: Could be up to our  
11 lifetime, depending on how efficiently we work.

12           MS. ANDERSON: Right, you can -- you can  
13 always model more, but just to get -- and finish  
14 documenting the results, you know, then you need to  
15 look at, "Well, what did we find out from this  
16 comparison? What does this really tell us?"

17           You'll get a risk increase from the non-  
18 propagating fires, and you'll basically skew your risk  
19 results. It's unclear exactly how you impact your  
20 application. So, that would be quite time-consuming,  
21 and it's not really clear what the -- what's gained  
22 from that information.

23           CHAIR STETKAR: The -- I clearly  
24 understand the level of effort, regardless of your  
25 estimated amount of time. The product of -- your last

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1 bullet there, the risk increase from non-propagating  
2 fires will decrease, and the bias will skew the risk  
3 results and have an unknown impact on applications.

4 I guess that sort of supporting bullet I'm  
5 not quite sure what you're saying there. I mean, in  
6 -- let me say just my vision of the whole process is  
7 that you start out with something that's fairly simple  
8 and hopefully conservative.

9 As you refine the analysis process from,  
10 if you want to call it screening, scoping, and  
11 detailed analysis, you become more realistic hopefully  
12 reduced uncertainty, and remove some of the most  
13 important conservatisms in that process such that your  
14 detailed analysis should be as realistic as reasonably  
15 achievable using the tools and the data and all of  
16 that sort of stuff.

17 The scoping, the results of the scoping  
18 analysis should be somewhere in between. They should  
19 still have some amount of conservatism inherent in  
20 them, and the whole reason you do it is to simplify  
21 the process so you don't have to do the detailed  
22 analysis. So I'd like to understand, since you  
23 brought it up, the product of the comparison in terms  
24 of what it might mean.

25 MS. ANDERSON: Well, if you're --

1 basically, you're looking at back-tracking to --  
2 you're going to be weighting some of your fires  
3 differently, from what I understand, and Kiang Zee  
4 just stood up --

5 CHAIR STETKAR: Okay.

6 MS. ANDERSON: -- and he is going to  
7 kindly explain exactly how this goes down the line.

8 MR. ZEE: Well, this is Kiang Zee. Maybe  
9 I can help, and I like trying to portraying some of  
10 these not so much in the words that we all struggle  
11 with but sort of in sort of visuals.

12 In yesterday's presentation from DC Cook,  
13 a picture was shown that showed a series of electrical  
14 panels along the wall, cable tray coming out of the  
15 top, and one of the words Rick said in this  
16 presentation was because the panel wasn't sealed, the  
17 fire will always propagate up the cable tray.

18 So, the way I like to characterize it from  
19 a big-picture standpoint, when we look at an  
20 electrical cabinet, we look at fires that stay inside  
21 the box and fires that get out of the box.

22 If you -- what Rick was saying is because  
23 of the rules of 6850 and the characteristic of that  
24 panel, every fire that occurs in that panel always  
25 gets out of the box. There is no fire within the

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1 distribution function for heat release rates for that  
2 cabinet type that stays entirely within the panel.

3 So, what we're saying here is because of  
4 that treatment, every fire, twelve minutes of growth  
5 rate. Every fire comes to some peak heat release rate  
6 per the distribution function, but every fire gets out  
7 of the box.

8 What this factor is trying to do is create  
9 a partition between fires because of their behavior  
10 and experience with respect to not every fire having  
11 12-minute growth rates, not every fire growing a  
12 certain way, not every fire having this genericized  
13 suppression characteristic.

14 The experience would exhibit sort of a  
15 natural behavior of these fires, and that was what was  
16 done when we reviewed all the industry events to try  
17 to find those fraction of fires that had this  
18 combination of behaviors that would just inherently  
19 tend to make the fire stay inside the box. That  
20 became sort of a slick fraction, if you will.

21 Now, if we take the factor out and we say  
22 every fire gets out of the box, what that will tend to  
23 do is it'll tend to have your risk analysis tell you  
24 if you have a critical target that's important to you  
25 that's outside the box, it doesn't matter where it is

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1 outside the box. It will always give you the same  
2 answer.

3 So, moving forward in applications, if,  
4 for example, I was making a modification and I was  
5 rerouting cables, if the analysis is already telling  
6 me that every fire gets out of the box, then I can put  
7 a new circuit or reroute something and put it anywhere  
8 I want near that box, and I get the same answer when  
9 inherently we know that's not true.

10 So, this idea of masking is something that  
11 people I think are generally beginning to start  
12 talking about, whether some of these things start to  
13 drive some of these fire behaviors to always be very,  
14 very aggressive, whether it might have this unintended  
15 consequence in the other applications where it may be  
16 masking something. I think Doug alluded to that a  
17 little bit in one of his earlier presentations to the  
18 Subcommittee.

19 CHAIR STETKAR: Thanks, Kiang. Let me --  
20 stand up there, because I'm sure you're going to need  
21 to respond to this.

22 If I start out -- we'll use the box and  
23 the cabinet analogy. If I start my analysis during my  
24 screening process and I use a 1.0 fraction as  
25 recommended in 6850 where all of the fires get out of

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1 the box, as you've kind of characterized it, my sense  
2 is the scoping process might apply a factor of like  
3 .5, maybe .3, maybe .1. I don't care, some number.

4 So let's say 50 percent of the fires get  
5 out of the box. That's an improvement. It's not much  
6 of an improvement, but it's an improvement.

7 If I were to do a detailed analysis, if I  
8 were to build myself a little FDS model for that  
9 cabinet and look at all of the ignition sources and  
10 any location in the cabinet and develop heat-release  
11 rates and spend, you know, the greater fraction of the  
12 gross domestic product of the United States doing  
13 that, I might determine that, you know, 1/100th of one  
14 percent of the fires get out of the box. I might. I  
15 don't know.

16 What I'm trying to understand from the  
17 third bullet is my understanding of this sensitivity  
18 analysis was a request to say, okay, if you applied  
19 that -- it's called a .5 factor -- for your scoping,  
20 do a sensitivity analysis to show what? How much that  
21 difference is from the 1.0 factor or from the detailed  
22 analysis that would give me the 1/10th or whatever I  
23 said, 100th of one percent?

24 That's what I'm trying to understand, you  
25 know, this notion of risk increases from non-

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1 propagating fires will decrease and biasing the  
2 numerical results. I'm not arguing with level of  
3 effort.

4 MR. ZEE: Right.

5 CHAIR STETKAR: I'm trying to understand  
6 what all of this means in terms of understanding the  
7 risk from the fires compared to doing -- you know,  
8 from a scoping analysis compared to the detailed  
9 analysis, unless I'm misunderstanding this request for  
10 the sensitivity study.

11 MR. DINSMORE: Mr. Stetkar, if I could for  
12 a second, this is Steve Dinsmore again. I think,  
13 actually, what Kiang has discussed is a good example  
14 of the complexity of these different decisions.

15 So there's a whole series of decisions  
16 there, and what we were requesting was we would like  
17 to know what the answers, all the answers would have  
18 been if you'd have used 6850, as opposed to whichever  
19 method he was proposing or which set of parameters he  
20 was proposing.

21 We wanted to do that, because we hadn't  
22 reached resolution on whether we would agree with this  
23 new set of parameters or not. We wanted to keep  
24 going. We needed the licensees to be able to submit.

25 Many of the licensees had used these other

1 methods, and we realized it would take a long time to  
2 go back and fix them, so we said, "Well, go ahead and  
3 submit. Give us a sensitivity study so we have  
4 something to work with moving forward."

5 CHAIR STETKAR: Sensitivity study, though,  
6 in what sense, Steve, sensitivity compared to --

7 MR. DINSMORE: To what you would get if  
8 you used --

9 CHAIR STETKAR: Assuming --

10 MR. DINSMORE: -- 6850 methods or some of  
11 the facts in the --

12 CHAIR STETKAR: Well, wait a minute. 6850  
13 allows you to do a broad range of anything from -- it  
14 can't be any more conservative to this to doing very  
15 detailed, specific fire modeling, so don't hang it on  
16 6850, because --

17 MR. DINSMORE: I don't think 68 -- I don't  
18 think this is 6850.

19 CHAIR STETKAR: You mean 6850 process?

20 MR. DINSMORE: Okay, I'm starting to --  
21 because I'm not entirely sure what -- I thought 6850  
22 would not -- does not --

23 CHAIR STETKAR: It doesn't have a scoping  
24 step for this particular type of fire, if I recall  
25 correct.

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1 MR. DINSMORE: We'll talk to Gallucci and  
2 ask his --

3 CHAIR STETKAR: But that's a process.  
4 That's not --

5 MR. DINSMORE: Right, but --

6 CHAIR STETKAR: That's some intermediate,  
7 not such detailed --

8 MR. GALLUCCI: Ray Gallucci, NRR. Had  
9 they done a phenomenological approach with detailed  
10 fire modeling to begin with, and there was an attempt  
11 to pursue an effort like that with the EPRI/SAIC heat  
12 release rate report, this entire cabinet factor method  
13 would not have even been necessary. There would have  
14 been no request for sensitivity if that had been the  
15 approach that was taken.

16 Because the approach was taken, there was  
17 this cabinet factor method with which the NRC  
18 dissented, and, by the way, the dissent was known to  
19 the industry as early as last October. The request is  
20 that either perform some sort of phenomenological  
21 modeling for your comparison, or, in lieu of that, you  
22 go back and you just do not take credit for the  
23 factor.

24 CHAIR STETKAR: Okay. Thanks, Ray. That  
25 at least, in my mind, anyway, helps to kind of

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1 understand where that issue is.

2 MR. ZEE: Well, let me sort of expand on  
3 this a little bit, because, John, I think you were  
4 headed exactly where I think it should go, but at one  
5 point where your mental framework for how the process  
6 should work, it went on the other side of the line in  
7 terms of being outside of what the industry  
8 understands as being what the staff expects.

9 CHAIR STETKAR: Okay.

10 MR. ZEE: So, for example, you are  
11 absolutely correct. The first step would have been do  
12 a 1.0. Every fire gets out of the box. You get an  
13 answer. You don't like it. Then do something  
14 straightforward with something simple.

15 Now, what's interesting is, as you were  
16 running through your tape, if in that one example we  
17 saw that we're looking at the panel on the wall, and  
18 with the rules within 6850 with the heat release rate  
19 distribution function in 6850, if I envision a table  
20 tray about two feet above that cabinet and I did 12-  
21 minute growth rate, I use the approved suppression,  
22 manual suppression rates. That factor I would get  
23 after I have exhausted all my fire modeling tools is,  
24 in fact, somewhere between .4 and .6

25 So, the next step which you describe is

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1 that if I went inside the panel, tried to find where  
2 the fire was inside the panel, moved things up and  
3 down within the panel, that the staff would interpret  
4 as a new method and would ask for a sensitivity study  
5 against the answer you got with the .5 or .6 factor.

6 6850 doesn't prescribe or describe how to  
7 go about doing that, and, in fact, if one were to  
8 attempt to do that, what would tend to happen is the  
9 lower you are in the panel, you would start to damage  
10 fewer circuits, but since fires would naturally  
11 vertically propagate up, at some point in time you  
12 would very rapidly get to the same set of impacts as  
13 you would have gotten for a fire that consumed  
14 everything within the cabinet.

15 So, in some early effort to try to do  
16 that, what we discovered was even if you were to try  
17 to spend the time to bring out where all the wires  
18 were, where they landed, all determination strips, it  
19 didn't really have a substantive change to what the  
20 answer was.

21 CHAIR STETKAR: Okay.

22 MR. ZEE: So, I guess what I'm trying to  
23 say is the net impact of exhausting all of your  
24 available fire modeling tools --

25 CHAIR STETKAR: Wouldn't make much

1 difference compared to that.

2 MR. ZEE: Wouldn't make much difference,  
3 so the issue is, and I heard this yesterday -- I think  
4 our issues aren't necessarily with the fire modeling  
5 tools or fire modeling technology. I think that's  
6 fine. There are empirical relationships. There's  
7 many people who spent a lot of time dealing with it.  
8 The issue is the source of the input parameter that  
9 you feed into that correlation.

10 CHAIR STETKAR: Okay. Thanks.

11 MEMBER BLEY: Mr. Chairman, I'm not sure  
12 that we can make any judgments about this sort of  
13 thing unless we see some real details on some of the  
14 exchanges. I mean --

15 CHAIR STETKAR: That's where I was kind of  
16 getting to is I think we've probably spent more than  
17 enough time on this. I think we spent -- I think it  
18 was productive, because we at least understand that  
19 issue that you highlighted, and I agree. It is an  
20 important issue, so I think you're right. We should  
21 move on.

22 MS. ANDERSON: All right.

23 CHAIR STETKAR: But thank you for bringing  
24 it. That was good.

25 MS. ANDERSON: All right. Glad to hear

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1 that that was helpful. So I'll run through the rest  
2 of this pretty quickly, because I think we've made our  
3 points.

4 The utilities are pursuing moving targets.  
5 The fire PRAs do remain conservative, which obscures  
6 some insights. There is some concern that if you use  
7 some specific methods that aren't currently in NUREG-  
8 6850 those could wind up causing problems with your  
9 SE.

10 That could eventually make it difficult or  
11 impossible to make improvements to your fire PRA in  
12 the future after that SE comes out, so there are some  
13 concerns about that, and updates could also be  
14 difficult.

15 Again, our big concern is the potential  
16 for hampering technology advancement. As we noted,  
17 there are some time line issues, and for utilities  
18 that need to submit NFPA 805 applications in the near  
19 future, pursuing technological advancement and new  
20 methods and approaches is not really attractive.

21 I don't like to whine and not offer  
22 suggestions for improvements, so how can we make this  
23 better? We have already been in discussions with the  
24 NRC staff to make this better and make sure we  
25 understand our language and terminology a little bit

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1 better, and we appreciate that.

2 I think that's going to do a lot for the  
3 applications that are due in 2013-2014, the  
4 applications coming in this year, but it's still going  
5 to be a little bit shaky, but in the future that'll be  
6 helpful.

7 MEMBER BLEY: This was always the intent,  
8 as I understood. Is that not true?

9 MS. ANDERSON: Was what always the intent?

10 MEMBER BLEY: That the methodology would  
11 evolve.

12 MS. ANDERSON: Yes, we need to pursue a  
13 living --

14 MR. WACHOWIAK: That's my presentation.

15 MS. ANDERSON: Yes, that's Rick's  
16 presentation. He has a good five minutes for it.

17 MEMBER BLEY: I'll be glad to wait for  
18 that.

19 MS. ANDERSON: But, yes, that was always  
20 the intent, but we're concerned that that's not going  
21 to happen because of some of the process issues.

22 We need to make better use of the  
23 consensus review process, and, again, we need to make  
24 sure we have a mutual understanding of how to approach  
25 new methods in the 805 LAR review process and the

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1 acceptance process.

2 I think we're getting there. We've had  
3 some good conversations with the NRC staff the past  
4 couple of months, but it's still going to take a  
5 little bit of time.

6 MEMBER SCHULTZ: Victoria, for  
7 clarification, what are you shooting at when you're  
8 talking about a better use of the peer review process?

9 MS. ANDERSON: The peer review process,  
10 you know, compares the fire PRA against the ASME and  
11 FPRA standard, but rather than relying on the  
12 information from those, there is still some reliance  
13 in the LAR development and review process on NUREG-  
14 6850, rather than the standard.

15 MEMBER SCHULTZ: Okay. Thank you.

16 MS. ANDERSON: So, that's some of our  
17 concern. I think the conclusions at this point are  
18 pretty evident. We need to make sure that we're  
19 continuing to develop and use realistic fire PRAs, and  
20 we need to make sure we have a process for NFPA 805  
21 that fosters that. We need to continue pursuing  
22 improved methods, and that's what Rick is going to  
23 talk about.

24 MR. WACHOWIAK: Okay. So, we all know  
25 this stuff here, so I'll go on. I think we've covered

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1 some of what I was planning on talking about already,  
2 so at places I'll try to move along.

3 I want to -- I want to touch on what it is  
4 our issue is with this thing, so a little bit of a  
5 background so we get some of our terminology and  
6 expectations correct. Then we'll talk about what the  
7 vision for 6850, EPRI 1011989 was from the beginning.  
8 Then I'll offer some thoughts about how we can move  
9 forward from here.

10 So, just to get everybody on the same  
11 page, the process that we use for developing PRA  
12 starts with you do a PRA, okay. Simple stuff, do a  
13 PRA.

14 Are the results reasonable? And I'm not  
15 talking about here do we have the right number. What  
16 I mean is are the results telling us the things that  
17 are real that we would get from our model, the  
18 insights that make sense in that if we change  
19 something in the plant, it would change the PRA model  
20 predictably, that sort of thing. If we don't get  
21 reasonable results, we go back and iterate back  
22 through in that loop.

23 Then we also go and we do risk-informed  
24 applications, and when we do the applications, we find  
25 out more things about our model, about our plant,

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1 things like that. Once again, we could find an area  
2 where the results aren't reasonable for that  
3 application.

4 We would have to feed back through, and  
5 then finally we'd come out and use this. This happens  
6 in all the different pieces of the PRA and like that,  
7 so it's not really a simple, as simple as I put on  
8 this slide.

9 In the background of all that there is  
10 continuous research into new ways of doing things,  
11 better ways of doing things, more data collection,  
12 that sort of thing. As you go through this process,  
13 you tend to fold those sorts of things in.

14 So, as kind of an example that's been  
15 thrown around in terms of things that you learn while  
16 you're doing these things into the fire PRA world,  
17 let's say we have a room, a fairly large room kind of  
18 like this one.

19 In one corner of the room back in the back  
20 there is a risk-important set of cable trays, and it's  
21 way off on the side by itself, and we find that in  
22 doing the analysis that that scenario where that tray  
23 is burned is important. So we want to do something  
24 about that. What can we do in the plant to make sure  
25 that that tray is protected?

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1           With the method that we have in front of  
2           us here that we've all used and in many cases trust in  
3           this, we can model what we would do to address that  
4           cable tray. So one example you would think of, let's  
5           put up a fire barrier around that cable tray so it's by  
6           itself and nothing can -- it's protected.

7           Just going through the method, we would  
8           find that the risk would tend to go up if you build a  
9           fire barrier around that because of the way you count  
10          the fire areas. Now, there are some ways to mitigate  
11          that and stuff like that, but in general if you do  
12          that, because it's being taken out of the big fire  
13          area and being put into its own, the counting rules  
14          get you to a risk increase in that particular space.

15          However, if you were to put a piece of  
16          tape around the area where the cable tray is and just  
17          say, "Don't put combustibles there," the method would  
18          tend to decrease the risk a little bit.

19          So that kind of a result that you would --  
20          you would find only by doing a real fire PRA at a real  
21          plant and trying to address a risk-significant issue.  
22          It's the only place where you would find anomalies  
23          that come out in the method.

24          So, we need to take that information that  
25          we find those kinds of things and feed it back.

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1 Something is not working correctly there. Maybe it's  
2 the way things are averaged out in the counting.

3 Maybe it's the way the weighting factors  
4 are done, but there is something that's going on there  
5 that isn't a reasonable result, okay, so thus the need  
6 for having this feedback loop, not only at the base  
7 PRA section but at the application section, because  
8 when you use it, you find things like this. So,  
9 that's the background I want to have on this.

10 Now, the concerns we have that we've seen  
11 in some of these instances with the application of 805  
12 along with the building of the fire PRAs is that that  
13 traditional process doesn't seem to be either being  
14 used or allowed or something. Something is happening  
15 here where you get the idea that all of the  
16 instructions are in 6850 and the associated documents  
17 that go along with that and that that's all you need  
18 to know to do this.

19 We have to have the insights that we gain  
20 by building the fire PRAs and by doing this  
21 application fed back into the process, and we really  
22 can't use it, if you will, as a cookbook. We'll miss  
23 some things.

24 One of the things that it seems like we're  
25 getting toward in this particular application is the

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1 fire PRA is being treated similar to the way the DBA  
2 LOCA analysis is. We come up with a method that's  
3 reliably conservative. It gives us a high result  
4 every time.

5 We know that it's the bounding result, and  
6 then we apply that to everything without going the  
7 traditional PRA method where we strive to feed back  
8 our experience and build realism into the models. It  
9 looks like this is some of the concern that the  
10 industry has that we're going toward this.

11 We don't want to do that. I think we want  
12 to -- we want to get back into the mind set that we  
13 are going to continuously improve the models, we are  
14 going to continuously improve the way that we use fire  
15 PRA in our application.

16 So, getting to 6850, EPRI 1011989, there  
17 have been things thrown out saying that the industry  
18 is trying to -- is trashing 6850 right after it came  
19 out and saying we don't want to use it. Maybe the way  
20 it's been portrayed sounds that way, but I just want  
21 to say that, at least at EPRI, we fully stand behind  
22 what's the document that came out as 6850, EPRI  
23 1011989.

24 That was developed between EPRI and  
25 Research, did it in 2003, published in 2005, so it's,

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1 you know, it's graying a little bit, but it was the  
2 best practices of things that were available at the  
3 time.

4 Not a lot of new development was done  
5 during that process. There was some, but not a lot,  
6 and it was arranged in a way that you could easily  
7 understand how you would go through the process of  
8 doing a fire PRA, and that process, that framework  
9 that's in 6850 is robust.

10 Maybe there's some tweaks, you know, some  
11 places where we didn't add a scoping step. We could  
12 add a scoping step now, but overall what's arranged in  
13 that particular document, that framework, is good, and  
14 it probably is going to be good for quite some time.  
15 We want to use it, and we want to use it properly.

16 Okay, so don't -- we're not trashing this.  
17 What we find, though, is that the document put  
18 together a set of methods, tools, and data that fit  
19 into the framework of doing a fore PRA, and that was  
20 done based on the best available information at the  
21 time.

22 We are continuing to get more information,  
23 and we're continuing to do the fire PRAs and finding  
24 quirks like the one I mentioned there, and there are  
25 other ones that are being found that we need to just

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1 figure out how to address those things.

2 So, in my mind, if the issue is does it  
3 need to be -- is 6850 going to be the place where  
4 we're going to go for our look at how you do fire PRA  
5 for the framework and maybe for the toolbox that does  
6 it? We need to make sure that the document actually  
7 can be used for that purpose and is being used for  
8 that purpose.

9 One of the other things that I'm going to  
10 go through here a minute, maybe some of you recognize  
11 this, but this document was intended to be a living  
12 document. It wasn't intended to be static and say,  
13 "This is how you do it," and 100 years from now this  
14 is what we'd be doing.

15 I have a couple -- I pulled quotes from  
16 the thing there, and we can go through these quickly,  
17 but the intent is to say that additional developments  
18 were anticipated when it was written, and they should  
19 be able to be folded into the framework. That's what  
20 we believe.

21 The authors of the document also recognize  
22 that as you do fire PRAs you're going to find out  
23 things that they didn't know and that the document  
24 would need to be updated to address the things that  
25 are found by doing fire PRAs.

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1           So, just the 6850 project itself was  
2 supposed to be done in four phases, and this is  
3 documented in the report itself. The third phase,  
4 which was supposed to be full-scale pilots of the  
5 methodology to get those insights that they were  
6 talking about and fold it back in, that wasn't done in  
7 the time frame there.

8           So, because of that, we still -- we have  
9 to do it now, and we're doing it now in the, you know,  
10 with the shadow of these NFPA-805 LARs around us, as  
11 well. It would have been much nicer to have done the  
12 pilots outside of a parallel regulatory process, but  
13 we are where we are, and we have to deal with this.

14           Once again, in the document they say --  
15 they talk about the pilot not being done, and one of  
16 their conclusions is that the authors of the document  
17 weren't able to predict the impact of the overall  
18 risk, because they just didn't know, so it was the  
19 best available information at the time.

20           It was put together in a framework that  
21 looked -- that is robust and will work, but there are  
22 nuances and quirks and things that couldn't have been  
23 predicted at the time of the document, and the authors  
24 recognized that that was going to happen.

25           So, I think I said all this when I had the

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1 quote up there, but one of the keys that they -- I  
2 didn't say all of it. The second bullet I didn't get  
3 to.

4 One of the keys, though, they recognized,  
5 and we all recognize this, is that if you're going to  
6 do something that is methods, tools, and data that's  
7 somewhat different from what's in the document right  
8 now, the reason that the framework was put together is  
9 so that all the pieces would be self-consistent,  
10 right.

11 So, if you're going to do something  
12 different from what's in there, you have to make sure  
13 that it's also going to be self-consistent with all  
14 the rest of things, or you have to change the  
15 associated tasks along with it.

16 So, the document itself, you know, it's  
17 kind of like the Constitution. The document itself  
18 gives you a way to update the document, so it's part  
19 of why I consider that the framework is robust,  
20 because it recognizes that it would need to be  
21 updated, and here's the kinds of concerns you'd have  
22 to deal with when you're updating. This is the quote  
23 that goes along with that piece.

24 So what we've been trying to do over the  
25 last two or so years is advance the state of the art

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1 associated with how you do fire PRAs. I think --  
2 well, we've tried different things.

3 There's the fact process that we talked  
4 about that some don't like and others do like, and,  
5 you know, it's all over the -- the utilities, the  
6 vendors develop position papers, and they've done  
7 their own things, and that sort of thing has happened.

8 EPRI has written some reports and put out  
9 guidance for how to do things. We've had the expert  
10 panels, which is the review panel sort of thing.

11 We've had other expert panels to address  
12 these sorts of things, and then also the research arm  
13 of the NRC has been doing more experiments on cable  
14 trays, and they've been writing NUREGs associated with  
15 this sort, these sorts of things.

16 We've had varying degrees of success and  
17 acceptability with all of these, and some of the, from  
18 my perspective, some of it is because we were -- we  
19 did some of these because we were trying to do things  
20 quickly to meet the schedules for these LAR  
21 submittals.

22 Some of the things we did because we were  
23 trying to address specific things for specific  
24 utilities and their configuration. Then when we tried  
25 to make it generic to cover everyone, the assumptions

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1 and things will break down a little bit, and it makes  
2 it more difficult. Once again, the time pressure on  
3 this to get these things done quickly has been maybe  
4 some of our undoing on these, maybe.

5 We still need to do this. We need to  
6 figure out a way to be able to advance the state of  
7 the art, make it acceptable, make sure that we all  
8 have the same understanding of what it is we're trying  
9 to do going forward, and have a reliable, predictable  
10 way of doing this.

11 So, in thinking about how we would do  
12 this, we have to recognize that there are two  
13 different needs, and I mentioned this a few times now  
14 this morning is that there are things that address a  
15 specific issue in a specific configuration at a plant  
16 and then there are things that are generic that we  
17 want to update the method, tools, data to incorporate  
18 new information, new knowledge that we have either  
19 gained by doing experiments or by doing fire PRAs.

20 So, I've been working with the guys in  
21 Research in the fire area with Mark Salley, and what  
22 we think we need to do is fold the advancement work,  
23 the development work, maybe into a process that does  
24 the updates to 6850, EPRI 1011989 that were  
25 anticipated from the beginning and can bring the

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1 people together to look at the interdependencies  
2 between the tasks.

3 This is more for the generic sort of thing  
4 that we're looking at here, and we would still like  
5 the plants to address on their own and through the  
6 peer review process plant-specific issues that come up  
7 and get the quirks that are on there.

8 I don't know that the acceptance piece of  
9 this, the work being done under the MOU, is going to  
10 be much better than what we've done with the other  
11 methods over the last couple of years, but I think  
12 it's worth attempting, and it's probably the most  
13 reliable way to bring it all together and keep a  
14 coherent implementation of the framework that we have.

15 So, I think I just talked about the  
16 parallel paths. We have to do all that, and we still  
17 need the information coming from the individual PRAS  
18 to inform what it is we want to do on a generic basis  
19 for this.

20 One of the things that I think is a high  
21 priority are the electrical cabinet scenarios, and we  
22 talked about them. It's come up over and over. Every  
23 time we talk about this, it comes up.

24 What we need to do is we need to  
25 understand where the issues are with the electrical

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1 cabinet fires. We've, you know, kind of gone off and  
2 looked at what we've seen in the past and try to  
3 adjust the methods to address what we've seen in the  
4 past in electrical cabinet fires, and I think we need  
5 to take a real hard look, hard dive into this and see  
6 what's going on.

7 So now that the database project we've  
8 talked about previously here is coming to a  
9 conclusion, we can pull some of the information from  
10 the fires that we've seen out of that and try to make  
11 some characterizations.

12 So, in the 1990 to 2000 data, which is the  
13 current window, we've looked at -- we've looked for  
14 electrical cabinet fires, things that would be called  
15 electrical cabinet fires, and counted in the frequency  
16 for electrical cabinet fires that you would put into  
17 scenarios in a fire PRA.

18 There's 150 or so. That's an order of  
19 magnitude thing. It's probably a little bit more than  
20 that, but it's not quite 200.

21 We looked and said, "Okay, so tell me how  
22 many of these 150 fires" -- which is a pretty good  
23 sampling, right? "How many of these fires have caused  
24 damage to cable trays?"

25 We look in the database. The answer is

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1 none. Nothing is marked as a cable tray damage, so we  
2 said, "Okay. Well, maybe all the cables aren't listed  
3 as cable trays. Let's look for damage to cables as  
4 the target in the database."

5 What we find is that there were no -- this  
6 is thermal fires, not high-energy arc faults.

7 CHAIR STETKAR: Okay.

8 MR. WACHOWIAK: Make sure that we're all  
9 with the same terminology here. The thermal fire is  
10 in electrical cabinets.

11 CHAIR STETKAR: Thank you.

12 MR. WACHOWIAK: That's the ones that are  
13 causing problems in the fire PRAs. It's not the high-  
14 energy arc fault, necessarily, across the board.

15 We looked for cable failures, and we  
16 didn't really see anything where the cables failed.  
17 We saw a handful where the cables had been damaged,  
18 you know, jacket damage, insulation charring, that  
19 sort of thing.

20 The percentage is small. It's five, six,  
21 three, somewhere around there, depending on how you do  
22 the math and what kind of priority you use and that  
23 kind of thing. Anyway, so it's small, less than ten  
24 percent.

25 CHAIR STETKAR: Rick, we are running a

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1 little tight on time here.

2 MR. WACHOWIAK: I'm almost done.

3 CHAIR STETKAR: I know. One quick  
4 question, though, and we may decide to have another  
5 briefing on this data if you're -- depending on where  
6 you are.

7 Have you started to separate out  
8 electrical cabinets from the one-size-fits-all into  
9 different categories of electrical cabinets ranging  
10 from small, wall-mounted cabinets to 6 kV, 13.8 kV  
11 switch gear?

12 MR. WACHOWIAK: That piece has not been  
13 done yet. However, however, the way the database is  
14 structured doesn't require us to use the same binning  
15 that we used previously

16 CHAIR STETKAR: In 6850.

17 MR. WACHOWIAK: So, that can be done. I  
18 don't know if it'll be done in the first phase.

19 CHAIR STETKAR: Well, the reason I ask is  
20 some of the conclusions that you're drawing regarding  
21 consequential damage to cables, that conditional  
22 probability of consequential damage to cable may vary  
23 significantly, depending on the category of that  
24 cabinet.

25 MR. WACHOWIAK: I agree.

1 CHAIR STETKAR: We'll just leave it there  
2 if you haven't --

3 MR. WACHOWIAK: For right now, I didn't do  
4 that. I just looked at, you know, things that would  
5 be considered electrical cabinets.

6 So, I had -- I went through an exercise,  
7 then, of looking at the parametric uncertainty, the  
8 full distribution of the heat release rate curve  
9 that's in 6850 and others. There's a few of them, but  
10 for this particular exercise I used the one that we  
11 had in the *Fire Modeling Applications Guide*, so it's  
12 the one you're familiar with.

13 In the guide, they looked at the  
14 probability of a flame reaching the cable tray four  
15 feet above the target, and they come up with a  
16 probability. But that's not really what we're  
17 interested here.

18 That's the -- the flame reaching there is  
19 the probability that you're going to ignite that  
20 cable. What we really want to look at is the plume  
21 temperature, the probability that the cable is going  
22 to experience a temperature that gets to the place  
23 where you could damage the cable.

24 The four feet is probably a good model or  
25 a good estimate for this sort of thing, because most

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1 cabinets have some sort of cable within, you know, one  
2 to four feet away from the top of the cabinet, so  
3 that's pretty representative on the upper bound, I  
4 guess, of where things would be.

5 So, when I went and did that exercise and  
6 propagated the full parametric distribution that's in  
7 -- that's listed in 6850 for that, we find that 96  
8 percent of the cabinet fires should result in a plume  
9 temperature at four feet that would damage the cable.

10 So, 96 percent is quite different than a  
11 couple of percent that we see in the data. So what  
12 did I leave out? So far I left out suppression,  
13 because the data includes suppression.

14 You can use the same method that's in  
15 there to extend that to including the fire suppression  
16 curve into the same uncertainty distribution, and we  
17 find, just as Kiang was saying earlier, that it's 40  
18 to 60 percent of the time that you have an electrical  
19 cabinet fire you would expect the cables to be  
20 damaged. We clearly don't see that in the data.

21 There is a difference of an order of magnitude there.

22 So, what's wrong? I don't know. Is the  
23 heat release rate wrong? I don't know. Is the fire  
24 growth model wrong? It could be. I don't know. Is  
25 the fire suppression model wrong? I don't know. It

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1 could be.

2           These are the things that need to be  
3 investigated, and we need to figure out how we can  
4 move forward on these and find the places where the  
5 models clearly don't match up with what we observed in  
6 the field and figure out how to change those.

7           I think there's a utility for things like  
8 scoping methods. We know about where the thing is  
9 going to be, and we can put a scoping method in  
10 between the screening and the details, and we can get  
11 a pretty good result based on, you know, actuarial  
12 type of data, but then we still need to go in, and we  
13 need to understand what's going on here.

14           Is it the fire growth, heat-release rate?  
15 We can pull some of that information out of the  
16 database. We may have to work with Research on that  
17 to do some more experiments in that area, but we need  
18 to do that.

19           MEMBER REMPE: But a couple of slides back  
20 you said you need to have a schedule to figure all  
21 this out, yet you're listing all these uncertainties.  
22 Do you have any idea what kind of schedule it would  
23 take to resolve these issues?

24           MR. WACHOWIAK: Welcome to research.

25           MEMBER REMPE: I know.

1 MR. WACHOWIAK: Some of the things I think  
2 can be done. By a schedule I really mean that we can  
3 lay out in which years we're going to solve some of  
4 these problems and then try to identify what we can do  
5 in the interim to do that.

6 I think for the electrical cabinets we  
7 need to be working on it now, and I think the first  
8 part is looking through the data at those particular  
9 fires and trying to find out what the fire growth is.  
10 Is there enough information there to tell other pieces  
11 of it? We need to be working on that part now and  
12 have something in the relatively near future for it.

13 MEMBER REMPE: Well years to --

14 MR. WACHOWIAK: So detailed schedule.

15 MEMBER REMPE: A couple of years to make  
16 some progress and then --

17 MR. WACHOWIAK: I think a couple of years  
18 to solve it.

19 MEMBER REMPE: Okay.

20 MR. WACHOWIAK: But we need something now,  
21 so we can't just say we're going to wait a couple  
22 years and have this thing solved. We need to come up  
23 with some reasonably thoughtful ways in the interim of  
24 saying, "Well, we think we know where it's going to  
25 go, and based on this evidence we can put an

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1 intermediate method in place."

2           There's a couple of things that are out  
3 there that have, once again, varying degrees of  
4 acceptance, and in this particular area it's probably  
5 closer to no degree of acceptance at this point, but  
6 we need to -- we need to work on those things and find  
7 out where our areas of uncertainties are, what the  
8 disagreements are on the different methods, and try to  
9 put something in place. So it's not a good answer to  
10 your schedule question, but it's probably the best I  
11 can do at this point.

12           So, my last point here was just to say,  
13 you know, we think that the framework is viable from  
14 6850, and we can work within it. There is a lot of  
15 work that needs to be done in the individual methods,  
16 sub-methods, tools, data, and they should be improved.  
17 They can be improved. They should be improved.

18           I think that the insights we find from  
19 doing the fire PRAs need to be folded back in. One is  
20 the high-risk significance of electrical cabinets in  
21 the fire PRAs where the data from the field don't  
22 quite support what we see in the fire -- predict in  
23 the fire PRAs.

24           That's an insight that somehow needs to be  
25 resolved. Then there's other insights, onesie-twosie

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1 things that have come in from doing now, what, 50 fire  
2 PRAs or so that are out there.

3 We've got to continue to handle the plant-  
4 specific things on a case-by-case basis, and we can't  
5 just shut that off. There's got to be an avenue for  
6 a plant to say, "I've got a situation that's different  
7 than what the people who wrote 6850 were thinking of,  
8 and I have to treat it differently, because it doesn't  
9 quite fit what was laid out there.

10 So, in the discussions with Research, I  
11 think what we want to do here is we want to start with  
12 a systematic update of 6850. Now, we think that if we  
13 were to say, "Okay, we're going to do Rev 1, and we're  
14 going to start doing it now," this whole multi-volume  
15 document, we'd never get to the end of it.

16 It would be years and years before we  
17 could do a full update like that, so what we're  
18 thinking of is looking at a more modular approach  
19 where we can address --

20 So we're presuming that the framework is  
21 good, and we're going to attack the methods, sub-  
22 methods, tools, and data, update them with information  
23 we have, possibly provide a toolkit where maybe a one-  
24 size-fits-all isn't in every place but allows for  
25 things that plants could use if they find some sort of

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1 a quirk in their area, something like that.

2 So we think that's the right way to go,  
3 and it's a manageable way of updating this and yet  
4 keeping everything collected in one place, which is  
5 strange for PRA, because normally you have to go and  
6 do literature searches and get 200,000 documents to  
7 figure out what you're going to do but maybe try to  
8 focus it down into some place where it's more easily  
9 referenceable.

10 That was -- that was what I had.

11 CHAIR STETKAR: Good. That was quite a  
12 bit. Any members have any more questions for Victoria  
13 or Rick?

14 MEMBER RAY: Well, I've got a comment for  
15 you, John. Maybe you've done this, too, because  
16 you're much more expert here, but you made the comment  
17 that models don't match up with what we've observed in  
18 the field.

19 In areas that I do know something about,  
20 that's not a good -- that's not a good measure of  
21 whether or not you're accurately representing  
22 something in a probabilistic model, just because our  
23 experience is so limited. So, that was the only query  
24 I had.

25 MEMBER BLEY: I've got a few things, John,

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1 and I may as well say them now instead of at the end,  
2 because they fit here.

3 CHAIR STETKAR: Yes.

4 MEMBER BLEY: The first part of this is  
5 going to agree with some of what Rick had to day.  
6 Fire PRA is not as immature as many people seem to be  
7 claiming. We've got 30 years of experience doing  
8 these. Rick said we've had over 50 of them. If you  
9 go a little more broadly outside, there are even more.

10 We tried to formalize what's been done  
11 with some improvements in 6850, which, from all the  
12 briefings we've had and from my reading of it, seemed  
13 to be a reasonable consensus at that time. I don't  
14 think it's surprising that when you try to formalize  
15 something that big, it doesn't quite work right. You  
16 find glitches in the process.

17 Some of the comments I heard yesterday and  
18 some actually not at the table about where some of the  
19 disagreements are, even in distributions, say, that  
20 are in 6850, kind of hang on the mean values maybe not  
21 being right and wrote disagreements on that.

22 It seems to me -- I hadn't thought about  
23 this before -- we could learn something from seismic  
24 PRA experience where we had to do some of these things  
25 kind of early on where we formalized this idea of Beta

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1 U and Beta R, the randomness and the state of  
2 knowledge and uncertainty, and dealt with the fact  
3 that we use an almost artificial single parameter for  
4 the earthquake to represent a whole range of  
5 earthquakes that have that parameter and then talk  
6 about the uncertainty of damage that occurs and  
7 uncertainty in the excitation over all the earthquakes  
8 that could have that same parameter.

9 Maybe something of that kind of all the  
10 fires that can have the characteristic we start with  
11 and try to formalize those two ideas might help us. To  
12 that end, we might formalize an elicitation process  
13 using something like SSHAC to develop probability  
14 distributions that represent the consensus of the  
15 technical community.

16 That went a long way on the seismic area  
17 to resolve really strong arguments that finally were  
18 worked out by coming up with this idea of getting the  
19 consensus of the technical community into that  
20 distribution and not forcing the argument on the mean  
21 but looking at the extremes and the general shape of  
22 it.

23 It's often argued that costs way too much.  
24 Well, what's going on now seems to be costing a heck  
25 of a lot, and maybe that's not an unreasonable thing

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1 to try.

2 I also want to say despite the time  
3 pressure on the current LARs, that shouldn't stop the  
4 refinements that's been talked about and that I think  
5 need to come, because it'll apply to a whole range of  
6 plants that haven't yet decided to make the shift into  
7 new plants in the future. This is something that  
8 ought to stand for a long time if you get it done  
9 right.

10 I just wonder. The Subcommittee may wish  
11 to review some of those documents that have been  
12 mentioned in the last few days that industry submitted  
13 and staff reviewed on specific fire issues that, as I  
14 understand it, staff rejected the industry positions,  
15 but we haven't looked at either the staff's review or  
16 those positions. I think that might be something we  
17 want to take a look at.

18 Sorry for the long ramble, but --

19 CHAIR STETKAR: No, that's good. Keep  
20 that last note for --

21 MEMBER BLEY: I definitely will.

22 CHAIR STETKAR: When we finish today, I  
23 want to see, you know, where we go moving forward in  
24 case we have desires for other Subcommittee meetings  
25 on, you know, specific topics. I didn't write fast

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1 enough.

2 Anything else? If not, thank you very  
3 much. I very much appreciate that, thought it was a  
4 good discussion. We're now about half an hour behind  
5 schedule, but I'm confident.

6 We will recess until 10:15.

7 (Whereupon, the above-entitled matter went  
8 off the record at 10:01 a.m. and resumed at 10:14  
9 a.m.)

10 CHAIR STETKAR: Let's reconvene. We are  
11 -- we do have a little bit of time pressure. We  
12 should try to end around 1:00 or not too much later,  
13 because folks -- I know folks do have flights that  
14 they need to run for, so we'll try to mutually keep  
15 that time constraint in mind.

16 With that, I guess we'll hear first from  
17 the -- I don't know what's on the schedule but -- PWR  
18 Owners Group. Some of you folks can talk. Ray or  
19 Dave?

20 MR. FINE: Yes, my name is Ray Fine. I'm  
21 with First Energy, and I'll be talking for the PWR  
22 Owners Group Risk Management Subcommittee.

23 Roy Linthicum couldn't make it. He's  
24 trapped in airline traffic. What we're going to talk  
25 about is the peer review process.

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1 CHAIR STETKAR: Do me favor a little bit.  
2 I don't know if you're coming through. Move the  
3 microphone off around the side of your computer there  
4 a little bit. It'll pick you up. Just be careful  
5 that you don't hit it, because it then explodes in our  
6 recorder's ears, and she'll --

7 MR. FINE: Is that better?

8 CHAIR STETKAR: That's a little better,  
9 yes. Thanks.

10 MR. FINE: Okay. So we're going to talk  
11 about the peer review process, and I've got moral  
12 support of Dave Finnicum, and then Bob Rishel and  
13 Dennis will be talking about the same topic for the  
14 Bs, so you may get quite a bit of repeat here. So  
15 we're going to go over the peer review process, the  
16 schedule for fire PRA peer reviews, lessons learned  
17 process, and lessons learned technical.

18 The fire PRA peer review process follows  
19 NEI 07-12 as the written process for the peer review.  
20 It's a detailed review, week schedule, and it's a  
21 structured report format. Everything is cut-and-paste  
22 into this format. The key documents that we use are  
23 the ASME/ANS RA-Sa-2009, the Reg Guide 1-200, Revision  
24 2, with clarifications from the NRC, and consensus  
25 methods.

1           There's typically an eight-person review  
2 team. There's the lead, typically two fire modeling  
3 experts, two circuit analysis experts, and the  
4 remainder are all PRA experts and HRA, quantification,  
5 and general.

6           The fire PRA peer review process for  
7 unreviewed analysis methods. You heard some comments  
8 earlier about those methods being if the peer review  
9 team did not have sufficient expertise to review that  
10 method, then we would write findings on the method,  
11 and we would send it up to the expert panel.

12           As you heard, also, that panel is not  
13 working the way it was intended to work right now, and  
14 they're trying to fix it. That puts plants in a  
15 precarious position, because they have to get to their  
16 submittal dates.

17           The peer review is critical to doing that,  
18 so this is an area that we need to improve upon, and  
19 we will continue to have discussions with EPRI and the  
20 Owners Groups together, because it's a joint effort to  
21 fix this.

22           We rely on the review team to identify  
23 during the review those unreviewed methods, and in  
24 some cases we do have expertise that can review these  
25 methods, and we do not push it up to the Committee.

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1 It just depends on the team.

2 Then the last bullets here talk about how  
3 we treat it, and there is some inconsistency between  
4 the Bs and the Ps of how we treat these, and we need  
5 to become more consistent in how we treat these, but  
6 right now in the Ps what we'll do is we will write a  
7 finding and tie that finding to the SR and say the SR  
8 is not met for that particular step where that method  
9 is applied.

10 Then for all cascading SRs that are  
11 affected by that, we'll connect the finding to them,  
12 as well. That's pretty much correct, right? So  
13 that's the general methodology we're using.

14 We need to -- but, you know, like I said,  
15 the intent was that those wouldn't stay there as not-  
16 mets. It would go up to another group, who would do  
17 a focus review and address it, but right now where  
18 they're staying is not-mets, because we don't have  
19 that functionality.

20 CHAIR STETKAR: And that pinch point, as  
21 you mentioned, is that EPRI penal.

22 MR. FINE: Right. Here's the current  
23 schedule, and I think the point of this schedule is to  
24 show how many plants are not transitioning to 805 but  
25 are doing fire PRAs. You can see it's a pretty

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1 aggressive schedule. This is about as many as we can  
2 possibly handle in a given year, and when we throw all  
3 the Fukushima reviews and stuff that will be coming in  
4 the next year, it's going to get quite challenging.

5 CHAIR STETKAR: Ray, is there any -- these  
6 are folks who are -- there's a large list here who are  
7 not transitioning but have scheduled fire PRA reviews.  
8 Because of the time pressures that we've heard about  
9 regarding the transition from both of you folks, are  
10 there any priorities?

11 If I come in and say, "I'm transitioning,  
12 and I need a peer review, you know, next week," do you  
13 bump somebody who's not, or is it just simply these  
14 folks are in your schedule?

15 MR. FINNICUM: Well, I want to make a  
16 slight addition to this slide is that most of the  
17 reviews done up to this time were for people who are  
18 transitioning.

19 CHAIR STETKAR: Okay.

20 MR. FINNICUM: So a lot of them are done.

21 CHAIR STETKAR: Okay. Okay.

22 MR. FINNICUM: If somebody comes in and  
23 says, "I need a review," we try not to bump somebody,  
24 but we also have several different team leaders that  
25 we can bring in, and then it's a scramble to get all

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1 the other expertise, and we can cap out across the  
2 entire industry.

3 CHAIR STETKAR: The reason I ask is we had  
4 an example yesterday of somebody who had had a review  
5 done pretty early, I guess, in their PRA development  
6 process and had a large number of F&Os.

7 I don't know if there's any folks who  
8 might be rethinking the fact that they'd had a review  
9 done early, and now, as they get very close to the  
10 submittal date, wanted to have a follow-up review, or  
11 in many cases it might be more comprehensive than a  
12 follow-up review, because they actually have now fully  
13 developed analysis.

14 Those might come in even though an early  
15 review has been done. I don't know if you've had any  
16 of those or not.

17 MR. FINNICUM: I think I had one, maybe  
18 two follow-up reviews. People wanted to come in. I  
19 suspect there are others who might want to have a  
20 follow-up, but they just haven't talked to me yet.

21 CHAIR STETKAR: Yes, that's the reason I  
22 was asking about possibly bumping somebody.

23 MR. RISHEL: Also, the BWR Owners Group,  
24 we can -- we have some experience in that. We can  
25 talk about that when we talk.

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1 CHAIR STETKAR: Okay. Thanks.

2 MR. FINE: Okay. So, lessons learned, the  
3 process, we have discovered that the level of effort  
4 and cost to complete a fire PRA is significantly  
5 higher than originally believed. I think the original  
6 projections were \$4 million to \$5 million, and the  
7 average plant is somewhere in the \$20 million range,  
8 so it's not a little bit of a change.

9 This also gets cascaded into schedule  
10 issues and follow-on reviews and so forth. Since  
11 there is schedule pressure, you have to do more work  
12 in less time, more money.

13 The other thing is with the schedule  
14 pressure you're not likely to leave and do anything  
15 unique, special, or innovative. You're going to stick  
16 with the known path, because you don't have time for  
17 anything else.

18 That's why I think you saw quite a few  
19 plants sticking to 6850. It's not because they want  
20 to stick to 6850. It's because they must, you know,  
21 management direction or what have you, okay.

22 CHAIR STETKAR: I was going to -- that  
23 latter part is important.

24 MR. FINE: So the review requested before  
25 the fire PRA is done is addressing the question you

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1 had before, and, you know, the fire PRA peer review or  
2 all peer reviews, we're not focused on the number.  
3 We're focused on the process, okay. We're focused on  
4 the methodologies and are they going about it the  
5 correct way.

6 So, the site gets to decide when they want  
7 to have their peer review. Now, if they physically  
8 have not quantified and have not done certain  
9 sensitivity studies and so forth, you know, they have  
10 to meet the requirements of the standard, and if they  
11 don't, they get the not-mets, okay.

12 But it is highly possible to have someone  
13 come in for a peer review that has numbers greater  
14 than  $10^{-4}$  for their contribution of fire. I know in  
15 my plants, you know, at least one in particular,  
16 that's definitely going to be the case.

17 You know, if a change of methodology to  
18 get an acceptable answer is required, then they're  
19 going to have to get the follow-on peer review, okay,  
20 and I think what we're going to see here in the next  
21 several years is quite a few follow-on peer reviews to  
22 refine the methods.

23 That's a burden that we really aren't  
24 ready for, either, so, because, you know, everything  
25 is moving forward. Everybody wants to get to 4(b),

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1 5(b), and 50.69, so in order to get to those  
2 applications, we've got to have seismic. We've got to  
3 have fire. We've got to have flood.

4 Everybody is moving, and so in that  
5 maelstrom, you know, the Owners Groups, which are the  
6 very same guys that are building these models, have to  
7 go review these models, and there's only just so many  
8 bodies, so that ends up being the point of issue.

9 Everybody's targeting is CDF of 5E-5. If  
10 you get there, we're done, and the only reason they're  
11 doing that is because that is what has been found to  
12 be acceptable to the LIC-109 reviews and so forth.  
13 So, it's an arbitrary threshold that everybody is  
14 drawing on themselves to get to.

15 CHAIR STETKAR: Good enough is good  
16 enough.

17 MR. FINE: Right, and no one wants to pay  
18 the additional money to get lower, because it's just  
19 no time, no money, no whatever, no people.

20 Plant partitioning requires complete  
21 coverage of all areas within the global plant  
22 boundary. In a number of cases where plants excluded  
23 obvious areas without providing basis or examples of  
24 man holes, can contain cables and transient ignition  
25 sources, there have been fires in man holes.

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1           You know, we're finding things like that  
2 missing in the models, and guys have to go fix them,  
3 so the -- it's not that common, but every once in a  
4 while you find them.

5           So those are the areas that people pick up  
6 in the peer reviews more often than a major  
7 methodology issue. It's, you know, did you look at  
8 everything you were supposed to look at.

9           Ignition frequencies requires review for  
10 outliers is another thing, the sensitivity studies we  
11 were talking about, and we should compare number of  
12 events to plants to the expected value, but as Mr. Ray  
13 mentioned, you know, what is the expected value? We  
14 have a limited knowledge.

15           We're going to have the same issue when we  
16 get to external flooding. You know, if I have to look  
17 back 10,000 years, one of my plants was covered with  
18 a few hundred feet of ice at that time, so I could  
19 only go back so far, you know.

20           If use of NUREG-6850, Supplement 1,  
21 frequencies, we need to perform sensitivity analysis  
22 stipulated in the supplement. That goes back to the  
23 issue you've been hearing earlier where if I want to  
24 use new EPRI data, I still have to go back to other  
25 data and do a sensitivity to the other data.

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1           In some cases, it's easy to do those  
2 sensitivity studies, and in some cases it really  
3 isn't. You know, we learn as we go, and so the first  
4 guys out of the gate -- like Bob here was one of the  
5 first out of the gate. You know, he learned a lot,  
6 and we all learned from that, but there is a lot more  
7 yet to go.

8           So, you know, I'm right behind him, and  
9 there's other guys behind me. It's an evolution, but  
10 we know that the answers we're getting don't make  
11 sense, so we have to go in.

12           The insights make sense. What we're seeing  
13 in the modeling and the insights makes absolute sense.  
14 Is it that significant? I don't know.

15           CHAIR STETKAR: Ray, we've heard it a lot,  
16 and I think Dennis mentioned it yesterday, that the  
17 results don't make sense. A couple slides earlier you  
18 had a five, E-5 number.

19           I challenge you that I don't understand  
20 what 5E-5 means, and I have evaluated the frequency of  
21 meteorite strikes. So, when things don't make sense  
22 in the context of really, really small numbers, I  
23 think you need to be a big careful about those broad-  
24 brush statements.

25           The insights are important. If the

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1 insights come out and, say, you look at your plant,  
2 and, indeed, yes, it kind of makes sense that I ought  
3 to do something about that group of cables over in the  
4 corner that I didn't really appreciate were there.

5 That's important, regardless of what the  
6 numbers are, but this notion of the fact that the  
7 numerical results, if that's the way you're  
8 characterizing it, don't make sense, I think you need  
9 to be a little careful in that area.

10 MR. FINE: Well, when I say it doesn't  
11 make sense, it may work just fine for the 805  
12 application.

13 CHAIR STETKAR: Yes.

14 MR. FINE: But it doesn't work in (a)4.  
15 It doesn't work in 50.69. It doesn't work in other  
16 risk-informed applications that require good, make-  
17 sense numbers, okay, and, you know, a good level of  
18 understanding of what it's telling you. If I've got  
19 my internal events model being completely swamped by  
20 fire, I'm not getting any of the insights from my  
21 internal events modeling.

22 MEMBER BLEY: I think you might have  
23 missed a little bit of what John was saying, though.  
24 John's saying from our experience, you know, numbers  
25 10-1, 10-2, borderline 10-3, we see an experience. We

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1 kind of have a feel for those.

2 MR. FINE: Right.

3 MEMBER BLEY: Once you get well beyond  
4 that, the feel we've got is probably coming from other  
5 analyses we've seen, which may or may not be in the  
6 real world. We don't have a good intuition about  
7 things at 10-5, 10-6.

8 CHAIR STETKAR: And the other point is  
9 that, you know, I mentioned these meteorite strikes.  
10 Suppose that you had made all of the, you know, spent  
11 all of the capital of the free world and made your  
12 plant so robust to defend against any conceivable  
13 internal event, fires, floods, such that your risk was  
14 completely dominated by meteorite impacts -- could  
15 happen -- at that point, that's the way the world is.

16 Now, you still may be able to use parts of  
17 that analysis if you want to evaluate deltas on, you  
18 know, a pump maintenance, for example, but the fact is  
19 that your overall risk is still dominated by something  
20 you don't have a lot of ability to address.

21 So, I think what I'm saying there, too, in  
22 terms of this notion of it isn't realistic, there's a  
23 context that you evaluate going forward potential  
24 applications, if you will.

25 If you're interested in fine-tuning

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1 maintenance frequencies or allowed outage times and  
2 tech specs or things, things that primarily affect,  
3 may be affected by fire to some extent but primarily  
4 affect normal operations, there may be sections of  
5 that risk model that you use that are more important.  
6 They aren't going to affect the meteorite damage.

7 So I think there, too, you know, broad  
8 generalizations about what makes sense sand why we  
9 can't use this stuff, you have to be a little bit  
10 careful, because they're application-specific.

11 MR. FINE: Right. We would -- I would  
12 absolutely use the insights from the fire model, but  
13 I may not use the numerical result of the fire model.

14 CHAIR STETKAR: Okay.

15 MR. FINE: That's where I was going with  
16 it doesn't make sense.

17 CHAIR STETKAR: Okay. Get back to your  
18 Owners. You do your review stuff here.

19 MR. FINE: The other technical issues  
20 lessons learned is the need for a mean CDF and error  
21 bounds, need for mean LERF, and assessment of  
22 contributors to uncertainty. A lot of the pre-  
23 conditioning of the fire scenarios as we run them have  
24 a tendency --

25 You know, we get these uncertainties, but

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1 some models, as you heard, they're so large that they  
2 can't quantify them to get all their uncertainties.  
3 VC Summer, I think, was that, you know, you have 1,500  
4 initiators and FRANX doesn't work, and you can't get  
5 the full model.

6 CHAIR STETKAR: Their tool doesn't work.  
7 It doesn't -- their tool couldn't quantify them if you  
8 had six.

9 MR. FINE: Well, no, it would quantify if  
10 you had six.

11 CHAIR STETKAR: It would?

12 MR. FINE: Yes. It would quantify up to,  
13 you know, 600, 700, just beyond that.

14 CHAIR STETKAR: Okay. I didn't -- I  
15 didn't appreciate that, so thanks.

16 MR. FINE: Yes, the -- yes, because we're  
17 using it, and we can get it right now, but I think in  
18 the future I'll be where he is. It also depends on  
19 the software you're using.

20 The guys who are using FRANX and CAFTA  
21 have different limitations than the guys who are using  
22 RISKMAN, for example. But we're finding, with my  
23 RISKMAN plant, we're even hitting the limits of that  
24 software.

25 So, you know, when we start adding, you

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1 know, 680 initiators to your model, you know, when  
2 originally you only had 50, that's a pretty  
3 significant increase in the model. So that's one of  
4 the technical issues we're dealing with is  
5 quantification, truncation, all that kind of stuff to  
6 meet the standard.

7 Lessons learned, additional, human  
8 reliability analysis. Dependency analysis needs to  
9 include all human actions in the model. It needs to  
10 evaluate feasibility for new fire-specific actions.

11 It needs to review alarm response  
12 procedures to determine if there are any adverse  
13 actions due to procedure compliance with one spurious  
14 indication, and all of human failure probabilities  
15 must address the impacts of fire, procedural guidance,  
16 accessibility, availability of cues, and increased  
17 stress levels.

18 HRA has gone through quite a bit in fire.  
19 We've improved it considerably, and we've had lots and  
20 lots of questions within the Owners Group of how do we  
21 improve N with EPRI. How do we improve HRA methods in  
22 fire? You know, when do you abandon? When do you do  
23 all these things?

24 All these questions come up. What are the  
25 stress levels? Different stations address fires

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1 differently as far as who is the fire lead and so  
2 forth, so, you know, how much stress is in the control  
3 room varies and so forth.

4 So, you know, we learn these lessons, and  
5 then people will change their processes because they  
6 found, "Oh, this other station did it differently, and  
7 they were able to succeed here," and so they change.

8 Then, circuit and cable selection.  
9 Breaker coordination needs to cover any circuits added  
10 to Appendix R list. That's just a statement.

11 I would say probably one of the biggest  
12 challenges in fire PRA for most stations is knowing  
13 where your cables are. We know where the cabinets  
14 are. We know generally where the conduit is and where  
15 the cables are in that room, but beyond that we don't  
16 know exactly what tray it's in.

17 So the few that you do, because of your  
18 Appendix R program you knew exactly where it was, you  
19 can address those, but when you don't, you have to  
20 lump them into the closest tray, and that leads to a  
21 lot of conservatism and uncertainty in your model.  
22 Even if we knew where 50 percent of those were, you'd  
23 still have a good bit of conservatism and uncertainty.

24 CHAIR STETKAR: Have you found much in  
25 your reviews -- you mentioned the sub-bullet there.

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1 It says breaker coordination. Have you found much  
2 difficulties in the breaker coordination studies, or  
3 is that swamped by the cable --

4 MR. FINNICUM: No, it's one of these  
5 things. It was a lessons learned. There were -- a  
6 number of the plants did a real good breaker  
7 coordination update where they covered everything, but  
8 there were a set of plants that forgot about it is  
9 basically what happened.

10 CHAIR STETKAR: Okay.

11 MR. FINE: So, in summary, the use of fire  
12 PRAs for NFP 805 before fire methods models were  
13 developed has led to significant rework and additional  
14 costs. The earlier plants have redone their analysis  
15 several times to work the numbers down and get to  
16 something more acceptable.

17 We need to improve the process with  
18 respect to approving unreviewed analysis methods, not  
19 just to address them for the peer review itself but  
20 also to get more methods accepted. We have basically  
21 squashed all innovation at this point, and we need to  
22 get back to the business of innovating and coming up  
23 with new methods.

24 CHAIR STETKAR: I'm going to put you on  
25 the spot here, and you have the complete right to say,

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1 "I'll defer that." You mentioned -- you know, we've  
2 heard both yesterday and today this notion of we're  
3 stymied in terms of the ability to apply unreviewed  
4 analysis methods or NAMs or whatever you want to --  
5 whatever acronym you want to give them -- in a timely  
6 manner to support the LARs.

7 Do you have a solution? I mean, you know,  
8 people pointed to a pinch part, pinch point in the  
9 EPRI review panel.

10 MR. FINE: Right.

11 CHAIR STETKAR: And I think everyone is  
12 aware of that. Is there an alternative solution? You  
13 know, have you thought about it?

14 MR. FINE: Well, right now we pretty much  
15 have to work through EPRI and NEI and with the NRC to  
16 create this consensus panel, but we need to understand  
17 it is a consensus panel, and, you know, it's not my  
18 opinion or his opinion that matters. It's the  
19 consensus opinion, and we need to get there.

20 We haven't gotten there yet, and the same  
21 thing goes for the peer review process. It's  
22 consensus, and everybody agrees with that, and we have  
23 no issues there, but when it comes to -- you know,  
24 when we do any other risk-informed application, when  
25 I go to come up with a new method or a new way of

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1 doing things --

2 I used to work with Rick Grantor, and we  
3 always came up with new, creative things, okay, and  
4 so, you know, not having the ability to do that in  
5 this particular case fast enough to meet my schedules  
6 and do everything I've got to do, it's not healthy,  
7 you know, but we understand the limitation and we move  
8 on.

9 CHAIR STETKAR: You know, Ray, that's --  
10 I used to work with Rick, too, so -- but what you're  
11 saying, in those instances the individual plant took  
12 the initiative --

13 MR. FINE: Right.

14 CHAIR STETKAR: -- and went out and said,  
15 "We're going to use this method," and asked, you know,  
16 for NRC acceptance or whatever. Is it -- are the  
17 individual plants being stymied by this process of  
18 funneling everything through EPRI and NEI?

19 MR. FINE: I wouldn't say they're stymied.  
20 I would say that --

21 CHAIR STETKAR: Or reluctant, let me say.

22 MR. FINE: They're reluctant, not just  
23 because of that one issue. They're also -- they also  
24 have the management issue, the money issue, the other  
25 issues.

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1 All of those lead to this problem that,  
2 you know, they just want this application done. It  
3 cost way more than they wanted. Everybody wants to  
4 get through it and get on to the next thing, but also,  
5 you know, there are plants that are coming up with  
6 methods.

7 Typically, you're going to see that the  
8 non-805 plants are going to be the ones using those  
9 methods freely, whereas the 805 plants typically will  
10 not, because they don't want to risk the RAI issues  
11 and the LIC-109 reviews.

12 So, you know, I know our plants the  
13 management has decided we will not push the envelope.  
14 We will do what 6850 says, and we've had several  
15 opportunities to, but we aren't doing it.

16 MR. HENNEKE: John, this is Dennis  
17 Henneke. Let me -- let me speak up to a specific  
18 issue that'll give you an idea of the stymied portion  
19 of it.

20 In 2007, so I was a reviewer on 6850. I  
21 was a peer reviewer, and we recognized a couple  
22 issues. 6850 was silent on the area of hot short  
23 duration. This is a bit issue, because your main hot  
24 shorts are your PORVs, SRVs, ADS, MSIVs, those sorts  
25 of things and, depending on your plant, could be your

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1 seal cooling for your RCPs.

2 So, I authored an FAQ, FAQ-51, started in  
3 2007, issued this -- submitted this in March of 2008.  
4 It included in it the analysis of CAROLFIRE, which are  
5 AC circuits, and some extension of that to some of the  
6 testing that showed results I thought would be  
7 applicable to DC circuits. Now, DC valves are the  
8 most important. Those are the PORVs and the MSIVs and  
9 so on.

10 I submitted this March 2008, all right.  
11 So, it was -- it went through some discussion. It was  
12 rejected by the NRC. It was an eventual FAQ. I was  
13 the author of the FAQ, but the FAQ got changed, so the  
14 wording of the FAQ was not my words.

15 The DC circuit stuff came out. No word.  
16 So, I tried again to submit another FAQ separately,  
17 and I was told, "No, we're doing the DC testing,  
18 DESIREE testing. In the meantime, we're going to wait  
19 until DESIREE Testing is done."

20 So, in the meantime, so the FAQ came out  
21 with the hot shorts and AC circuits, which is not a  
22 very useful -- MOVs, a hot short duration, a tenth of  
23 a second, MOV would change states. So we issued a GE  
24 report, which we eventually got the BWR Owners Group  
25 to submit, and we worked that and finished that in

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1 spring of last year.

2 We submitted that to the EPRI panel June  
3 of last year as to methods for cabinet fires which  
4 would solve some of the cabinet fire issues, June of  
5 last year, and DC circuits, right, some initial  
6 analysis of the DESIREE testing, which we had access  
7 to at that point.

8 Both FAQ-51 and the BWR Owners Group  
9 report, because of the uncertainty, we skewed them  
10 conservatively. I think the results are coming out  
11 now of the DESIREE, the DC expert panel that I'm also  
12 involved with at the NRC, are showing that the results  
13 were conservative that we came out with.

14 We submitted that June of last year. We  
15 provided copies to some of the NRC folks at that  
16 point, and they said, "Remove it. We will not approve  
17 it. We're not going to do anything on that until  
18 DESIREE comes out."

19 Now, this time next year we'll be lucky to  
20 have that expert panel. We're going through a SSHAC  
21 process for extra panel to have DC stuff available.  
22 In the meantime, the plants are going without.  
23 There's not a single plant that I know of that has put  
24 DC hot short duration in, because they're afraid to  
25 submit it.

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1                   Now, the -- so you want a solution. Get  
2 the regulator side off of the decision on PRA methods.  
3 Put an NRC research person on the process for a  
4 consensus.

5                   Let them go, and then accept what they do,  
6 because what happens is they'll get a person accepting  
7 it, and then the regulatory side of NRC rejects it and  
8 requires all these sensitivity runs. People are  
9 afraid of that, because the sensitivity runs means you  
10 have to do the work in the first place, and you don't  
11 save yourself any money.

12                   So that's the broken process right now,  
13 and it's -- you know, I had a solution in March of  
14 2008 for this, and still today we have nothing.  
15 That's the frustration of it.

16                   CHAIR STETKAR: Thanks.

17                   MR. FINE: Okay. So, probably one of the  
18 biggest lessons learned that we're going to be taking  
19 forward is future model development. We've worked  
20 with the standards committees.

21                   We've worked with everybody else and said,  
22 you know, "Please do not issue a standard until it's  
23 been fully vetted and reviewed and we've done pilots  
24 and we know what it is. Then, once it's piloted and  
25 we understand it, then issue the standard." It's sort

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1 of like, you know, coming up with a standard for how  
2 to build a pressure vessel never having built one  
3 before.

4 We think we know what is, you know, the  
5 state of the art, but the reality of it is no one's  
6 built a fire model to this level before. No one has  
7 built a seismic model to the levels we're going to  
8 have to build these new seismic models to before.  
9 Yes, they've built seismic models but not to this  
10 level of detail.

11 So, even our internal events models are  
12 nothing like what I saw ten years ago. They are  
13 significantly more advanced than what they were at  
14 most stations.

15 So, we now know that we've got to properly  
16 follow a process where we peer review, where we  
17 understand, where we improve before we implement.  
18 This time, we didn't do that, and we found out just  
19 how bloody it can be, and we're going to try not to  
20 ever repeat this again, because it's just too  
21 difficult.

22 You know, our research people, EPRI,  
23 they're not doing research. They're doing crisis  
24 management, just like we are, and that's not where  
25 they need to be. You know, they need to be out there

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1 doing research on the next thing. Then, applications  
2 should have real pilots prior to widespread  
3 application, and that's just pretty much repeating  
4 what I just said.

5 I'd also like to answer a question that,  
6 Mr. Stetkar, you brought up yesterday, which goes back  
7 to peer reviews and F&Os and the staff reviewing F&Os  
8 back to the beginning of time of the PRA.

9 This is my opinion, not that of the Owners  
10 Group, but I don't understand why they're doing that,  
11 and that's because the fire PRA has ties back to the  
12 internal events models.

13 There's quite a few SRs that tie you back  
14 to that internal model and verify that the internal  
15 model is capable of supporting that fire PRA. You  
16 know, your foundation has to be good to build this  
17 model on, okay. So we're going back and re-reviewing  
18 sections of the model, okay.

19 The other thing is a lot of plants made  
20 changes to their models. They've added shutdown  
21 seals. They've added additional battery capability.  
22 They've added B.5.b or FLEX equipment to their models.  
23 They've added a lot of stuff to help them with the  
24 fire analysis, okay, and they're reviewing those  
25 aspects, as well, of the internal events models.

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1           So, to go back to the internal event, peer  
2 review doesn't make much sense to me when the fire  
3 peer review covered all that, so that's just my two  
4 cents. And that's all I have unless you have any  
5 questions.

6           CHAIR STETKAR: Anybody have any questions  
7 for Ray? If not --

8           MEMBER SCHULTZ: Ray, the summary slide  
9 that you presented here would suggest that the  
10 industry is in strong agreement with the staff in  
11 terms of a process which would assure that the models  
12 are, in fact, vetted, resolved, understood across the  
13 industry as being the appropriate way to proceed,  
14 reviewed by the staff before they're applied, piloted  
15 before widespread application. This is also in  
16 agreement with what the staff has asked for.

17           MR. FINE: Right.

18           MEMBER SCHULTZ: So I'm -- and we also  
19 heard yesterday that it seemed that there is frequent  
20 communications between the staff and the industry on  
21 this particular adventure.

22           So I'm trying to understand why these  
23 improvements in model, the improvements to the models  
24 moving from -- moving from development to application  
25 with approval of the staff, I'm still trying to find

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1 out where that barrier is.

2 MR. HENNEKE: Yes, this is Dennis Henneke  
3 again. Let me take the example that Kiang Zee  
4 discussed earlier, the cabinet fire one.

5 So, we know that the present 6850 model  
6 doesn't do well with cabinet fires, especially when  
7 there's cables right above the cabinet. We see that,  
8 so fire modeling doesn't get you very far.

9 There was a -- there was in process a  
10 cabinet fire heat release rate modification which  
11 would talk about oxygen-limited cabinets. We reviewed  
12 that as part of the EPRI panel. We sent it back for  
13 revision. That's being revised as we speak.

14 We're not sure that's going to give you  
15 the same results of what Kiang's work would do, but  
16 Kiang's work was more trying to let's try to get a  
17 simplified approach so we can at least get some  
18 scoping evaluations and do detailed evaluations for  
19 the ones that pop up to the top.

20 So we go through that almost a year, and  
21 then we're told it's rejected by the NRC, because they  
22 would like us to use this alternative method or an  
23 alternative method, and we'd like to see all the other  
24 methods.

25 That's frustrating when you -- let's come

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1 to a consensus on what's an acceptable approach for  
2 this severity factor. We can't. So, yes, the NRC  
3 would like to work with us on it, but in the end,  
4 they're not, you know, so that's part of the  
5 frustration.

6 Why can't we come up with an acceptable  
7 method that Kiang has come up with for cabinet  
8 severities to at least scope it out that's acceptable  
9 to the staff, that's not going to have to go through  
10 sensitivity studies and the whole thing and be done  
11 with it? But in the meantime, a year later we have a  
12 rejected approach.

13 MEMBER SCHULTZ: But it didn't sound as if  
14 the peer, the industry peer review process really  
15 reached completion on that model in particular.

16 MR. HENNEKE: No, we've -- we're done.  
17 We've been done.

18 MR. GALLUCCI: This is Ray Gallucci. I  
19 was on the UAM panel as the NRC representative. It  
20 convened in April of 2011. We had a face-to-face  
21 meeting in downtown DC. I think it was at NEI.

22 At that time, we were told we were going  
23 to be reviewing four ERIN methods, one of which was an  
24 electrical cabinet method. At that time, I said,  
25 "Well, I know there's an EPRI heat release rate report

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1 method in the process," and Dennis had mentioned that  
2 GE had an approach.

3 I recommended strongly that we review all  
4 three of these concurrently. That recommendation was  
5 rejected. We were told we have to do it sequentially,  
6 so we proceeded along that line.

7 Dennis informally provided the GE  
8 approach, which had an electrical cabinet approach.  
9 It had hot short duration and other in there. It was  
10 not formally put into the UAM panel process.

11 The EPRI heat release rate report was  
12 introduced. I looked at it. I felt it was well  
13 beyond the scope of what could be reviewed by the UAM  
14 panel, so I recommended that it be processed through  
15 the MOU, Memorandum of Understanding, with Research in  
16 a parallel process.

17 At the time, NRC did offer some  
18 preliminary comments on that, and they were accepted,  
19 and we were told that prior to final publication we  
20 would be given the chance to do a detailed review. It  
21 was published in February. We did not do the detailed  
22 review until after it was published.

23 The GE methods were never formally given  
24 to the panel for review. We were knowledgeable of  
25 aspects of them for the electrical cabinet method, but

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1 we did not formally review that, and so we were really  
2 constrained during the UAM process to just reviewing  
3 those four methods, although at least I had hoped that  
4 we would review them concurrently.

5 MR. DINSMORE: This is Steve Dinsmore.  
6 Could I -- in general, though, I think what Dennis  
7 said, they submitted a FAQ, and we looked at it, and  
8 we changed it. We issued it, and industry didn't like  
9 it or didn't agree that what we issued was enough or  
10 good enough for them, but that's the process we go  
11 through.

12 The ASME is a behemoth compared to all  
13 these working groups, and we do exactly the same thing  
14 with them. They come up with a methodology. They  
15 issue it.

16 It's a consensus standard. It comes to  
17 us. We review it. Many of them reject. We say,  
18 "We're not going to accept that." Many of them we  
19 change. Many of them we accept.

20 I mean, it's just a process, and we're  
21 following the same process here. It's just there  
22 seems to be a bottleneck somewhere between the methods  
23 that they're developing and us formally getting to  
24 review them.

25 MR. HENNEKE: But, Steve, Steve Schultz,

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1 that goes against what you just mentioned, which is  
2 that the NRC wants to work with us and come up with a  
3 consensus approach. We come -- we do this, and we do  
4 all our work. At the end they have right of  
5 rejection, and they do quite often reject these.

6 So what are we to do? I mean, just a  
7 simple cabinet severity factor that Kiang did, I bet  
8 you he probably did two weeks of work on this  
9 initially, and I bet you he has probably -- his team  
10 has probably spent eight, nine man-months in meetings  
11 and conference calls and revisions and all this.

12 So we have these simple methods. These  
13 are not difficult to develop, but the process to go  
14 through to get to the point where it's approved by the  
15 panel, you spend eight, nine months on that, and then  
16 it gets rejected. It's all wasted time.

17 MR. GALLUCCI: This is Ray Gallucci.

18 CHAIR STETKAR: Ray, hold on a second.  
19 Let me -- let me intercede here and try to get control  
20 over this. I think -- I think the Subcommittee has  
21 heard, you know, several examples of continuing  
22 disagreements. Let me put it that way.

23 I think Dennis Bley suggested that perhaps  
24 we might consider another Subcommittee meeting to look  
25 in more detail at some specific examples so that we

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1 can at least better understand the technical issues,  
2 kind of both sides of the story so we can --

3 You know, is it programmatic? Is it  
4 procedural? Is it organizational problems, or, you  
5 know, where are the distinct technical disagreements?  
6 And this isn't the forum to do that. It is the forum  
7 --

8 I'm glad that we had the discussion,  
9 because that was the whole purpose of this  
10 Subcommittee is to identify specific issues or areas  
11 where there are perceived or actual impediments, and  
12 certainly this morning we've identified a couple of  
13 those. That's why I wanted to just cut off the  
14 discussion for the moment, because my sense is it  
15 could probably go on for a while, and with that we'll  
16 get to the BWR folks.

17 MR. RISHEL: Okay, yes, BWR Owners Group,  
18 I'm Bob Rishel, now of Duke Energy, formerly of  
19 Progress Energy, and --

20 CHAIR STETKAR: And you'll say no more.

21 MR. RISHEL: It's getting too much to say  
22 now, but I'm working on it.

23 MR. FINNICUM: Soon to be Constellation.

24 MR. RISHEL: So, I replaced Greg Kruger in  
25 February of this year as the Chairman of the BWR IRIR

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1 Committee. Greg did a great job, and his  
2 responsibilities have driven him a little different  
3 route there.

4 So we're going to discuss the BWR Owners  
5 Group experiences with our peer review process, which  
6 not many of the BWRs are going to NFP 805. Just a  
7 smaller percentage are, and so we're going to talk  
8 about the review process, lessons learned, and some  
9 summary thoughts.

10 I'm going to turn it over to Dennis.  
11 Dennis actually led most of the peer review for fire,  
12 and so he can relate his experiences in that.

13 MR. HENNEKE: I should probably thank  
14 Harold Ray for the path that he led me down some 13 or  
15 14 years ago. I got the call from -- I was at San  
16 Onofre at the time and got the call from Tom Hook,  
17 said the NFP 805 was looking for somebody that had PRA  
18 experience and worked on fire PRA.

19 That led to working on that NFP 805  
20 Committee, then the Circuit Task Force Committee.  
21 Then I was asked to work on the Standard and became  
22 Chair of the Standard for the last 12 years.

23 It eventually led me to leading the BWR  
24 Owners Group peer reviews. I got hired by GE about  
25 six years ago, and so for all of the 12-hour, 14-hour

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1 days for the peer review weeks that we have, I wanted  
2 to thank you for that, Harold.

3 CHAIR STETKAR: But as a consultant it's  
4 been okay.

5 MR. HENNEKE: So these are difficult  
6 things. We make light of them, but these peer reviews  
7 are pretty serious things.

8 MR. RISHEL: Yes, I just want to go back  
9 one. These peer reviews in the fire PRAs, you know,  
10 as we touched on earlier, are a lot more important  
11 than just NFP 805, right. They're getting used in  
12 SDPs. They're getting used in notices of enforcement  
13 discretions, other risk applications.

14 Although we are getting insights into  
15 them, at the end of the day the Reg Guides demand a  
16 number, and there is a threshold. That's the other  
17 concern about getting as, you know, realistic of a  
18 number for the fire as possible.

19 CHAIR STETKAR: Bob, out of curiosity, you  
20 mentioned that a relatively small fraction of the BWRs  
21 are actually transitioning to NFP 805. Are most or  
22 all of the BWRs pursuing fire PRAs outside of the NFP  
23 805 process to support --

24 MR. RISHEL: Yes, they are.

25 CHAIR STETKAR: Okay.

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1 MR. RISHEL: On a similar schedule, maybe  
2 a bit longer schedule, but most of them are.

3 CHAIR STETKAR: To support the other risk  
4 --

5 MR. RISHEL: To support the other  
6 applications.

7 CHAIR STETKAR: Okay, thank you.

8 MR. HENNEKE: Okay, so I'm going to spend  
9 just a couple of slides talking about some specific  
10 things that we've done in the BWR Owners Group peer  
11 review process to give you kind of an idea of how we  
12 try to approach the peer review in order to make it as  
13 complete and thorough a process as possible.

14 We'll go through lessons learned, and I'll  
15 focus in on some of the best practices, because it'll  
16 tell you that we've seen some of the utilities to  
17 particular steps very well, and that's how we expect  
18 all the plants to do it.

19 The reverse of that is that when you don't  
20 do it to that extent, a lot of times that will mean  
21 you'll get findings associated with the standard,  
22 depending on what category you met.

23 Some definite areas for improvement, and  
24 I'll touch upon what we talked about or what Ray  
25 talked about about not being ready for the peer

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1 reviews is probably our biggest issue and then some  
2 summary thoughts.

3 So, yes, we follow NEI 07-12, the standard  
4 Reg I-1.200. There's a clarification letter that NEI  
5 issued on some changes, some specifics on NEIO-712 as  
6 provided to the NRC that we also incorporated into our  
7 process, which is how to address UAMs. You've heard  
8 the discussion on that. We've really only used that  
9 twice in our reviews.

10 The early peer reviews we did beyond 6850  
11 approaches, we wrote findings on those. Then the  
12 process was changed in mid-stream, and then we were --  
13 we'd come up to an approach such as the ERIN approach,  
14 which was already in review by the EPRI panel. We  
15 call those the unreviewed analysis methods.

16 We also had some clarification after a  
17 couple of peer reviews on reference SRS. There are  
18 189 fire-supporting requirements in the standard.  
19 There are 212 reference SRs.

20 Those are SRs, supporting requirements  
21 such as perform your fire HRA per the internal events,  
22 guidance, in respect to fire, taking into account  
23 performance-shaping factors with regard to fire. It  
24 refers to a whole series of HRA requirement that you  
25 would do similar in internal events.

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1           So, how do we review those? Do we take  
2 into account they say, "Well, I used the same method  
3 we use in internal events," and so you don't review  
4 them. If you review them, do you review everything in  
5 complete detail, or do you do something in between?  
6 The guidance provides us some guidance on that, and  
7 that is it depends.

8           You know, if you use exclusively the  
9 approach it was already peer reviewed in the internal  
10 events and there's really nothing new that the fire is  
11 doing, there is nothing specific to fire, then you do  
12 a fairly cursory review to that.

13           If you're using the same approach, but  
14 you're modifying it for fire, then you do something  
15 kind of in the middle, and if you're using something  
16 new for a fire, you made new fault tree changes, new  
17 data, then you review it completely for that new data  
18 or new method that you've used.

19           So there's kind of three levels at which  
20 we do review, and we want it consistently between the  
21 Owners Group, and so we issued some guidance and made  
22 a revision to NEI 07-12 for that.

23           So it was a very important aspect of  
24 standard is that we didn't recreate the wheel on HRA  
25 or data. We referred to the internal events, SRs, in

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1 the fire standard, and how you review that is an  
2 important part of it.

3 Those reference SRs also mean we have  
4 about twice as many SRs in an internal events review,  
5 so the actual time that we put into a fire peer review  
6 is longer than an internal review, which meant for 12-  
7 to 14-hour days on the first couple. We've modified  
8 our approach more to not do that.

9 We also had some guidance come out on not-  
10 meant versus not-reviewed. So you talk about follow-  
11 on peer reviews. If we have a not-met with a finding  
12 and that finding can be addressed without any new  
13 methodology, then there is not a follow-on peer review  
14 required.

15 If there's a new method, then there is a  
16 follow-on peer review required. If we as a peer  
17 review give a not-reviewed, then we are automatically  
18 triggering a follow-on peer review, and we have done  
19 that several times.

20 CHAIR STETKAR: Dennis, let me ask you  
21 about the first one, make sure I understand it. You  
22 said if there's a not-met and the licensee can resolve  
23 that without -- I think you said developing new  
24 methods or something like that. There's no follow-on  
25 peer review. Who determines whether the licensee

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1 adequately addressed the initial concern, then?

2 MR. RISHEL: I would say in the submittal  
3 that whatever submittal you use, you know, you have to  
4 provide the staff with enough detail about how you  
5 address the issue, or, you know, the alternative is to  
6 say, "For what I'm doing, that one, that doesn't  
7 matter. The not-met doesn't matter, and I'm going to  
8 carry that along."

9 CHAIR STETKAR: Okay, but it's --

10 MR. RISHEL: The staff gets to make a  
11 judgment on that.

12 MR. FINE: Yes, what we were really  
13 trying hard not to do is to have people come back for  
14 follow-on, follow-on, follow-on, because one of the  
15 things you'll see in peer reviews is each team is  
16 different. Each team is going to see different things  
17 because of their makeup, okay.

18 So I've been really careful that if I did  
19 have a follow-on, and I did at one of my plants, I've  
20 got the same team to come back, okay. That way I had  
21 a consistent follow-on, but that's very hard to do.

22 CHAIR STETKAR: I was going to say that --  
23 I understand both, kind of both sides, but in many  
24 cases, having done some reviews, unless I'm really  
25 careful about very, very detailed description of my

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1 particular concern, in some cases they can be  
2 misinterpreted.

3 In other words, somebody thinks they're  
4 solving my problem, and they go forward, and they  
5 really weren't solving my problem, which is my issue,  
6 because I didn't necessarily express the concern  
7 correctly or something like that.

8 MR. FINE: We at utilities --

9 CHAIR STETKAR: That's important to have  
10 the same person come back and say, "Well, gee, you  
11 didn't really address my concern."

12 MR. FINE: Yes, we've become  
13 hypersensitive to that in utilities.

14 CHAIR STETKAR: Okay.

15 MR. FINE: And, at least -- I just  
16 finished two peer reviews last week for flooding, and  
17 so I made sure I sat down with the peer reviewers and  
18 understood his words exactly --

19 CHAIR STETKAR: Okay.

20 MR. FINE: -- and even asked him to  
21 rewrite his paragraph so it was in a way that I  
22 understood what he was saying but also agreed with  
23 what he was thinking.

24 So it's not uncommon now for the feedback  
25 loop go through the process to make sure the words are

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1 right. I'm not contesting the finding. I just want  
2 to make sure I understand what he's saying.

3 CHAIR STETKAR: Good. Good. That's  
4 important, especially when you have a third party  
5 trying to compare things.

6 MR. FINE: We also will come back, because  
7 they'll give you, you know, "Here is a method to  
8 correct it." We may come back with another method to  
9 correct it, and we'll ask them before they issue the  
10 finding, "Would you consider that an acceptable  
11 resolution?"

12 CHAIR STETKAR: This is in real-time?

13 MR. FINE: Yes.

14 CHAIR STETKAR: This is during --

15 MR. FINE: Yes.

16 CHAIR STETKAR: During the week.

17 MR. FINE: "Would you accept that as an  
18 acceptable resolution?" and they'll put that into  
19 their report.

20 CHAIR STETKAR: Okay.

21 MR. HENNEKE: Yes, and you can connect the  
22 dots to a lot of the issues that people have talked  
23 about. So 6850 doesn't quite do it for us, and we  
24 have to do beyond that. It's also a lot more  
25 difficult than we thought.

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1           So, in the meantime, we have 805 schedule,  
2           which tells us we have to finish by X date. So we get  
3           -- we come in, and we do a peer review because the  
4           schedule says you have to do it, and the utility is  
5           not ready.

6           So, we write, like you heard yesterday, 89  
7           findings. So we write 89 findings as a result of  
8           that, and now the utility spends a ton of time fixing  
9           it -- it hits the schedule again -- and then gives  
10          that to the NRC to review.

11          Now, what kind of -- you know, the NRC  
12          won't have very much confidence in that PRA, because  
13          there were 89 findings, and that new PRA hasn't been  
14          peer reviewed, because maybe there wasn't any new  
15          methods associated with it.

16          So by process we could do that, but now  
17          that's going to cause a lot of REIs, a lot of time in  
18          the review from the NRC, and the NRC now has to do  
19          more review than they originally thought.

20          So it's all cascading, and we're kind of  
21          in the middle of it, but when you see a lot findings  
22          in a peer review, that's just a symptom of the overall  
23          process really having issues from start to finish.  
24          Anyways, talk about that all day.

25          Last slide on our specific stuff, you

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1 know, I'm Chairman of the PRA Standards, so we started  
2 a process which we thought was very useful. We have  
3 a two-hour training on the standard, everybody who  
4 comes in for peer review, and we require that for  
5 everybody.

6           Everybody who has taken the training has  
7 thought that was a really useful thing to come in and  
8 go through all the SRs ahead of time and reference SRs  
9 and some of our lessons learned that are in there.

10           We also, rather than having an eight-  
11 person team and 80-hour days -- well, the first one we  
12 did I think we had the -- I would think we still have  
13 the record of 1:27 a.m. in the morning of finishing on  
14 one of the days of review, starting at 7:00 in the  
15 morning.

16           CHAIR STETKAR: Wimps.

17           MR. HENNEKE: So we had like 80-, 90-hour  
18 weeks. Rather than do that, we require about 40 or so  
19 percent of the assessments to be done prior to being  
20 onsite, which has led us to shorter days, like 12-hour  
21 days.

22           CHAIR STETKAR: Dennis, something you just  
23 mentioned, actually, in seriousness, not the 1:27 a.m.  
24 but for -- I'm assuming that people are joining the  
25 peer review teams in real-time. Is that true? I

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1 mean, you have new folks coming in and being trained,  
2 or are both Owners Groups now pretty well stable?

3 MR. RISHEL: There is some new blood, you  
4 know, from time to time. Personally, for my utility  
5 I get great value out of taking somebody that has not  
6 been on a peer review team before but I believe has  
7 got the required skills and knowledge and put him in  
8 a peer review team, both for his personal development.  
9 Also, you know, he will bring a new, a different view  
10 of things to that peer review team.

11 So there is some new, but I'll see on the  
12 fire PRA part we are still very hampered by it's very  
13 contractor-heavy. The number of utility folks that  
14 have enough skills and knowledge is a relatively small  
15 pool, and Progress Energy happens to have probably the  
16 lion's share of those folks, mostly because we did not  
17 use contractors to do the lion's share of the work.

18 MR. HENNEKE: But the standard and the NEI  
19 guidance basically says that in order to be involved  
20 in a peer review, you had to have a certain amount of  
21 experience, including three years of fire PRA. It  
22 also says in order to lead a technical element that  
23 you have to have performed that technical element, and  
24 there aren't a lot of utility guys out there that meet  
25 that.

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1 CHAIR STETKAR: What I was leading to is  
2 do the Owners Groups maintain a compilation of issues  
3 that had been raised during the previous -- so, for  
4 example, if I joined your team, I can at least look  
5 at, "These are the sorts of things we found," in an  
6 easy way to kind of orient myself --

7 MR. HENNEKE: It's in our training.

8 CHAIR STETKAR: -- in that sense. You  
9 always need the new blood. I mean, it is good.

10 MR. RISHEL: Dennis has incorporated many  
11 of the "lessons learned" or observations in the  
12 training. In addition, we have -- the Owners Group  
13 have put out sort of a generic lessons learned from  
14 peer reviews to go out not only just for the peer  
15 reviewers but also folks that have not completed their  
16 PRA yet. They can incorporate a, you know, "don't  
17 forget about melted copper soldered joints," is one  
18 example.

19 MR. FINE: There's also a group. All the  
20 peer review leads create a group, and that group meets  
21 and talks on the phone or in person, and lessons  
22 learned flow that way.

23 So the reason we started that was because  
24 of inconsistency between reviews. We didn't want one  
25 lead doing something that the others said, and then it

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1 gives him also a point to he can call that group or  
2 send an email out to that group during a peer review  
3 and go, "Okay, this issue has come up. How am I to  
4 address this, because I'm having problems here?" That  
5 group can override what's going on.

6 CHAIR STETKAR: Good. Thank you.

7 MR. HENNEKE: All right, so let's go  
8 through some best practices. In the plant  
9 partitioning area, early on we saw some less than  
10 adequate review of non-Appendix R barriers, but in  
11 more recent ones we've seen some really good work in  
12 the area of non-rated barriers, including analysis,  
13 walk-downs, and visual inspections of all these non-  
14 Appendix R barriers to make sure that they meet the  
15 definition of a barrier to contain the fire, so  
16 potential containment of fire as required by the  
17 standard and by 6850.

18 In the multiple spurious operation area,  
19 we've seen some excelling work on there that follows  
20 on the MSO expert panel process where they will take  
21 that MSO expert panel process, provide a full  
22 description of what the scenario involved, full  
23 description of the components involved, what the  
24 status of that is in the safe shutdown analysis. Are  
25 there single or multiples in the safe shutdown

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1 analysis existing, and are those components modeled in  
2 the fire PRA?

3 We saw basically a full page, page and a  
4 half on each MSO that was in the MSO list, and it  
5 makes it so easy in review to have that sort of thing,  
6 and we're starting to see more and more of that.

7 CHAIR STETKAR: Just out of curiosity,  
8 since all of you folks have done, obviously, a number  
9 of these reviews, I'm aware of the lists. Do you see  
10 many individual plant-specific MSOs arising, in other  
11 words, things that are outside the list but somebody  
12 discovered as they're going through their analysis, or  
13 do people pretty well stick to the script?

14 MR. HENNEKE: So, in the -- and I'm the  
15 author of the BWR Owners Group list, so we maintain  
16 that for NEI. So, in general we do see between two  
17 and five plant-specific MSOs, and when we do not see  
18 it and we come in for the peer review, that's a string  
19 we see, and we pull it.

20 Almost every time that we've seen no  
21 plant-specific MSOs we end up with a finding, because  
22 the process really didn't explore it well enough to  
23 give us that confidence that there aren't any. So I  
24 would say we expect to see plant-specific MSOs.

25 CHAIR STETKAR: Is that the same over on

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1 the PWR? How about you guys?

2 MR. FINNICUM: Not quite but similar.  
3 We've updated the PWR-specific MSO list, the generic  
4 list, several times to bring in the lessons learned,  
5 so now in the last six to eight months of peer reviews  
6 I can't remember anybody finding a new MSO that's not  
7 covered.

8 MR. FINE: That's because we've done quite  
9 a few peer reviews.

10 CHAIR STETKAR: That's because you're  
11 somewhere pretty well up on the learning curve.

12 MR. FINNICUM: And I do want to say is one  
13 of the things I'm seeing -- I'm going to guess that  
14 Dennis is, also -- that the fire PRAs are improving  
15 from what we saw originally to now. Would you agree,  
16 Dennis?

17 MR. HENNEKE: Oh, absolutely, yes.

18 CHAIR STETKAR: Okay. Thanks.

19 MR. HENNEKE: One of the things we like to  
20 see is just a list of the components that are in safe  
21 shutdown, a list of the components that are in the PRA  
22 and compare them and then have reasoning why, if there  
23 is something in the safe shutdown analysis and it's  
24 not in the PRA, why that's not true.

25 I would say in IPEEE days that was

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1 probably one of our biggest issues. We didn't fully  
2 model safe shutdown, and we didn't fully model safe-  
3 shutdown operator actions in the PRA, including  
4 spurious operation.

5 You know, we're expecting that if there is  
6 a manual action for a spurious operation that's in  
7 safe shutdown that that's also going to be in the PRA,  
8 and if it's not, there really should be a reason why  
9 that's not there.

10 So, the best practice is to do that  
11 comparison fully, and it makes the equipment selection  
12 process so much easier to see that. We're seeing a  
13 lot more of that.

14 So, a Category 3 on the standard is to  
15 include all of the internal events components, active  
16 components, into the fire PRA, and we're starting to  
17 see more and more of that, including tracing all of  
18 the internal events PRA components, the inactive  
19 components, and do all of the circuit analysis for  
20 that.

21 So that would be a Cat 3 PRA to do that.

22 It's very difficult. For a plant that does have a  
23 good cable-tracing program, this is a fairly -- I  
24 don't want to say fairly simple.

25 It's a little more simple task, but if you

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1 have to go hand-over-hand to trace cables and 16 hours  
2 to even find one cable, you wouldn't expect a utility  
3 to do this, so you have to -- the Category 2 is to  
4 make sure you have everything risk-significant, and  
5 that's a more difficult process to prove but would  
6 still meet the standard.

7 So, fire-induced initiating events, so if  
8 you have, for example, a loss of DC power, and MSIV  
9 closure, feedwater over-feed, for example, if you have  
10 a feedwater over-feed and you're going to now  
11 determine what components are associated with that,  
12 you have a completed equipment listing of that,  
13 complete cable-tracing of that or at least some sort  
14 of way to identify what fire areas can cause a fire-  
15 induced feedwater over-feed event, for example. There  
16 are simplified approaches, but the best practice for  
17 us is a complete equipment list for every fire-induced  
18 initiating event that can happen.

19 We saw earlier a coordination review for  
20 all fire PRA-credited power supplies. We saw that in  
21 a number of plants. There are simplifying approaches  
22 that you can use. In almost all cases a simplifying  
23 approach ends up with conservatism.

24 For areas that might be mixed trains, for  
25 example, you end up failing power supplies on both

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1 sides, A and B train, which cause you to have high  
2 CCDPs as a result, so coordination review is not a  
3 cheap review, but in the end it does help your overall  
4 fire PRA numbers.

5 As far as NEI 00-01 and NUREG-6850, they  
6 talk about how many cables to select even for  
7 individual components. You get a very complex circuit  
8 for some sub-components where you may require two or  
9 three or four spurious operation or to get an  
10 undesired end state.

11 A lot of the approaches that are taken by  
12 safe shutdown analysis don't limit the number of  
13 cables. If you carry that same approach over to the  
14 fire PRA, that's a best practice that we've seen in  
15 the Category 3 in that particular requirement.

16 We've seen some discussion on multi --  
17 fire model earlier, so if you look at a lot of the  
18 work that we're talking about, the many, many  
19 thousands of hours, a lot of it is in cable tracing,  
20 sure, but the detailed fire-modeling we talk about  
21 full-room burnout, which is really a single size, but  
22 it's full room. Then you may have a single size for  
23 an individual scenario.

24 When you have scenarios that pop up to the  
25 top, then we would expect to see two fire sizes at a

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1 minimum based on the minimum damaging size and some  
2 sort of limiting fire size. The standard and 6850  
3 discussed that, but the best practice is to go beyond  
4 that.

5 The standard is actually being updated  
6 now, so the Addendum B of Revision 2 that is being  
7 approved now combines Category 2 and 3 to say a multi-  
8 fire model. It discusses that as if you have your top  
9 scenario and you have it as a two-point fire model,  
10 you may want to think about a three-point fire model.

11 So if a three-, four-, or five-point model  
12 gets you an order of reduction in that scenario, then  
13 the standard would -- the next revision of the  
14 standard would guide you to do more, but at present  
15 Category 2 is the two-point fire model, but even  
16 getting to that is a considerable amount of work.

17 We've seen -- probably, when your people  
18 say they've stopped and they haven't finished, they  
19 get a Capability Category 1. They get a finding, a  
20 number of findings, actually, that cascade from this.  
21 This is where they've stopped the work. They haven't  
22 one every significant scenario, the two points.

23 What ends up happening is when you do two-  
24 point fire modeling and you do growth, you do non-  
25 suppression, putting it all in there, that scenario

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1 becomes non-significant, and the new scenario becomes  
2 significant, and you keep working and keep working.  
3 By the end of it, you've done detailed analysis for  
4 probably about a third of your scenarios and your fire  
5 PRA in order to finally get down to what meets the  
6 standard.

7 So, in meeting the standard, this and the  
8 cascading ones for growth and decay and all that, this  
9 is the one harder to meet.

10 CHAIR STETKAR: Because you're just  
11 looking at the standard for the models, rather than,  
12 "It's good enough to meet my 5E-5."

13 MR. HENNEKE: That's correct.

14 CHAIR STETKAR: Because that's good  
15 enough.

16 MR. HENNEKE: When we started the  
17 standard, one of the things we wanted to do and what  
18 we were tasked with was to get the fire PRAs in  
19 Capability Category 2 to the same level of quality,  
20 completeness, and uncertainty as an internal events  
21 model.

22 In order to do that, we saw this as kind  
23 of one of the key areas. We're not there. There's no  
24 question we're not there, and by not being there and  
25 having single fire sizes for a lot of your scenarios,

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1 we are conservative.

2 You asked, I think, yesterday how much  
3 conservative. Our best guess is a factor of ten right  
4 now, and so these 5E-5 plants are probably 5E-6 when  
5 it's all said and done.

6 CHAIR STETKAR: Any basis for that best  
7 guess?

8 MR. HENNEKE: We've done -- we've done  
9 some calculations, comparisons of scenarios that  
10 you've done, single-point fire models to two-point  
11 with full modeling and then looked at MSO durations,  
12 MSO probabilities, and other things.

13 My personal opinion is the ignition  
14 frequencies aren't as bad as we try to put them off to  
15 be. They're not a factor of two or three off now.  
16 They're some percentage off and so on, but when you  
17 put all that in, as well as suppression and control --

18 Control versus suppression, that was one  
19 end that we identified in the front of 6850 Volume I.  
20 I was a reviewer and added that one in. We look at  
21 when the fire is actually suppressed, but sometime  
22 earlier they come, and they're controlling it from  
23 damaging further. It's probably a factor of two just  
24 on that issue alone. When you put all those factors  
25 in, we've calculated it out to be about a factor of

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1 ten.

2 CHAIR STETKAR: Okay. Thank you.

3 MR. HENNEKE: So we've done that a number  
4 of times when we look at fire PRAs to kind of estimate  
5 where they sit. So that particular SR is probably one  
6 of the more important ones. People say they've  
7 stopped, and people -- it's probably one of the ones  
8 --

9 MR. RISHEL: This is also one of the ones  
10 that give you all these high numbers of scenarios,  
11 too, so every time you do that, that's another  
12 scenario.

13 MR. HENNEKE: Yes. Time to -- you know,  
14 following on from that, you put a multiple in fire  
15 model. You put time-dependent growth, time-dependent  
16 decay. We've seen people use the time-dependent  
17 growth and decay in their modeling in pretty good  
18 detail in some very nice spreadsheets. We've seen  
19 that done well.

20 Thermal response, we've only seen that a  
21 couple times. There's a basic thermal response model  
22 I have here, but there's one, the THIEF model the NRC  
23 had come out of the CAROLFIRE testing that can be  
24 used.

25 It gives you a time delay, even once you

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1 get to the damage center. You're not immediately  
2 going to damage. You have some time before damage  
3 occurs.

4 If you put that time-dependent thermal  
5 response in there, you can get a factor of two or more  
6 reduction in some of your modeling. We have not seen  
7 that very much, but when we do see it, we give it a  
8 best practice for that, so it's one of the areas I  
9 think PRAs can improve on more is that thermal-  
10 response model.

11 Detailed analysis of all operator actions,  
12 we have seen that in one case. In most cases it's  
13 detailed as the significant ones and scoping on the  
14 non-significant. That's more typical, but some plants  
15 have done detail on all of them.

16 MEMBER BLEY: Before you leave this one,  
17 on the thermal response model, the gains you see  
18 there, are they due to over the time the fire is  
19 burning itself out, or the time-response model allows  
20 time for suppression.

21 MR. HENNEKE: Suppression.

22 MEMBER BLEY: Primarily suppression.

23 Okay.

24 MR. HENNEKE: Absolutely, because when you  
25 look at the suppression curves, and we talked about

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1 this, you know, say, 10- to 12-minute growth and so  
2 on. You only get like a factor of 40 percent  
3 reduction or something like that.

4 If you give yourself like another 13  
5 minutes here on your curve, you double your time. You  
6 can get a factor of three to four reduction in that,  
7 so typically it's a factor of two reduction by  
8 including your thermal responses.

9 MEMBER SCHULTZ: Dennis, with respect to  
10 operator action, when Ray made his presentation he  
11 talked about how important the human reliability  
12 analysis was as it particularly related to the fire  
13 PRA, because there's different actions that are taken,  
14 as well as a different environment that operators and  
15 personnel are in.

16 So, here you've listed it as best  
17 practices, detailed analysis of all operator actions.  
18 Why isn't that more -- I got from Ray's presentation  
19 that that was an expectation that one would put more  
20 emphasis on a detailed analysis of operator action.

21 MR. HENNEKE: Well, we see a couple  
22 things. We see the 805 plants trying to remove  
23 operator action credit so that what they're trying to  
24 do is put probably -- they'll put it in their model  
25 and put probably a 1.0 in there and see if they can

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1 live with that so that they don't have to call that a  
2 required action for safe shutdown.

3 So we see some of that in there, and so  
4 you might even get a finding in peer review space for  
5 an action that meets a significant, you know, like one  
6 percent of CDF. You might get an action that's there  
7 that they haven't analyzed, because they're trying to  
8 remove that from the model, and they haven't quite  
9 finished everything at that point.

10 So you see some of that but more along the  
11 lines of you see the PRA is not done. They've  
12 finished the first part, and they just haven't  
13 analyzed everything by the time we get there.

14 So the trend is, yes, they're going to  
15 analyze everything in detail, but by the time the peer  
16 review team sees it they've maybe done some sample  
17 analysis. They've done the top three or top ten, but  
18 they have not analyzed everything in full detail.

19 MEMBER BLEY: So this thing you just  
20 talked about, do you have an estimate of how big an  
21 effect that is in the overall PRAs of putting in these  
22 intentional conservatism for, I guess you'd call it  
23 regulatory convenience?

24 MR. RISHEL: I can speak a little bit from  
25 experience in that part is that in some cases, you

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1 know, there will be a few operator actions that can  
2 have some, one, two percent contribution. What my  
3 experience has come in is that more importantly is  
4 when you go off and you, say, analyze a diesel out of  
5 service, so now an operator action that may not have  
6 been in your face as important suddenly shows right  
7 up.

8 In that case, that typically might drive  
9 the particular analyst to go off and do that one or do  
10 ones like that, but, you know, I guess I would echo  
11 Dennis's thing is, you know, a lot of this is driven  
12 by good enough.

13 I get to a point, and it's good enough,  
14 and I stop. Be in time, cost, HRAs are relatively --  
15 well, not difficult but long process to do all these.  
16 It takes quite a bit of time to do, especially if you  
17 start talking about field operator actions.

18 Can I actually get there? Where's the  
19 fires? Can I send a person there and execute that?  
20 Going through that type of -- which isn't really the  
21 operator part. It's more the access part, and that  
22 part alone takes quite a bit of effort.

23 MR. FINNICUM: There's another issue that  
24 creeps up in here is that some plants when they have  
25 a fire, they switch from their normal EOPs to FEPs,

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1 and almost all of the operator actions that they have  
2 to perform and respond to this now has to address two  
3 sets of procedures, so that adds to it.

4 MR. FINE: Right, and then, you know, when  
5 it comes to doing the actual analysis, you don't do  
6 your dependency analysis until the very end. After  
7 you've done everything, right before your submittal  
8 you're doing your dependency analysis, okay.

9 You know, you did a cursory one for peer  
10 review to get that done and peer reviewed, but really  
11 after you've done your fire risk evaluations and all  
12 that stuff you're going to quantify again, and you're  
13 going to do decency analysis.

14 That's when you're going to start to want  
15 to tweak or say, "Oh, geez, I need to go look at that  
16 HEP deeper. That .1 may have been good enough early  
17 on, but now it's not. I've got to go deeper."

18 So those are the refinements I think we're  
19 going to see a lot here in the near future is I'm not  
20 changing my methodology. I'm just going deeper into  
21 my methodology and being more specific, more exacting.

22 Another big unknown for us is the  
23 unknowns. We don't know where a lot of stuff is, and  
24 so you end up grouping them right to that closest  
25 cable tray. In these fire scenarios, that adds a

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1 tremendous amount of uncertainty to your result.

2 MEMBER SCHULTZ: So, I have to ask the  
3 question, though. So, when you say something like,  
4 "We're going to drive until we get the result to 5 x  
5 10-5," and then we're done.

6 MR. FINNICUM: No. No, that was a  
7 misinterpretation.

8 MEMBER SCHULTZ: Okay.

9 MR. FINNICUM: What that --

10 MEMBER SCHULTZ: I'm glad to hear that so  
11 far.

12 MEMBER BLEY: I've heard that a couple of  
13 times.

14 MEMBER SCHULTZ: It's a strong statement,  
15 and I'm --

16 MR. FINNICUM: What the 5E-5 is is,  
17 actually it was triggered by some comments that Jaczko  
18 made a couple years ago, and what we were seeing is  
19 people were coming in for fire PRAs that had 1E-3, 8E-  
20 4.

21 You look at that, and you're saying, "This  
22 is extremely conservative. It's really not going to  
23 do what they want," and saying, "You really need to  
24 bring your number down. What the right number is, I  
25 don't know, but what we're telling people is you

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1 probably want to be in the neighborhood of 5E-5.

2 There are people that have got there that  
3 had good PRAs. It's not a stop there. It's not --  
4 you don't have to get below it, but, you know, if  
5 you're looking at 7E-5, that's probably a reasonable  
6 number for your plant. There may be conservatives in  
7 there, but you may have gotten everything out.

8 Vintage of plant makes a difference on  
9 what number you can get, but, no, the 5E-5 is not a  
10 be-all and end-all. It's just a direction to indicate  
11 where you want to go.

12 MR. FINE: Ad back to the HEPs, how deep  
13 you have to go in HEPs is dependent completely on your  
14 plant. One of our plants has a lot of HEPs and a lot  
15 of dependency on human action, so we spend a  
16 tremendous amount of time on the HEP part of the  
17 model.

18 Another plant that maybe doesn't have that  
19 many operator actions because they have mostly  
20 automatic actuation, they're going to need to do that  
21 so much. That's not going to be their driver of their  
22 uncertainty and of their model, you know, so it really  
23 does depend on many things as to why you're driving  
24 into that area.

25 MEMBER BLEY: I'm sitting here with a

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1 funny look on my face because I've been thinking about  
2 what Bob was saying about the human reliability  
3 analysis, and I guess I could see running a case with  
4 your HEPs set to one to make an argument, but those  
5 things you talked about being hard, the things that  
6 preclude access, two sets of procedures, it's not  
7 always they jump from one to the other.

8 There's often two sets of procedures are  
9 going on at the same time. The complications issued  
10 by those things are real safety issues, and they're  
11 things that you can learn about by doing this PRA, and  
12 if we're not learning those things, it's just we're  
13 missing a real opportunity, I think.

14 MR. RISHEL: Correct, and, you know, what  
15 Dennis was alluding to, you know, one of Progress's  
16 goals I heard yesterday was -- or Duke's goals -- was  
17 to -- I'm still learning.

18 CHAIR STETKAR: Old speak.

19 MR. RISHEL: Was to eliminate manual  
20 actions in as much as possible as compensatory actions  
21 for fire scenarios. That was a -- that was a goal  
22 established early on, and so in that case, you know,  
23 that's a big safety benefit.

24 Now, the other part is, as you point out,  
25 is that the procedures may not mesh so well or need to

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1 be, and we've frequently fed back to the fire  
2 protection organization that procedures need some  
3 revision and make that part of the overall project to  
4 revise those procedures, be it, "If then, if this,  
5 then this," rather than, you know, "Go execute  
6 regardless of the fire damage. If I have a fire in  
7 this compartment, go do this."

8 Well, that may not be the best thing. You  
9 know, if you have a spurious aux feedwater pump and  
10 you're worried about over-feeding, now go do  
11 something, rather than disable the aux feed pump early  
12 on. So correct on both ends, and I think, you know,  
13 this is where PRA and Appendix R philosophies clash in  
14 some cases, and it's up to us utilities to try and  
15 mesh those two views of the world together.

16 MR. FINE: We are -- you know, even though  
17 a lot of the stations are upset about the way this  
18 fire PRA development has gone, because really the PRA  
19 aspect of it is a very, very small aspect of it. It's  
20 mostly fire analysis that's the big chunk, but,  
21 unfortunately, it all gets thrown in. It's the PRA  
22 guys.

23 But it has made people more aware. It has  
24 made people more sensitive to what we have to say, and  
25 if we go sit down with the operators and we say,

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1 "Okay, you see this indication. You see this  
2 indication. This is happening. What are you going to  
3 do?" you know, they're going to go to the procedures,  
4 and they're going to say, "I would do this."

5 You know, and it's interesting like when  
6 we were doing internal flooding. We gave them a  
7 series of indications, and the operator was just like,  
8 "Yes, that's a bad day," and he starts writing a CR,  
9 you know, so it is working. The process is working.

10 MR. HENNEKE: All right. To answer your  
11 question a little more specifically, I haven't seen  
12 more than about a 20 percent error because of detailed  
13 HRA. I mean, if a plant sees that they're trying to  
14 work something out and it's 50 percent of their CDF,  
15 they may have to do detailed -- they have to credit it  
16 and then do a detailed operator analysis.

17 They do it, so it's only the couple of  
18 percent here and there, so I wouldn't say detailed HRA  
19 is killing the numbers, but there are a lot of actions  
20 down in the one, two, three percent range which we  
21 consider significant which require by the standard to  
22 have detailed HRA walk-throughs, simulator runs, the  
23 whole deal.

24 Continuing, best practices, human action  
25 for control room evacuation, control room scenarios,

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1 including evacuation and damage to remote shutdown.  
2 We've seen a number of plants that have these .1  
3 number in their analysis.

4 That would be a capability Category 1.  
5 We'd get a finding for that. That may be sufficient  
6 for 805. You know, we're not there to judge that, but  
7 some plants have tried to do better analysis and have  
8 done so, and that would be the best practice in our  
9 mind.

10 One of the things that was missed early on  
11 are these reference SRs, and the reference SRs have  
12 all these review of sequence cut sets, importance  
13 measures, review of insignificant cut sets, review of  
14 insignificant scenarios, and all this stuff that the  
15 internal events have done for many, many years.

16 The fire, because the reference SRs are  
17 thought of secondary, a lot of the fire PRAs early on  
18 didn't have this review for robustness of your  
19 insignificant cut sets, for example, and so we saw a  
20 number of issues there.

21 In more recent ones we're starting to see  
22 some excellent reviews, and we're starting to see at  
23 least the fire PRA getting closer to the internal  
24 events PRAs in the area of documentation and reviews  
25 and robustness for logic.

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1           Dependency analysis, I think Ray has  
2 mentioned that. We've seen some good evaluations on  
3 that. We've seen some where that wasn't done before  
4 we got there, and we've seen some where it was kind of  
5 done at the last minute. We had some issues with what  
6 was done, so we've seen a range of that, but we have  
7 seen some pretty good stuff come out of some of these  
8 plants.

9           Uncertainties, characterization of  
10 uncertainty, there have been some recent papers. In,  
11 for example, the PSA 2011 Conference there was a paper  
12 on how to do uncertainties in the area of fire  
13 modeling and fire modeling parameters, which can get  
14 you quantification of uncertainties in your fire  
15 modeling.

16           We have seen that in one of our peer  
17 reviews which allowed you to quantify some of the  
18 things that we don't even do in internal events, for  
19 example, the thermal hydraulics uncertainties. We  
20 don't -- we have uncertainties in thermal hydraulics.

21           We don't carry that in internal events  
22 through quantitatively, but we're asking for them to  
23 do that in fire modeling, so it's actually gone beyond  
24 what internal events does. We have seen that. It is  
25 quite difficult to do.

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1           We have seen full quantification. We've  
2           seen full uncertainty parameters. We've seen state-  
3           of-knowledge correlation and correlation in your  
4           parametric studies, full documentation of PRA  
5           limitations affecting applications.

6           So that's the sort of thing we would  
7           expect to see in the uncertainties section. A  
8           majority of plants have not done this, especially the  
9           early ones, but we have seen at least one plant that  
10          has attempted to do this fairly well.

11          CHAIR STETKAR: I think -- I'm trying to  
12          be cognizant of the time here, but it's also too easy,  
13          I believe, to generalize the term "model uncertainty."  
14          There's a NUREG coming out soon, I hope -- it's out in  
15          draft form -- that addresses fire modeling, issues of  
16          model uncertainty as part of that process.

17          There is uncertainty in the fidelity of a  
18          particular model to replicate test data. That's kind  
19          of model uncertainty in my mind. There's also  
20          uncertainty in the parameters, the input parameters to  
21          that model that affects the results of that model.

22          The second of the two is something that  
23          can be treated, you know, and people tend to lump both  
24          of those two together as, "Well, that's all model  
25          uncertainty," and I don't know whether you've seen,

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1 you know, examples of people trying to address both of  
2 those issues. You said you've seen a few.

3 MR. HENNEKE: Yes, we had a -- we had a  
4 workshop in the spring that just came out. The notes  
5 just came out on uncertainty, and included in that was  
6 some pretty good discussion on those. There was  
7 discussion, actually, of what we call the completeness  
8 uncertainty.

9 I mean, "We haven't finished our model, so  
10 is that an uncertainty?" Yes, well, it's completeness  
11 uncertainty, although the theoretical uncertainty guys  
12 wouldn't consider that completeness uncertainty, but  
13 in essence it is.

14 So we're driven by completeness  
15 uncertainty, but, yes, we're seeing -- we're seeing  
16 people try to do what they call uncertainty analysis,  
17 and we haven't really looked at everything you're  
18 talking about.

19 CHAIR STETKAR: Okay.

20 MR. HENNEKE: But we do recognize that,  
21 and the standard does point to that. We refer back to  
22 the internal events one, and in there it looks at all  
23 the aspects of uncertainty and assumptions.

24 CHAIR STETKAR: Thanks.

25 MR. HENNEKE: Okay, so areas of

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1 improvement, we tried to focus the last couple slides  
2 on the things we saw that plants were doing right, at  
3 least in some cases. Obviously, the big issue for us  
4 is not that they're not complete at the time of the  
5 peer review.

6 Six weeks prior to the peer review being  
7 performed, we do a readiness review. We have on a  
8 number of cases not gone forward. We have on a number  
9 of cases recommended they not go forward and have gone  
10 forward, anyways.

11 The end result of that is 89 findings,  
12 which doesn't help, you know, but to date I don't  
13 believe -- in comparison to what we would do for an  
14 internal events review and how ready the internal  
15 events PRAs are done, I have not done a single review  
16 where they were ready, which gives us some issues, so  
17 we end up averaging more than 50 findings.

18 When you look back at the internal events  
19 peer reviews, you won't see that many findings, so  
20 it's a real issue, and it's -- you know, you have a  
21 schedule to get it done. You get it. You do it  
22 early. You have too many findings, and it ends up  
23 working against you with regard to schedule.

24 We keep trying to tell the utilities not  
25 to do it too soon, but when you have the Senior Vice

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1 President for the site calling up the BWR Owners Group  
2 Chair saying, "We've got to get this done," then  
3 that's what we do, but we try to reflect that in our  
4 findings, and we do, so we're seeing some high number  
5 of findings as a result of that.

6 CHAIR STETKAR: So, can I -- I'm sorry,  
7 Dennis.

8 MEMBER SCHULTZ: Well, just for  
9 clarification, Dennis, what I heard you say is if  
10 somebody really isn't ready, that's going to be 80, 90  
11 findings, but on average you're finding that there's  
12 50 findings as you've gone forward here? In other  
13 words --

14 MR. HENNEKE: I don't know the exact  
15 number is more. I would say the average --

16 (Simultaneous speakers.)

17 MEMBER SCHULTZ: -- are really ready?

18 MR. HENNEKE: The average number is about  
19 70.

20 MEMBER SCHULTZ: And that's not a good  
21 place to be.

22 MR. HENNEKE: No, it's not a good place.

23 MEMBER BLEY: Can I ask you a  
24 clarification on findings? I haven't seen any of  
25 these peer reviews. I've seen only a few peer reviews

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1 of internal events PRAs. I'm pretty sure those, as I  
2 recall, and it's been a few years since I saw them,  
3 for each issue that they look at, they get a grade.  
4 I forget if it's A, B, C, D, or something like that.

5 So, you find something on every one of  
6 those issues, but some of them are perfect. Some are  
7 good enough. When you say findings, you're counting  
8 the things that you identify as deficiencies.

9 MR. HENNEKE: The new, the revised  
10 approach, findings are A or B from the previous one,  
11 so a C and D would be a suggestion.

12 MEMBER BLEY: Okay.

13 MR. HENNEKE: So when there's 50 findings,  
14 there's probably 70 suggestions.

15 MEMBER BLEY: Okay.

16 MR. RISHEL: But the new approach is a  
17 finding is written if the SR does not meet Capability  
18 Category 2.

19 MEMBER BLEY: Okay.

20 MR. RISHEL: If it meets Category 1,  
21 you're still going to get a finding.

22 MR. HENNEKE: Or there is a substantial  
23 error --

24 MR. RISHEL: Or there is an error.

25 MR. HENNEKE: -- where you could meet

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1 Capability Category 2, but you have a fairly  
2 substantial error which affects your results.

3 MR. FINE: And a lot of it is style of  
4 the peer review. You can have a peer review team that  
5 writes one F&O against multiple SRs because it's a  
6 common threat, or you could write a finding on each  
7 one of those SRs individually, okay. That's style,  
8 okay, and that's --

9 MEMBER BLEY: So counting findings isn't  
10 really a good way to evaluate these things.

11 MR. FINE: Yes, counting findings is not,  
12 no, not at all, and even the -- what really matters in  
13 the findings is the significance of the finding. A  
14 majority of findings are, "Add this sentence," or, "Do  
15 this." You know, they're minor editorial in many  
16 cases, but --

17 MR. FINNICUM: I'm going to disagree. I'm  
18 going to disagree with that.

19 MR. FINE: I'm just saying in my peer  
20 reviews --

21 MR. FINNICUM: We wouldn't write a finding  
22 on that.

23 MR. FINE: In my peer reviews, there has  
24 not been anything of real major meat that says, "I've  
25 got to go back and fundamentally do something

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1 methodologically," or something like that. Some guys  
2 do. Some guys do get those big ones.

3 So you have to look at the significance of  
4 the finding, if it's minor documentation, or is it,  
5 "You need to go back and completely re-do walk-downs  
6 and re-do everything from there"? That's -- there's  
7 a significance there.

8 MR. HENNEKE: So, we have been consistent  
9 in the BWRs. We do have findings that cover multiple  
10 SRs. We have -- we try not to write the same issue on  
11 multiple SRs over and over, so we do try to combine  
12 them, so these are typically combined.

13 We do have very specific guidance on what  
14 a finding is versus what a suggestion is, and if the  
15 utility comes back and says, "This isn't significant.  
16 Here's our reasoning," then we will revise our  
17 findings as suggested, and we have done a couple of  
18 those.

19 But we -- but Ray is correct. For  
20 example, one of the plants that had less findings than  
21 50, for example, but a number of the findings were as  
22 a result of they had something like 2,200 scenarios.  
23 They had done great detail analysis and great detail  
24 analysis on uncertainty analysis, but once we got into  
25 detail, we found some issues. Is it significant? Is

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1 it --

2 You know, so sometimes you get more  
3 findings the more detailed the analysis gets, so  
4 counting findings doesn't tell you significance.  
5 There is no question, but the overall trend of not  
6 being ready and having that many findings is an  
7 indication that these PRAs aren't ready to be peer  
8 reviewed at the time of it.

9 So whether they trigger follow-ons really  
10 depends on whether in correcting things they do a new  
11 method. That's up to the utility. It's not up to the  
12 Owners Group, so that's not our call.

13 We have done three follow-on peer reviews,  
14 and, unfortunately, two of those we again feel like  
15 that the fire PRA wasn't ready for the follow-on peer  
16 review, and as a result we had a number of findings  
17 come out of those follow-on peer reviews, and it  
18 continues -- schedule continues to be really the  
19 driving issue here.

20 MEMBER BLEY: I like to focus on technical  
21 issues, but let me ask you one process issue about  
22 that. Are you recommending that utilities wait until  
23 they are ready, or do they need this process to get  
24 ready? Is this such a new thing for them?

25 MR. HENNEKE: We recommend they're ready.

1 It's just a waste of time for everybody to come and do  
2 a peer review and have 89 findings.

3 MR. RISHEL: We have recently -- we  
4 require the utility to submit sort of a readiness  
5 letter, so we have beefed up our requirement and our  
6 approval of readiness to try and focus on getting  
7 farther down the road before we bring in a peer review  
8 team.

9 MR. FINNICUM: We've also tried to put in  
10 penalties.

11 MR. RISHEL: You know, that success is not  
12 yet reportable.

13 MR. FINNICUM: In the early day, we had --  
14 I think we had three. Dennis said he had some. The  
15 team came onsite, and they looked at what was there,  
16 and they laughed.

17 CHAIR STETKAR: Really? Seriously?

18 MR. FINNICUM: It was that bad. They  
19 couldn't figure out what had been done.

20 MR. HENNEKE: We just -- we just do not-  
21 reviewed, and we finish the review, and then we  
22 require the follow-ons. We've never left site, but  
23 it's been pretty close.

24 CHAIR STETKAR: Those weren't the 1:27 in  
25 the morning reviews.

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1 MR. HENNEKE: A lot of the findings,  
2 especially the larger numbers of findings, were  
3 related reference SRs because the initial four or five  
4 they didn't look at the reference SRs and didn't look  
5 at the non-significant cut sets and all these things,  
6 and so the documentation wasn't complete or as  
7 complete as an internal events PRA.

8 For example, the simple thing of the  
9 importance measures, you expect importance measures to  
10 come out of the fire PRA. Importance measures are  
11 part of the internal events, and it is a reference SR,  
12 so the requirement to do importance measures was not  
13 recognized by at least one utility.

14 So, we went in, said, "Where's your  
15 importance measures?" "Well, we don't have it. It's  
16 not required," and we said, "Yes, here it is," and we  
17 write a finding on it.

18 So, is it a big deal? Well, I mean, it's  
19 hard to do with FRANX, as you've heard, or FRANK, so  
20 it is quite time-consuming to do that. Does it affect  
21 the results? No. Is it an insight? Yes, importance  
22 measures are part of the insight.

23 So, you read your review, your importance  
24 measures, for logic to see, "Yes, this event is  
25 important. Why is that, and does it make sense?" so

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1 these reference SRs really hit us early on, but we're  
2 seeing better results more recently because we've let  
3 the utilities know as part of their self-assessment  
4 that they have to review their internal, their  
5 reference SRs and provide a self-assessment that ranks  
6 their reference SRs.

7 As you heard, utilities are very rarely  
8 doing the supplemental analysis. Like I said, we  
9 we've only written two UAMs. We have supplemental  
10 analysis in our BWR Owners Group report.

11 As you heard, we submitted over a year  
12 ago. We're waiting in line to be reviewed. Our more  
13 recent peer review got a UAM against one of the  
14 approaches, but to date, for example, the DC circuit  
15 one, I don't believe anybody has used the DC hot short  
16 duration in any of the PRAs, even though it's a major  
17 conservatism in the results.

18 So, utilities have recognized and have  
19 communicated to us that the time and effort and the  
20 issues associated with the 805 transition on using an  
21 unapproved method of something beyond 6850.

22 So, as you can see, you know, we take our  
23 peer reviews very seriously. We recognize that our  
24 role in all of this is to make sure that we are  
25 comprehensively identifying issues, and I think we

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1 have been very successful in that. We're part of the  
2 overall fire PRA quality process that we think in the  
3 end we're going to help utilities out and try and get  
4 the best product out there, but it's been painful.

5 We do share our best practices with our  
6 utilities. We have slide presentations at our Owners  
7 Group meeting for this, but still the one we need to  
8 improve the most is getting the fire PRA reviews ready  
9 before we do peer review. Somehow in all of this we  
10 need to encourage supplemental analysis and  
11 innovation, and I think all of the speakers have said  
12 that. So, go ahead.

13 CHAIR STETKAR: Thank you, Dennis. Any of  
14 the members have any final questions or comments for  
15 the presenters?

16 MEMBER BLEY: We still have staff to come.

17 CHAIR STETKAR: We still have staff to  
18 come, but I want to make sure that we have the folks  
19 up front here grilled extensively.

20 Good. What I'd like to do, we have two  
21 members who have to leave at noon for whatever  
22 reasons.

23 MEMBER RAY: Selfish reasons.

24 CHAIR STETKAR: Okay, if you want to put  
25 it on the record, because they just don't care.

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1           MEMBER SHACK: Because the schedule showed  
2 the meeting ending at noon.

3           CHAIR STETKAR: In seriousness, typically  
4 at the end of one of these Subcommittee meetings we  
5 usually go around the table and ask each of the  
6 members if they have any summary comments or  
7 suggestions, and I want to make sure I capture that  
8 from both Bill and Harold before they leave. So,  
9 Bill, do you have any --

10           MEMBER SHACK: Well, I just -- I am  
11 encouraged. You know, we've heard a lot of  
12 complaints, so I'd be the first to say that the  
13 process doesn't seem to be optimal, but it does seem  
14 to me to be working.

15           I think, you know, we're getting what we  
16 really wanted to in a regulatory sense out of this,  
17 which was a much better understanding of the fire risk  
18 of plants, and I think we seem to be getting that, as  
19 painfully as it may be. We clearly do need  
20 improvements in the process, but that will come.

21           I'm actually very surprised to see the  
22 number of plants that are planning to do fire PRAs  
23 that aren't transitioning to 805. That was -- that  
24 was news to me. That was perhaps the most surprising  
25 thing that I saw, which does indicate to me that

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1 people see value in the risk-informed applications  
2 that are coming up in terms of tech specs and 50.69.

3 So, as painful as this process is, I'm a  
4 little surprised they're not sort of waiting a little  
5 bit for, you know, perhaps some refinements in the  
6 process, but, again, I think we've seen enough  
7 examples that the process does work.

8 It may not be optimal, but it's doing the  
9 job, and we are getting important insights and, I  
10 think, a much better understanding of fire risk in  
11 plants. I'm generally pretty encouraged.

12 CHAIR STETKAR: Thank you. Harold?

13 MEMBER RAY: Yes, I was more interested in  
14 the process and what I'll call the generic take-aways  
15 here, as opposed to the technical detail, which the  
16 Subcommittee is more focused on, as you've indicated.  
17 I think there has been some suggestion by the  
18 presenters that there are generic conclusions to be  
19 drawn here, and I believe there are.

20 We should try and grapple with those, as  
21 well, even though that may not be the primary aim the  
22 Subcommittee is involved in, because I think that this  
23 is the first of what may be more efforts to better  
24 risk inform and perhaps even make a more dramatic  
25 change in how plants are regulated from a safety

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1 standpoint.

2           So, that being said, I am interested also,  
3 for example, in, well, what is the longevity of this?  
4 Having, as Dennis mentioned, operated a plant for a  
5 while, I can't imagine how I would expect this 5 x 10-  
6 5 that's been chosen as a reference point for the  
7 industry efforts would be implemented over time as  
8 other things change going forward or what even the aim  
9 is that we should have in this particular effort, much  
10 less a larger effort, because with all the diversity  
11 that exists, not only in plant designs but in siting  
12 and other things, the bottom line of all of this  
13 effort is an enormously diverse set of outcomes.

14           If you could achieve perfection and  
15 calculate a full-scope PRA, including fire and  
16 external events and so on, you'd find an enormous  
17 range. Well, what do you -- what does that mean? I  
18 don't know.

19           It's a fact, and so, like I say, that's  
20 not got anything to do with this particular meeting  
21 here, but it does have a role to play, ultimately, in  
22 what we're doing, because there's comments that have  
23 been made about how much resources are consumed by  
24 this effort.

25           Ultimately, if you're a Senior Vice

1 President at a plant site or something like that, you  
2 have to ask yourself, "Why am I doing this? What is  
3 it really achieving?"

4 You know, I set up a PRA to manage  
5 equipment outage in the plant, among the very first  
6 plants to do that, and so I know the value that it has  
7 in trying to make sure the plant is maintained with  
8 safety margin all the time.

9 So it's not that I don't appreciate PRA,  
10 but I'm just not sure where all of this goes  
11 ultimately, and so that's just an observation I make.  
12 It doesn't require any response. I don't expect it to  
13 be part of anything that we're doing specifically  
14 right now having to do with fire PRA, but I think this  
15 is a great model that we should learn from, and that's  
16 basically what I wanted to say.

17 CHAIR STETKAR: Thank you.

18 MEMBER RAY: With that, Bill and I will go  
19 meet our airplane.

20 CHAIR STETKAR: You two are now excused.

21 MEMBER RAY: Thank you.

22 CHAIR STETKAR: And I guess we'll have the  
23 staff --

24 MEMBER RAY: Twelve o'clock right up,  
25 straight up.

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1 CHAIR STETKAR: You've got ten seconds to  
2 get to the elevator. We'll have the staff come up.

3 We are ready. We have our necessary  
4 number of people, so just proceed.

5 MR. BEASLEY: Okay. I am Ben Beasley. I  
6 am acting as the Branch Chief for the PRA Licensing  
7 Branch. The real Branch Chief is supporting us over  
8 here on the side, Don Harrison, and Ray Gallucci is  
9 there, as well. Stephen and JS will give the  
10 presentation, but I wanted to just say a couple things  
11 to kick it off.

12 You've heard some frustration on the part  
13 of the industry. I think you will now hear some  
14 frustration on the part of the staff, which I'm sure  
15 you expected. One other thing is that we are eager,  
16 as well, to have processes that work that can review  
17 and accept methods, new methods to advance, you know,  
18 the state of the technology.

19 It is interesting to point out that the  
20 FAQ process has worked. There are a dozen or so  
21 clarifications and guidance that has come out of that  
22 process. The EPRI UAM panel did work, not as well as  
23 it was hoped, but of the four items that were  
24 submitted to it, three were accepted, and, you know,  
25 we would -- those can be used freely now.

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1           So those processes do work, and we're  
2 eager and willing to continue using those, or if  
3 industry wants to develop, you know, another process,  
4 then we would be happy to consider that, but that was  
5 something that I think I'd like to throw out there to  
6 set the stage.

7           Our main preference is to not see new  
8 methods in an LAR, you know, that being the first time  
9 that we have an opportunity to review it. That is not  
10 our preference. So, with that I will turn it over to  
11 Stephen.

12           MEMBER BLEY: Before you do --

13           MR. BEASLEY: Yes.

14           MEMBER BLEY: I want to ask something, and  
15 either you can answer it or these guys or somebody  
16 over here, because it didn't look like it was in the  
17 slides. Can you give us just a brief overview of how  
18 the peer review process is envisioned from the staff  
19 side?

20           You know, back when it started with the  
21 PRAs and with the standard, my understanding was the  
22 utility had developed the PRA, had it peer reviewed,  
23 and then submitted, I guess, a letter to you saying --  
24 to the NRC saying that their PRA meets the standard.  
25 Then, the review from NRC is limited to some kind of

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1 a spot-checking to make sure that, in fact, it does.

2 It sounds like, and it seems reasonable to  
3 me, that in the case of the fire PRAs after they reach  
4 that point that you're doing a much more thorough  
5 review, and this is all -- much of this is new, so  
6 that doesn't surprise me. I wonder if that's true.

7 MR. BEASLEY: Just very briefly, we don't  
8 do a detailed review. The main thing we do when we  
9 review an application is go through the F&Os and see  
10 how they were dispositioned.

11 So that's been a lot of our requests for  
12 information is, you know, that it'll say -- you know,  
13 an F&O response will be, "This was dispositioned." We  
14 will say, "How?"

15 MEMBER BLEY: It was really a similar  
16 process to what you use every day.

17 MR. DINSMORE: Well, it's a similar  
18 process. This is Steve Dinsmore from PRA Licensing  
19 Branch. It's a similar process, but it's the high  
20 end. I mean, we have the opportunity to tailor our  
21 review to how important what's being requested is, and  
22 most of our stuff has been kind of at the low end.  
23 This is one of the first ones that's really up there,  
24 so it's within the process, but it's at the --

25 MEMBER BLEY: Getting more attention.

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1 MR. DINSMORE: -- hard end of the process.

2 MEMBER BLEY: Okay, thanks.

3 MR. HARRISON: This is Don Harrison. I  
4 guess some day I'll be back as Branch Chief of the  
5 APLA, but the other perspective there is that, you  
6 know, the fire PRA applications here are very complex,  
7 and I would argue it's more complex than what we've  
8 seen from our previous applications that typically  
9 have quite a bit of use now, and so there's more  
10 reliance on the peer review findings and focusing on  
11 those.

12 Here we're seeing a lot of, again, nuances  
13 that are showing up in the applications beyond just  
14 new methods, and that's driving us down into more of  
15 a detailed review in those areas, because they are  
16 different than what, way, NUREG/CR-6850 number might  
17 be.

18 So there's, in addition to just peer  
19 reviews, there's also things that may trigger the  
20 staff to start pulling the string on the use of a  
21 method or a parameter that's different than what we  
22 would have seen in the general method. So there's  
23 reasons why some things drive us into the details.

24 MEMBER BLEY: Okay, thanks.

25 MR. HYSLOP: And I guess the only thing

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1 I've got to say is that the staff in its reviews has  
2 identified some key assumptions. In fact, we have a  
3 generic set of REIs that we have developed as a part  
4 of these reviews. There are about 12 of them, and so  
5 these may or may not be picked up in the peer review.

6 MR. GALLUCCI: This is Ray Gallucci. Also  
7 remember that 805 the focus is on the change in risk.  
8 Peer reviews are focused on the baseline risk. Under  
9 805, the authority having jurisdiction has to pass  
10 judgment on the changes in risk, so there's more than  
11 just relying on the peer review in an 805 application.  
12 The delta risk is not something that's typically  
13 covered in the peer review.

14 MR. DINSMORE: Well, it's been a very  
15 invigorating morning. I'm going to try to walk  
16 through these as quickly as possible, and we'll see  
17 what happens.

18 The first one, NUREG/CR-6850 provided for  
19 detailed fire modeling to be used when the simpler  
20 methods to determine fire damage produced results that  
21 are believed to be too conservative. That was kind of  
22 the plan. Consistent with the previous ACRS  
23 conclusions, the staff continues to believe that 6850  
24 is usable as the basis for NFP 805.

25 We think if you follow 6850 and the facts

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1 and the formal process that you can reach a solution.  
2 Most or some licensees have -- that have relied on  
3 this detailed fire modeling have completed their LAR  
4 so that the process works if you really wanted to use  
5 it.

6 After I read this next bullet, I have a  
7 clarification before I get questions. Some licensees  
8 have tried alternative methods, assumptions to address  
9 perceived excess conservatisms, which introduces  
10 additional model uncertainty.

11 We need to kind of set up where this is  
12 being used here. This PRA is being used to make  
13 really substantive changes to the plant. This hasn't  
14 been done before.

15 There's many hundreds of VFDRs that are  
16 brought into the licensing basis using the PRA. As  
17 part of those VFDRs, a lot of operator actions are  
18 disappearing, because they're no longer VFDRs.  
19 They're changing from cold shutdown to safe-and-  
20 stable, which is also kind of in the PRA, and that  
21 change, too, is bringing out hundreds of operator  
22 actions.

23 This is all good. This is what we  
24 intended. However, it does place a lot of emphasis on  
25 this PRA, and so that's one of the reasons why this

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1 process is becoming maybe more formal than the  
2 traditional PRA process where five or six guys say,  
3 "Well, this thing is too high. It's obviously too  
4 high. Here's a way to get it down. We're going to  
5 get it down like that," and the NRC has kind of not  
6 reacted badly to that.

7           However, this stuff is different. We want  
8 to approve those methods that they're using to bring  
9 this stuff down, and the other side of this is they've  
10 got these hundreds of things that they don't have to  
11 do. It's not like they're having to fix hundreds of  
12 things that they -- it's not like they're having to  
13 fix hundreds of things. They're only fixing may five  
14 or ten or 15 of these VFDRs.

15           So, it's not having that huge an impact on  
16 the results as we're seeing them, so I guess we're not  
17 quite as frantic about getting these new methods  
18 reviewed, although we'd love to have them, but we  
19 don't think it's necessary to keep moving.

20           CHAIR STETKAR: For your purposes to have  
21 reasonable assurance that the transition is  
22 acceptable.

23           MR. DINSMORE: Yes, to have confidence  
24 that the analysis they did supports what we  
25 authorized.

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1 CHAIR STETKAR: Okay.

2 MEMBER SCHULTZ: And here your focus is  
3 for the NFPA 805 --

4 MR. DINSMORE: That's correct.

5 MEMBER SCHULTZ: -- versus the other suite  
6 of fire PRAs that are also being performed.

7 MR. DINSMORE: That's correct. When they  
8 come in with their own 4.bs and stuff, we might --  
9 we'll have to deal with that as part of that process.

10 MR. HARRISON: If I can -- this is Donnie  
11 Harrison again. If I can just add one thing, though,  
12 it's not just an 805. It's not typically just  
13 transition. It's also the use of these methods post-  
14 transition for the licensee to do what's referred to  
15 as self-approval.

16 CHAIR STETKAR: I think of that as part of  
17 the training.

18 MR. HARRISON: So, sometimes you have to  
19 -- you're looking at the method, not knowing exactly  
20 how it's going to be used in the future, so that  
21 aspect also has to be kind of considered.

22 MR. DINSMORE: Then the next bullet --

23 CHAIR STETKAR: Actually, Steve, before --  
24 Donnie, a bit of a clarification. Once a licensee is  
25 approved, you know, makes the transition and then is

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1 -- can do their own self-assessment, you know, self-  
2 approval for certain levels of plant changes, as part  
3 of that process do they have to provide auditable  
4 justification that indeed the model that they're  
5 using, you know, is adequate to support that?

6 MR. HARRISON: There's still documentation  
7 requirements.

8 CHAIR STETKAR: Yes.

9 MR. HARRISON: It has to be auditable.

10 CHAIR STETKAR: So, in the oversight  
11 process, you could come in and audit that and say,  
12 "Okay, you self-approved this change. Justify that  
13 your model was okay. We have a question about that,"  
14 but that's oversight.

15 MR. HARRISON: That would -- that would be  
16 captured probably in Reg Guide 1.205.

17 CHAIR STETKAR: Right.

18 MR. HARRISON: I'm trying to recall. At  
19 a low level, they could do self-approval, and if they  
20 were to then have a higher level where they had to  
21 come back in for approval from the staff --

22 CHAIR STETKAR: Well, certainly then you  
23 --

24 MR. HARRISON: -- that would trigger a  
25 review.

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1 CHAIR STETKAR: That's right, but what I  
2 was asking in terms of the low level, if they self-  
3 approve the change, you know, and as part of that I'm  
4 assuming they're going to have to have some sort of  
5 internal justification that's available then for staff  
6 audit under the --

7 MR. HARRISON: Right.

8 CHAIR STETKAR: -- reactor oversight  
9 process, for example, or whatever fire protection  
10 reviews you do perform.

11 So, what I'm asking about is, you know,  
12 some of your concerns about going forward, well, do we  
13 need to look at all of the details of every nuance  
14 because we're worried that they might be misused in  
15 the future? Some of that might be caught, picked up  
16 in the future.

17 MR. HARRISON: Yes, but you don't -- you  
18 want to make sure the method starting out is  
19 acceptable. You don't want to find out that the  
20 method may have been acceptable for some reason in  
21 transition but clearly would not be acceptable in  
22 certain circumstances down the road.

23 CHAIR STETKAR: Okay.

24 MR. HARRISON: I think that's why the  
25 Ocone review we approved transition but did not

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1 approve the self-approval capability --

2 CHAIR STETKAR: Yes.

3 MR. HARRISON: -- because there was a  
4 concern about the PRA for its use.

5 CHAIR STETKAR: Yes.

6 MR. HARRISON: So, but, yes, I was  
7 reminded that there is a change process that's within  
8 805 that licensees would have to follow, and it's got  
9 documentation, so the information is there.

10 CHAIR STETKAR: Okay. Thanks.

11 MR. DINSMORE: Okay, the last bullet is  
12 somewhat brutal, but we want to make sure that this is  
13 clear. We disagree that a peer review team can review  
14 and accept any method assumption by not issuing a  
15 finding on that.

16 That's kind of the flip side of when you  
17 say, "Well, if the peer review team didn't find,  
18 didn't issue a finding on this, the staff shouldn't  
19 review it." That's another way to say that, and we  
20 don't agree with that.

21 Part of it, it's aggravated by the fire  
22 stuff, because there is a lot of different opinions  
23 about what's the proper method out there, and all  
24 these peer review teams are doing these reviews.

25 So we haven't delegated authority to

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1 approve methods to the peer review. We always review  
2 methods, and the SRP actually directs us to review key  
3 assumptions, and the rule requires the use of methods,  
4 data, and approaches that are acceptable to the NRC,  
5 so we're maintaining our authority to go out and look  
6 in as much detail as we find is necessary.

7 Next page. The staff is finding that some  
8 of the new methods/assumptions are somewhat arbitrary  
9 and insufficiently justified to be used to support  
10 substantive risk-informed changes. That's this NFP  
11 805 in particular.

12 Now, part of our problem is we can't sit  
13 here and say, "We like that. We don't like that." We  
14 have to issue a formal document that says, "This is  
15 okay. This isn't okay," which is best for everybody.

16 The only reason I was able to write this  
17 is, as Donnie mentioned, some of these methods were  
18 actually used in Oconee. We wrote a draft SE where we  
19 said, "You can't use this PRA in the future before you  
20 come in and ask us again."

21 Oconee withdrew the request to self-  
22 approval, so that stuff all disappeared, so there's  
23 really still no formal position. However, it's pretty  
24 clear what we would probably do.

25 So the formal review and acceptance or

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1 denial of these new methods has suffered from changing  
2 venues. We went from the facts to the UAMs, and now  
3 we're back to plant-specific. We actually started  
4 with plant-specific LAR, because it was the Oconee,  
5 and then that didn't work out, so we started with the  
6 FAQs, and the FAQs became unpopular. Then we went to  
7 the UAMs, and now we're --

8 So we need a vehicle. We need a way to  
9 get the document in or the method in to look at it, to  
10 review it. All these discussions, it depends a lot on  
11 personalities and stuff. What you need is the  
12 documents.

13 So we're having a -- so we agree 100  
14 percent with them. We're having a hard time getting  
15 these methods in, reviewed, and finished. I guess we  
16 disagree to some extent on how much of the review we  
17 need to do, but we feel we need to do a fair amount.

18 MR. HYSLOP: The one thing I want to add  
19 is with the -- we've indicated that the -- this is JS  
20 Hyslop. The FAQ process is a process that we've used.  
21 It is successful.

22 In fact, as a part of these discussions  
23 that we're having with the plant NRC has initiated a  
24 FAQ related to transient and hot work fires, and  
25 that's been presented to the FAQ Panel, and it's been

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1 presented to industry. So we're working that, so we  
2 do have a process.

3 CHAIR STETKAR: And I think in previous  
4 Subcommittee briefings we've heard kind of both sides  
5 of that process, you know, some of the things we've  
6 heard this morning, elements of frustration about  
7 timeliness is reaching, you know, consensus between  
8 the industry and the staff, but there is a process.

9 MR. HYSLOP: But I guess the only other  
10 thing, even some of the other process, timeliness has  
11 been an issue.

12 CHAIR STETKAR: That's --

13 MR. HYSLOP: It's been an issue with the  
14 UAM, so, you know, these issues when you start getting  
15 into developmental concerns and things, they're  
16 complex.

17 CHAIR STETKAR: Yes.

18 MR. BEASLEY: And speaking to the  
19 timeliness, the FAQ process is faster than submitting  
20 a topical report, which is our routine process for  
21 reviewing methods.

22 MR. DINSMORE: Yes, the FAQ process is  
23 pretty fast, actually.

24 Then the last bullet, the staff  
25 differentiates between unreviewed methods and

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1 assumptions and formally unacceptable ones. What  
2 that's trying to say is we are open to changing these  
3 methods. We'd like to change them, but if we do it in  
4 the SEs particularly, by the time we get to the end of  
5 an SE review and the licensee has retained a method  
6 that we don't agree with, in the case of Oconee we  
7 just said, "Well, you've got such a big change in  
8 risk. We don't think that if you did it the way 6850  
9 said that you would be above the guideline, so you can  
10 transition, but you can't do self-approval."

11 In the case of Harris, there was one  
12 specific model they were using for incipient detection  
13 that we said, "Well, you can't do self-approval on  
14 stuff that's affected by incipient detection until you  
15 use the model, I believe, that was in effect."

16 So we kind of need to keep going, moving  
17 through these submittals. We have to get SEs. We  
18 have to finish, so what I'm trying to say here is if  
19 we can finish but we still have a disagreement about  
20 a method and we can --

21 And these sensitivity studies that  
22 everybody is talking about, this would be the way for  
23 us to say, "Well, okay, we don't agree with the method  
24 that you used. It's been a long time. The review  
25 should be finished. We have enough information to let

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1 you transition. We might not think that you can do  
2 self-approval using this model, but you can  
3 transition."

4 So that's kind of the nuclear option for  
5 the end of one of these reviews, but it is an option  
6 that's available, and it was an option which we've had  
7 to use already once, and so it would be better to kind  
8 of reach some kind of understanding before we get to  
9 that point.

10 MEMBER BLEY: I think this is consistent  
11 with your practice everywhere. Even though you would  
12 prefer no new methods, if you get a submittal that  
13 includes a method that's got its justification in it,  
14 you review it.

15 MEMBER SCHULTZ: But then that review by  
16 process would incorporate a sensitivity study.

17 MR. DINSMORE: A sensitivity study and a  
18 lot of requests for justifications and discussions  
19 about why this factor is acceptable. Within the staff  
20 there's discussions between a dozen people, so it kind  
21 of plugs up the process, too.

22 MEMBER SCHULTZ: I didn't want to diminish  
23 it, but it would at least require the sensitivity  
24 study.

25 MR. DINSMORE: Yes.

1                   MEMBER SCHULTZ: That's been pronounced as  
2 a part of the process.

3                   MR. DINSMORE: That's right. That's what  
4 we've --

5                   MR. BEASLEY: Having it come in as part of  
6 an application changes the dialogue a little bit. It  
7 changes the setting in which we can work on it.

8                   MEMBER BLEY: One o'clock may not be  
9 fixed, so you might not be safe looking up there.

10                  MR. DINSMORE: Actually, I was hoping to  
11 make you guys happy. Model uncertainty contain --  
12 model uncertainty is contained in all phases of this  
13 multi-step analysis, fire frequency, the magnitude of  
14 the fire and the effects of the fire. It just  
15 permeates the whole analysis, and everybody is having  
16 a hard time dealing with that.

17                  CHAIR STETKAR: But, again, I'm really  
18 becoming -- I don't know what the right word is.  
19 Model uncertainty doesn't have anything to do with  
20 fire frequency in the sense that most people think  
21 about model uncertainty.

22                  MR. DINSMORE: Well, let's see, the NUREG  
23 on model uncertainty, what's that called?

24                  CHAIR STETKAR: There is.

25                  MR. DINSMORE: 1855. I guess it includes

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1 key assumptions.

2 CHAIR STETKAR: I think we have to -- my  
3 only point is going to be I think we hear a lot of  
4 generalities, and I think that people too quickly  
5 focus on general issues and make general conclusions  
6 or general responses to those general issues.

7 It's true that indeed there are  
8 uncertainties associated with all of these elements of  
9 an analysis, but by just lumping them together and say  
10 there are huge model uncertainties and you need to  
11 address model uncertainties, if I were going to  
12 address that general issue, I would say, "Well, yes,  
13 there are, but if I'm talking about a particular plume  
14 model within FDT or CFAST, well, you know, how am I  
15 going to address the uncertainty in that model?"  
16 whereas if the results from that analysis are driven  
17 by uncertainty in a particular input parameter, that's  
18 a completely different issue.

19 I mean, that's -- all I'm trying to do is  
20 anchor people here on trying to not be so general  
21 about it. Uncertainties are large, and we can't  
22 address them, or people aren't adequately addressing  
23 model uncertainty because different people are going  
24 to have different interpretations of what that word  
25 might mean.

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1           Unless you, you know, effectively  
2           communicate it on both sides, you're just going to  
3           have this continuing high-level discussion about  
4           things that require too much effort to address because  
5           we don't know how to address them. I'll just stop  
6           there, but that's --

7           MR. DINSMORE: I'll agree with you.

8           MR. HYSLOP: I guess one reason why we  
9           might have fire frequency as a model uncertainty,  
10          because there are factors that are used to adjust the  
11          frequency and modify the frequency directly that are  
12          the result of approaches for continuous fire watches,  
13          hot work procedure, non-compliance, administrative  
14          control.

15          So these factors, they're not related to  
16          the magnitude of the fire, necessarily. It affects --  
17          they modify the frequency directly.

18          CHAIR STETKAR: Allocation of a plant-  
19          level fire frequency to a particular fire area, so in  
20          that sense that's true.

21          MR. HYSLOP: So I just wanted --

22          CHAIR STETKAR: It doesn't affect the  
23          plant-level fire frequency or any uncertainty in it.

24          MR. HYSLOP: It might affect the frequency  
25          applied to the rest of the scenario.

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1 MR. DINSMORE: It could affect the  
2 results, too.

3 CHAIR STETKAR: Oh, sure. I'll let you go  
4 on. I just, you know, kind of listening to both  
5 sides, a lot -- in some sense, I think a lot of the  
6 issues -- perhaps, you know, in the more detailed  
7 exchanges that you have and in the more focused  
8 meetings there isn't --

9 You are communicating more effectively,  
10 but certainly a little bit of, I think, what I've  
11 heard, anyway, over the last day or so is that there  
12 tends to be a little bit of, at least in these  
13 presentations, a little bit of too much generality in  
14 terms of, you know, grouping things together and the  
15 people responding, saying, "Well, we can't address all  
16 of that. It'll take the rest of our lives and all of  
17 the money that we can ever think about."

18 MR. DINSMORE: It's driven a bit by the  
19 language used in all the guidance documents.

20 CHAIR STETKAR: Okay, but the people who  
21 wrote the guidance documents, many of them never  
22 really did a fire PRA, so you kind of have to get past  
23 that.

24 MR. DINSMORE: Well, we have to follow the  
25 guidance.

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1 CHAIR STETKAR: You have to interpret the  
2 guidance.

3 MR. DINSMORE: Well, we have to follow the  
4 guidance as we understand it. We can't not follow --  
5 help.

6 CHAIR STETKAR: You can't not follow the  
7 guidance, but you can interpret the guidance.

8 MR. DINSMORE: Right.

9 MEMBER BLEY: You do.

10 CHAIR STETKAR: And you always interpret  
11 the guidance.

12 MR. DINSMORE: Yes.

13 MR. HARRISON: Really, what I'm hearing  
14 from you, John, is what you're hanging up on is really  
15 the use of this idea of model uncertainty as opposed  
16 to -- there are uncertainties. There are different  
17 kind of uncertainties, and you need -- some of those  
18 you can address directly. Some of those you can't.  
19 You address them indirectly or qualitatively, but you  
20 need to be aware of all of them.

21 CHAIR STETKAR: You need to be aware of  
22 all of them, and broad-brush statements saying, "Well,  
23 we have an RAI because you haven't adequately  
24 addressed model uncertainties," you know, just is not  
25 helpful.

1 MR. HARRISON: That would be too general.  
2 I agree. When we --

3 CHAIR STETKAR: Strictly recognizing the  
4 fact the guidance says model uncertainty should be  
5 addressed.

6 MR. HARRISON: We need to interpret what  
7 that really means in an --

8 CHAIR STETKAR: You need to interpret what  
9 that really means, because you don't know the people  
10 who wrote those particular words, what they understood  
11 at that time. That's the whole point I'm getting to/

12 MR. HARRISON: As long as we stay away  
13 from epistemic and aleatory, I would be happy.

14 MEMBER BLEY: You came to the wrong place.

15 CHAIR STETKAR: You came -- there are at  
16 least 50 percent of us here who won't say anything.

17 MR. HARRISON: But it's just an  
18 understanding that when we communicate we need to  
19 communicate what the real issue is regarding a  
20 particular uncertainty that we're addressing.

21 CHAIR STETKAR: That's the whole point.  
22 That's right.

23 MR. HARRISON: So, and I agree with that,  
24 clearly.

25 CHAIR STETKAR: Sorry, Steve.

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1                   MEMBER SCHULTZ: Steve, I think your  
2 general comment, and this is your closing slide, I  
3 believe --

4                   MR. DINSMORE: Yes.

5                   MEMBER SCHULTZ: I'm sure you've got other  
6 comments that you might like to make, but I think the  
7 general presentation of this slide as the last one and  
8 to be -- to lead to a statement that this is a lot of  
9 what causes the complications that we've discussed  
10 both in terms of technical concern, as well as process  
11 concern, in terms of trying to identify a path forward  
12 here.

13                   We've talked about, in this session, we've  
14 talked about the difficulty that the staff has when  
15 model changes, improvements come as part of the  
16 license amendment requests. I'm still struggling with  
17 how effective or what effective ways licensees have to  
18 bring models forward otherwise.

19                   Rick talked in his presentation earlier  
20 about that process that's been developed and called  
21 for what I heard was some changes in that process so  
22 that model development could be brought forward in a  
23 way that would be effective for implementation. For  
24 example, let's not try to rewrite the document in its  
25 entirety, but let's try to separate out models that

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1 could be improved, should be improved.

2 One would hope that industry would be able  
3 to identify those that would be the very most  
4 important and agree with the NRC on those model  
5 changes that would be most important and figure a way  
6 to make those changes, get those changes approved  
7 outside of the submittal process, because given the  
8 time frame that you've described for responses to  
9 requests for additional information, there is no way  
10 that one could justify a model change of the type that  
11 we've heard in two months or three months.

12 Frankly, that shouldn't be a surprise to  
13 the licensee or the NRC. Those are hard changes to  
14 come to agreement with and approve, and when you put  
15 it on a time frame and time schedule that tight, it  
16 makes it intractable, but at the same time we  
17 therefore need a process that allows the technical  
18 changes to be made outside of that, and there are a  
19 couple of key features that are associated with that.

20 One is that you identify the most  
21 important, and that has to be done by industry, to  
22 identify what I would think with agreement of the NRC  
23 what's most important to achieve in terms of model  
24 changes that would really affect a reduction on  
25 uncertainty, we'll call it, going forward.

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1           Then, secondly, having determined what is  
2 most important, how can we -- how can those changes be  
3 made effectively with approval of the staff to be  
4 implemented.

5           Then, the other thing I've heard that I'm  
6 trying to figure out is statements made by industry  
7 that we only -- we want to do this once. We want to  
8 get it done so we can move on to other things.

9           Well, this is -- I don't believe that's  
10 going to happen, because we are faced with a lot of  
11 work that we need to do as a result of Fukushima  
12 activities, heightened attention to external events,  
13 not just fire but fire, flooding, seismic, others.

14           We're going to be facing these issues  
15 associated with technical improvements, uncertainty  
16 reduction as we move forward in these very, very  
17 complicated areas which are similar, as Dennis said,  
18 similar activities that have been addressed but still  
19 need to be addressed again as we move forward.

20           MR. DINSMORE: Yes, so the quickest  
21 process is the FAQ process, and that is actually  
22 available. One of the difficulties with the quick  
23 process is if you don't like where it ends up, it's  
24 not as attractive.

25           MEMBER SCHULTZ: That's correct, but then

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1 there ought to be some iterative process that can be  
2 put in place that would allow the process to back up,  
3 determine where we go next, to reach a technical  
4 consensus.

5 MR. DINSMORE: Yes. The default process  
6 is the LAR reviews, and we've kind of fallen into the  
7 default process, because the other ones are not being  
8 used, but, yes, that's all correct.

9 CHAIR STETKAR: Steve, one of the things  
10 you mentioned I wrote down a note here, and I wanted  
11 to ask the staff, and perhaps the industry can weigh  
12 in. I've read through several of the FAQs, and, of  
13 course, the FAQs have evolved over, you know, five,  
14 six years or something like that, and they range in  
15 terms of complexity and focus, you know, quite wildly.

16 Have -- you know, now that we're through  
17 the two pilot plants and well into the first wave of  
18 applications, has there been an effort made --

19 Have you seen an effort, and has the  
20 industry made an effort to actually do something that  
21 Steve was suggesting, and that is to say, "Well, there  
22 are two or three, not 30 or 40, but two or three real  
23 modeling issues that we feel would substantially  
24 improve the quality of a large fraction, for example,  
25 of the submittals going forward, not minor differences

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1 in a model for a, you know, plume temperature but  
2 really substantive modeling issues"? Have you seen  
3 that coming forward?

4 MR. DINSMORE: I review all of the RAIs,  
5 so.

6 CHAIR STETKAR: Yes, but those -- that's  
7 back down to the fine structure. I'm talking at kind  
8 of a higher level, a little bit --

9 MR. DINSMORE: I'm going to ask the guys  
10 who are really digging into these analyses if the  
11 industry has approached them. Maybe Alex or --

12 MR. GALLUCCI: This is Ray. This is Ray  
13 Gallucci. Basically, I'd call them more like tweaks.  
14 I don't think we've seen any major attempt at an  
15 overhaul of models.

16 The electrical cabinet method was an  
17 attempt to combine suppression and propagation into  
18 one step, which would be somewhat different from the  
19 6850 approach, which kept them separate, but even  
20 there it was primarily an attempt to come up with a  
21 factor. So, I would say no, I don't believe we've  
22 seen --

23 I guess the one thing that would come  
24 closest to that might be the EPRI/SAIC heat-release  
25 rate approach, which was an attempt to come up with a

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1 phenomenological statistical-based method to reduce  
2 heat release rates based on cabinet ventilation.

3 I would say that would probably -- and  
4 that would have provided for modifications to the heat  
5 release rate curve distributions that were in 6850.  
6 So that one probably -- that was a multi-year effort.

7 CHAIR STETKAR: Thanks.

8 MR. FINE: This is Ray Fine. Is this on?

9 CHAIR STETKAR: Yes, it's on.

10 MR. FINE: Ray Fine, First Energy, and I'm  
11 going to agree with Ray Gallucci. There is no silver  
12 bullet. There is no two or three things. It's little  
13 tweaks throughout the entire methodology, from the  
14 very beginning to the very end.

15 CHAIR STETKAR: Are those, you know,  
16 because you've been involved in the peer reviews, so  
17 I'll put you on the spot, are those little tweaks  
18 generic little tweaks, or are they little tweaks that  
19 tend to be much more plant-specific?

20 MR. FINE: No, these would be generic  
21 methods.

22 MR. DINSMORE: Generic. Okay.

23 MR. FINE: You know, things like, you  
24 know, you start out the fire scenario with what I'll  
25 call deterministic preconditioning, okay. You're

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1 saying that that pump breaks. Oil is on the floor,  
2 disperses and ignites with a frequency. Does that  
3 frequency make sense to catastrophic failure frequency  
4 that we see in the PRA today? No.

5 Okay, so it's not based on a probability.  
6 It's based on it happens, okay, and it goes just  
7 little tweaks like that all the way through, but that  
8 one little thing propagates, and the earlier you start  
9 the propagation, the more it affects.

10 CHAIR STETKAR: Okay. Thank you. Anybody  
11 else? There are people standing in the back. Okay,  
12 you're just standing. Thanks.

13 MR. DINSMORE: I guess I would add one  
14 thing about excess conservatism. We keep hearing,  
15 "Well, if it's too conservative, then it doesn't  
16 matter where I put this second cable," and there were  
17 some examples earlier about that.

18 I think some of that might not be totally  
19 accurate. If it's too -- if you're assuming this  
20 whole room is burning up, you can't -- and you have a  
21 second cable from a different train in there, you're  
22 going to have to move that out, so you're going to get  
23 a safety increase from that.

24 You might not get as much as you'd think,  
25 but just moving it out is going to give you a safety

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1 increase. If that cable is very risk-significant  
2 compared to the other one, same thing, so excess  
3 conservatism, I'm trying to kind of argue that excess  
4 conservatism, per se, is not going to lead you to give  
5 the wrong answers.

6 It might lead you to do more than you  
7 would have needed to do if you didn't have it, but  
8 there were some initial arguments that, "Well, because  
9 there's excess conservatism there, you're going to get  
10 the wrong answer, so you have to approve these  
11 methods, because they're reducing that excess  
12 conservatism." I knew that would start a  
13 conversation.

14 MR. WACHOWIAK: This is Rick Wachowiak  
15 from EPRI. You have to look at the application that  
16 you're going to use the PRA for. If you're using it  
17 for an application that's based on the risk does not  
18 exceed a certain level, which is will you move the  
19 cable out of that room because it's too much risk,  
20 that kind of thing the conservatism doesn't tend to  
21 influence.

22 But if you're doing a type of analysis or  
23 a type of application where you're saying, "Is this  
24 thing more important than this thing?" then the  
25 conservatism tends to either make your answer too high

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1 or too low or something. It can get you to the wrong  
2 answer if you're doing that type of application.

3 So, if it's a -- so you have to look at  
4 the kind of application, and we've seen some of these  
5 places where in some of the PRAs it gives you funny  
6 results when you look at the second thing where it  
7 would tend to say that it doesn't matter if you have  
8 both diesel generators out of service at the same time  
9 because of conservatism in the fire model that burned  
10 up the entire room when we would recognize that that  
11 result cannot possibly be right. So, it's in the  
12 application where the conservatism gets you into  
13 concern.

14 CHAIR STETKAR: Thank you.

15 MR. DINSMORE: That's all the comments  
16 that we had.

17 CHAIR STETKAR: That's it? Any other  
18 members' comments, questions for the staff? Thank  
19 you. It was less animated than I think we had  
20 expected, but that's a good thing.

21 What I'd like to do before -- we usually  
22 go around the table and get final comments and  
23 suggestions from the members. I would like to open up  
24 the bridge line so that we have an opportunity for any  
25 comments from folks who may still be out there.

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1           While we're doing that, are there any  
2 comments from people in the room? Yes?

3           MR. AMICO: Yes, this is Paul Amico from  
4 SAIC. You know, I've been doing PRA and developing  
5 methodology since about 1977, and I think we all kind  
6 of know how methodologies generally get developed is  
7 that somebody provides a suggestion.

8           You get a bunch of experts together. They  
9 beat on it until some -- until you reach the point  
10 where you've got an answer that nobody is completely  
11 satisfied with, but you've got -- but it's something  
12 that you can say, "Well, you know, we're not all  
13 satisfied, but this is the best we can do right now."

14           Everybody's opinion is taken into account,  
15 and that's where the uncertainty distribution comes  
16 in. Somebody is going to be out on the tail of the  
17 curve, because you're never going to get complete  
18 agreement on anything.

19           So that's kind of the process we've really  
20 been following in this whole peer review thing, and  
21 it's not just the peer reviewers. Sometimes we go  
22 outside the peer review team. I was on both sides of  
23 it. I had a method in, and I had methods I was  
24 reviewing.

25           Sometimes we even go outside the peer

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1 review team at the time and get additional comments.  
2 On the heat release rate stuff we got 50-something  
3 comments from NRC. Let's keep in mind, by the way,  
4 it's not -- you're really not getting comments from  
5 NRC. It's a person. It's a technical expert or two  
6 that they've brought in that has their own opinion,  
7 okay.

8 What happens when you get a letter from  
9 the NRC rejecting a method, what that is doing is  
10 saying, "The weight of our technical expert is one.  
11 The weight of all the other ones is zero," okay, and  
12 that's just bad science. That's my comment.

13 MR. HARRISON: If I can respond, this is  
14 Donnie Harrison. Especially in the context of the UAM  
15 panels, we have a representative that would sit on  
16 those panels, but it's not like that person was in a  
17 void and had no interaction with any other staff or  
18 consultants.

19 Oftentimes during these panel discussions  
20 there would be other people incorporated or brought  
21 into the discussions, and so I don't want the ACRS to  
22 believe that one staff member made a decision, and  
23 somehow that became the NRC position. The NRC staff  
24 talk and discuss and even argue with each other about  
25 what the right approach is on a method and ultimately

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1 would come up with a decision.

2 Just like as we do endorsement and  
3 standards, we have staff that work with standards  
4 development organizations. They provide a standard.  
5 When that standard comes to the NRC for endorsement,  
6 there can be additional clarifications or exceptions  
7 taken to the standard based upon a broader review.

8 That's no different here than the NRC  
9 takes a broader view of a document that comes in, and  
10 that broader review results in its rejection. That's  
11 what our job is in that context. So, I just -- I  
12 understand the whole frustration, but that is the  
13 regulatory perspective.

14 CHAIR STETKAR: Thanks, Donnie. Anything  
15 else from anyone in the room? If not, if there's  
16 anybody out there on the bridge line, I had to keep  
17 saying this, but it's the only way we do know.  
18 Somebody out there just make a -- say something so we  
19 can confirm it's open.

20 MR. PINNELL: It is. This is George  
21 Pinnell with ARS.

22 CHAIR STETKAR: Thank you. Now, does  
23 anybody have a comment? Hearing no comments, I guess  
24 we can re-close it just to -- problem is that the  
25 bridge, for those of you out there, when the bridge

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1 line is open we get a lot of noise and clacks in here,  
2 which is disturbing to a lot of people, so we'll re-  
3 close the bridge line.

4 Thanks again to the staff. Thanks again  
5 to the presenters this morning, and before we close  
6 what I'd like to do is go around the table and ask for  
7 three things from the remaining members. Number one,  
8 do you have, as we asked Harold and Bill, do you have  
9 any final comments or observations? That's number  
10 one.

11 Number two, and, unfortunately, there are  
12 only four of us here, is there any sense of anything  
13 that we've heard over the last day and a half that we  
14 should bring forward to the full Committee at this  
15 time for either a briefing or for the final follow-up?

16 Number three, should we think about  
17 scheduling another Subcommittee meeting on specific  
18 topics, just to kind of get that out on the table?  
19 So, if we can kind of address those three issues, I'd  
20 appreciate it, and, Joy, you're first.

21 MEMBER REMPE: Okay. Clearly, it's  
22 complicated, and I appreciate both the staff and the  
23 licensees and the industry organizations for taking  
24 the time to not only come here but also giving  
25 specific examples on why it's complicated and how

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1 they're trying to address things.

2 I think another follow-on meeting would be  
3 useful. With respect to going to the full Committee,  
4 or you mentioned even if there's any letters that  
5 should be written, it's contentious enough and there's  
6 a lot of issues enough that I think it might be  
7 worthwhile having a smaller briefing to the full  
8 Committee and deciding whether a letter is worthwhile  
9 at this time.

10 CHAIR STETKAR: Okay. Any -- we'll  
11 obviously have to discuss this. Any initial, if we  
12 were going to schedule another Subcommittee meeting,  
13 any particular topics, or is it too premature to  
14 discuss that in the context of this meeting?

15 MEMBER REMPE: I'd rather go outside, but  
16 you had mentioned today about looking at more detail  
17 on a couple of issues.

18 CHAIR STETKAR: Okay.

19 MEMBER REMPE: And I think those issues  
20 would be worthwhile, too.

21 CHAIR STETKAR: Okay. Thank you. Steve?

22 MEMBER SCHULTZ: Well, I would also like  
23 to express my appreciation to all the presenters, both  
24 yesterday and today. There's been a lot of very good  
25 discussion related to the processes that have been put

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1 forward, many of the technical issues that are being  
2 faced, have been faced by the licensees, as well as  
3 the NRC reviewers in this area.

4 In spite of all those issues, it also  
5 appears that a lot has been accomplished, and the  
6 process is moving forward. The question is could it  
7 be moving forward in a more effective way? And I  
8 don't mean that just in terms of process.

9 I mean in terms of technical issues, as  
10 well, because, as I mentioned earlier, the issues that  
11 have been concerns, the technical concerns related to  
12 fire and especially as it pertains to both the  
13 characterization calculation of uncertainty with  
14 regard to the fire issues, are also carrying forward  
15 in other external event analyses.

16 Not to repeat, but this is going to gain  
17 even more importance as we go forward, so I am  
18 encouraged by what we've heard with regard to NEI  
19 involvement, EPRI involvement, industry involvement,  
20 and NRC involvement in the fire area in particular,  
21 and I hope this also carries forward in these other  
22 areas, as well.

23 With regard to bringing this forward to  
24 the full Committee, I think it would be better for the  
25 Subcommittee to first discuss a next Subcommittee

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1 meeting and then make that determination following  
2 that discussion.

3 CHAIR STETKAR: Thank you. Dennis?

4 MEMBER BLEY: Yes, I, too, would like to  
5 thank both the staff and folks from the industry for  
6 very good presentations and discussions, and even the  
7 bickering helped us see what's going on a little  
8 better, I think. I hadn't thought about full  
9 Committee, but some of the issues that have come up  
10 made me think it might be a good idea to get to a full  
11 Committee.

12 We in our letters pointed out the problem  
13 with rushing through these and having such a tight  
14 timetable that we didn't really have pilot studies  
15 that informed the rest of the process. What we've  
16 heard today goes even further to pointing out some of  
17 the problems in this rush through the process, and the  
18 reasons that came about aren't ours to talk about  
19 here.

20 There will be life after this rush, and  
21 that's where I think it might be important to get  
22 involved. Steve Dinsmore's point that now they're  
23 under a process that requires them to accept or  
24 reject, so they reject if they even don't like a  
25 little piece of the method means that for the longer

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1 term -- and I see why that is happening in the shorter  
2 term.

3 For the longer term, some way to get this  
4 process organized to get the best possible method and  
5 methods in place is important and to have ways to get  
6 those issues back on the table and look at them for  
7 the longer term and reach some degree of consensus.

8 So I think in the not-too-distant future,  
9 and I don't think it has to happen in the next couple  
10 of months, somewhere even further along through this  
11 rush process it would be good to have the full  
12 Committee meeting so that we could address some of  
13 those issues and give our thoughts both to the staff  
14 and the Commission on what we think would help this in  
15 the longer term.

16 As for Subcommittee meetings, I think it  
17 would be really useful for us to get a heads-up on the  
18 process by beginning to look at some of these reports  
19 that have been submitted and approved and submitted  
20 and rejected so that we're better informed about what  
21 the issues are and what the extent of the real  
22 technical disagreements are.

23 CHAIR STETKAR: Thanks. I'm a slow  
24 writer.

25 MEMBER BLEY: I didn't write any of it

1 down, so I'm glad you did. Somebody in the corner is  
2 getting every word.

3 CHAIR STETKAR: I was going to say John,  
4 I hope, can read his own writing, because I can't read  
5 mine.

6 MEMBER BLEY: That's all right. You'll  
7 get a transcript.

8 CHAIR STETKAR: Yes, but when you read  
9 those, they don't make any sense. As final comments,  
10 again, I said it before, and I really do appreciate  
11 all the effort that the staff and the industry, you  
12 know, the three licensees put into supporting this  
13 meeting, because I do know how much effort goes into  
14 that, and we really do appreciate that.

15 My own thoughts regarding full Committee  
16 and Subcommittee meetings are that I'm kind of on the  
17 margin about going to the full Committee now. I think  
18 that, personally, and we'll obviously need to discuss  
19 this among the Subcommittee, you know, offline, I do  
20 think that it would be worthwhile to have another  
21 Subcommittee meeting.

22 In particular, things that Dennis -- I  
23 kind of support Dennis's notion that for us to try to  
24 at least better understand what some of the technical  
25 issues are that seem to be driving the disparate

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1 opinions about things.

2 The whole purpose of this Subcommittee  
3 meeting was to try to ferret out what some of those  
4 issues are, and I think they have a sense of what they  
5 may be, but obviously we didn't have enough time to  
6 really dig in, so I think another Subcommittee meeting  
7 a little more focused on specific technical issues and  
8 then the notion of Steve's if there is some way --

9 You know, I don't think it would be useful  
10 to look at ten different equally five-percent  
11 contributors, if you will. If there were two or  
12 three, and I think the NEI and EPRI presentations  
13 started to focus on a couple of issues that might be  
14 a little more key or a little more contentious, that  
15 might be useful.

16 I have to think, you know, a little bit  
17 more about timeliness of going to the full Committee.  
18 I do support Dennis's notion. I think that it's  
19 important for ACRS to look as a full Committee past  
20 the current rush to get the LARs approved, because  
21 there are bigger issues.

22 Steve mentioned something about the  
23 process as it will apply to looking at floods, looking  
24 at seismic events, looking at, you know, other issues  
25 that are trailing behind the NFP 805 conversion, and

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1 if there is something that the ACRS Committee should  
2 weigh in in terms of whether it's a process issue or  
3 how technical issues are resolved, that might help.  
4 I think that is important going forward, but the  
5 timing of a full Committee meeting I think we'll have  
6 to discuss a little bit.

7 If there's anything else from any of the  
8 Committee members -- anyone else in the room? If not,  
9 thanks again to everyone. I appreciate it. We did  
10 make it by 1:00, and the meeting is adjourned.

11 (Whereupon, the above-entitled matter was  
12 adjourned at 12:56 p.m.)

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# Industry Perspective

## ACRS Reliability and Probabilistic Risk Assessment Subcommittee

**Victoria Anderson**

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**July 27, 2012**



NUCLEAR  
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# Impacts of NFPA 805 Review Process on FPRA

- **Extensive reliance on NUREG 6850 in NFPA 805 LAR review process**
  - Complicates incorporation of improved methods in FPRA
  - Continued expectations for use in sensitivity studies
  - Removes focus from evaluation of technical adequacy per the NRC-endorsed ASME/ANS PRA Standard
- **Communication issues regarding expectations for PRA results supporting NFPA 805**
  - Acceptance of FPRA methods
  - Sensitivity studies
- **Short turnaround time for supplementary information**
  - Additional sensitivity studies
  - LAR acceptance process vs. LAR review process

# Timeframe for Development and Implementation of Advanced Methods

- **Process**
  - **Development**
  - **Consensus review**
  - **NRC acceptance**
  - **Incorporation into FPRA**
- **Each step carries uncertainties**
- **Potentially unattractive to utilities with time limitations due to NFPA 805 LAR deadlines**

# Unreviewed Analysis Methods

- **Background**
  - Type of Fact and Observation used in peer review process
  - Not the same as a method that is different from those described in NUREG 6850
  - Purpose
    - Solution to handling rapidly improving methods in FPRAs
    - Ensured consistency in peer review process
- **External consensus review is key component**
- **NRC review process**
  - Timelines
  - Technical basis for review conclusions
- **Expectations for addressing in LARs**

# Sensitivity Studies

- **Expectations not clearly documented**
  - **Scope**
  - **Necessity**
- **Expectations for comparison to NUREG 6850**
  - **Impractical**
  - **Intended use of results is unclear**
- **Potential for SE conditions dictating changes to Fire PRA model**

# Sensitivity Studies: Example

- **Electrical cabinet method developed by industry**
  - Assigns a conditional probability to reflect the fraction of fires predicted to exhibit behavior consistent with that described in NUREG 6850
  - Based on thorough analysis of industry data
- **Sensitivity study comparing results using this method with results obtained using NUREG 6850 would be time consuming and technically cumbersome**
  - Re-analysis of fire modeling, growth, and suppression for many scenarios
  - Level of effort could require up to 40 weeks
- **Product of comparison**
  - Risk increase from non-propagating fires will decrease
  - Bias will skew risk results and have unknown impact on applications

# Result of Current Practices

- **Utilities pursuing moving targets**
- **FPRAs remain conservative, obscuring insights**
  - Use of specific methods could be tied to SEs, making improvement difficult or impossible
  - Updates could be extraordinarily difficult
- **Hampered technology advancement**
  - Timelines not supportive of use
  - Not attractive to pursue



# Key Potential Improvements

- **Pursue a living document in NUREG 6850**
  - **Update**
  - **Reflect current state of the art, not a snapshot**
- **Better use of peer review process**
- **Utilize consensus review process for advanced methods**
- **Mutual understanding of approach to new methods in NFPA 805 LAR review process**

# Conclusions

- **Current NFPA 805 LAR review process impedes development and use of realistic FPRAs**
- **SE conditions may force licensees to make changes to base models**
- **Pursuit of better process for encouraging continuous improvement to FPRA methods is vital**



# EPRI Perspectives on the Advancement of Fire PRA

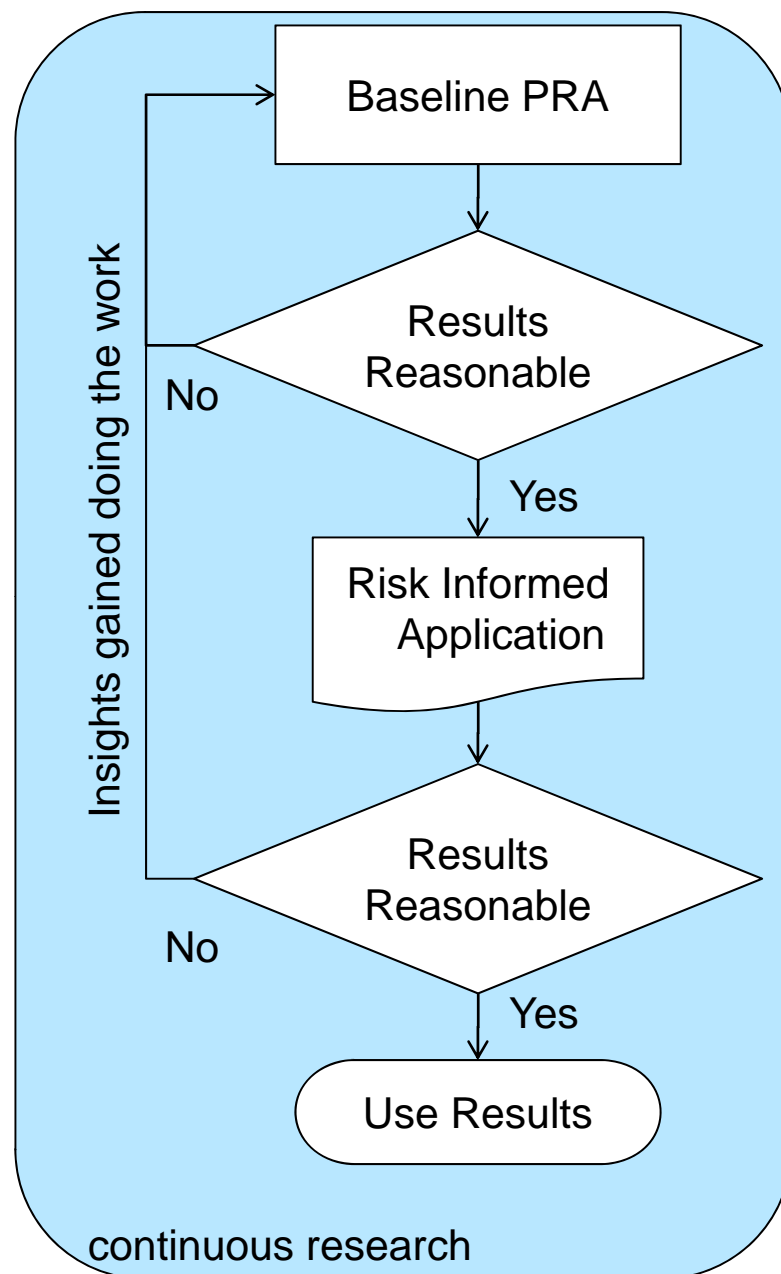
**Rick Wachowiak**  
Sr. Project Manager  
**ACRS PRA Subcommittee**  
July 27, 2012

# Contents

- Brief background
- Original vision for NUREG/CR-6850 EPRI 1011989
- Advancing the state-of-the-art
- Conclusions

## Brief Background

- Traditional PRA process has been iterative
- Processes outlined in literature work for most cases – rarely for all cases
- Analysts learn while performing the baseline PRA and while performing applications
- Continuous research on methods, tools, and data shapes each iteration



# Concerns with Fire PRA Process

Industry perceptions include:

- Traditional PRA process does not appear to be available in fire PRA – specifically NFPA 805 applications
- Insights gained by performing the analyses not fed back
- Too much reliance on prescriptive source of methods, tools, and data
- Treated similar to DBA
  - Define a method that reliably yields conservative results
  - Apply that method across the board

## NUREG/CR-6850 EPRI 1011989

- Developed under the MOU between EPRI and NRC RES
- Written in 2003 – Published in 2005
- Compilation of fire PRA methodology best practices available at the time
- Arranged into a framework that allowed for the evolution of the methods, tools, and data – yet maintained a consistent and coherent structure
- The document acknowledges that the development of methods, tools, and data would continue beyond publication
- The authors clearly intended further development of fire PRA

## Quote

*The methods documented in this report represent the current state-of-the-art in fire PRA practice. **Certain aspects of PRA continue to evolve and likely will see additional developments in the near future. Such developments should be easily captured within the overall analysis framework described here.** It is important to emphasize that while specific aspects of the analysis process will likely evolve, the overall analysis framework represents a stable and well-proven platform and should not be subject to fundamental changes in the foreseeable future.*

- Volume 1, Page xi



## Quote

*The methods documented in this report represent the current state of the art in Fire PRA. Fire PRA is an evolving discipline. **The most effective way to allow these methods to further evolve is through their use in practical applications.***

- Volume 1, Section 3.2

# Development of the Methodology

- Project was to include four phases
  - Documentation of current best-practice methods, tools and data
  - Publication of the NUREG/CR-6850 EPRI 1011989
  - Demonstration of the process through full pilot applications, including an update to the document
  - Technology transfer and training
- Third phase was not completed
  - Full pilot demonstration projects not performed
- As a consequence, limited update of the methods, tools, or data

## Quote

*Critical technical tasks documented in this report were tested individually during pilot demonstration studies. These demonstration studies were intended to ensure the viability and reasonableness of the recommended methods, assess their ease of application, and assess the adequacy of the documentation. It had been intended that the pilot plants would follow through with the balance of their plant analyses and provide feedback and risk insights to the Technical Development Teams. Neither of the two pilot plants completed their full analyses. Based on the demonstration studies performed, quantitative risk insights are limited to specific analysis tasks. No global insights related to plant-wide fire risk estimates or the relative ranking of risk contributors have yet been gained. **In the absence of a full application of the recommended procedures, the authors are unable to predict their impact on overall fire risk estimates with high confidence.***

- Volume 1, Section 3.1

## Alternative Methods, Tools, and Data

- NUREG/CR-6850 EPRI 1011989 project team acknowledged that alternate methods existed and would be developed
- Provided guidance for incorporation into the overall framework
  - Key is to consider the implications for other tasks
  - Task interdependence is also the focus of PRA peer reviews in accordance with the PRA standard

## Quote

*The authors acknowledge that alternative analysis methods do exist, and that their incorporation into the overall analysis framework presented here may be appropriate. However, implementation of an alternative approach to any given aspect of the analysis should include explicit consideration of the implications for other tasks. It is the analyst's responsibility to ensure that analysis consistency and task independence is maintained, or that any dependencies introduced are appropriately treated.*

- Volume 1, Section 2.2

# Advancing the State-of-the-Art

- Various processes attempted
  - FAQ
  - Utility and vendor papers
  - EPRI reports
  - Expert panels
  - Experiments and associated NUREGs
- Varying degrees of success and acceptability
- While difficult, advancement is crucial

## How to Advance the State-of-the-Art

- Further development of methods, tools, and data under the MOU appears to yield acceptable results – however:
  - Not as timely as some other processes traditionally used
  - Priorities of EPRI and RES arise from different perspectives – though they often converge
- Continue to work toward alignment
- Establish a process to update the methods, tools, and data in NUREG/CR-6850 EPRI 1011989
  - Make it modular – full update would be impractical
  - Best available data – experiments and insights from applications
  - Make it predictable – lay out a schedule

# Parallel Paths for Advancement

- Individual utilities and vendors need to continue with traditional advancement paths
- Find solutions for plant-specific problems - difficult to fit into generic prioritization scheme
- Methods, tools, and data should stand on their own merits
- Focus of review of these methods, tools, and data should be on interdependence with other fire PRA tasks
- Can be folded into the overall advancement effort



# Electrical Cabinet Scenarios – High Priority

- All current fire PRAs show electrical cabinet fire scenarios as risk drivers
- Models do not comport with observed fires
  - 1990 – 2009 data show more than 150 cabinet fires
  - None resulted in cable electrical failures
  - A very small percent resulted in insulation damage
  - Current modeling practice (including uncertainty) predicts a very large percentage would result in electrical failure
  - Order of magnitude differences
- Current attempts have not been able to resolve this or even acknowledge what needs to be done to resolve this

# EPRI Perspective

- Fire PRA framework outlined in NUREG/CR-6850 EPRI 1011989 remains viable
- Individual methods (sub-methods), tools, and data can and should be improved
- Insights from performing fire PRA and fire PRA applications identify issues that were not conceived during the development of the document
  - These can uncover quirks or errors in the methods
  - Some are significant
- Continue to address plant specific issues on a case-by-case basis
- Undertake systematic update of NUREG/CR-6850 EPRI 1011989



# Together...Shaping the Future of Electricity



# Lessons Learned From Fire PRA Peer Reviews

## **Risk Management Subcommittee**

### **Chairman:**

Roy Linthicum (Exelon)

### **Vice Chairman:**

Ray Fine (FENOC)

# **PWROG Lessons Learned from FPRA Peer Reviews**

- Peer Review Process
- Scheduled FPRA Peer Reviews
- Lessons Learned – Process
- Lessons Learned - Technical

# Fire PRA Peer Review Process

- NEI 07-12 is the Written Process
  - Pre-review
  - Detailed Review Week Schedule
  - Structured Report Format
- Key Documents
  - ASME/ANS RA-Sa-2009 (What has to be done)
  - RG 1.200, Revision 2 (NRC Clarifications and Qualifications)
  - Consensus Methods (How to do it)
- Eight Person Review Team
  - Lead, Fire Modeling, Circuits Analysis, HRA, Quantification, General PRA

# Fire PRA Peer Review Process

- **Unreviewed Analysis Method (UAM)**
  - Any analysis method not endorsed by the NRC or familiar to the Review Team
  - Methods endorsed only by EPRI expert panel
- **Rely on Review Team to Identify During Review**
  - Is analysis a reasonable modification to NUREG/CR-6850 methodology (judgment call and covered during consensus)
- **Treatment**
  - “UAM” Fact and Observation Written against methods that the review team does not have the expertise to review
    - Identify all other SRs affected by methodology
  - Other affected SRs assessed as if methodology acceptable but “UAM” F&O referenced.

# Scheduled Fire PRA Peer Reviews

Plant	Peer Review Date	NFPA LAR Submittal Date
Palo Verde	October, 2012	N/A (Not Transitioning to NFPA 805)
Salem	November, 2012	N/A (Not Transitioning to NFPA 805)
H. B. Robinson	December 2012	9/30/13
Comanche Peak	March, 2013	Not Scheduled Yet.
Davis Besse	April, 2013	7/1/14
South Texas Project	July, 2013	N/A (Not Transitioning to NFPA 805)
Wolf Creek	July, 2013	N/A (Not Transitioning to NFPA 805)
Seabrook	August, 2013	N/A (Not Transitioning to NFPA 805)
Watts Bar	October 2013	N/A (Not Transitioning to NFPA 805)
Indian Point Units 2 & 3	October, 2013	N/A (Not Transitioning to NFPA 805)
Sequoyah	November, 2013	N/A (Not Transitioning to NFPA 805)
Byron/Braidwood	December, 2013	N/A (Not Transitioning to NFPA 805)
TMI	December, 2014	N/A (Not Transitioning to NFPA 805)



## Lessons Learned - Process

- **Level of Effort and Cost to Complete FPRA Significantly Higher than Originally Believed**
  - Cascaded into Schedule Issues and Follow-on Peer Review
- **Review Requested Before FPRA Done**
  - Performed all steps in process
  - Documented what was done
  - CDF > 1.0E-04 so refinements in process
  - If change methodology to get acceptable answer, will need follow-on review

# Lessons Learned - Technical

- **Target CDF is 5.0 E-05**
  - If significantly above this value, need to refine the analyses
- **Plant Partitioning requires complete coverage of all areas within the global plant boundary.**
  - A number of cases where plants excluded “obvious” areas without providing basis
  - Example is “Manholes”: Can contain cables and transient ignition sources. There have been fires in manholes.

# Lessons Learned - Technical

- **Ignition Frequency requires review for outliers.**
  - Should compare number of events at plant to the “expected value.”
  - If use NUREG/CR-6850, Supplement 1 frequencies, need to perform sensitivity analysis stipulated in the supplement
- **Quantification**
  - Need Mean CDF and Error bounds
  - Need Mean LERF and assessment of contributors to uncertainty (Error bounds not required for LERF)

# Lessons Learned - Technical

- **Human Reliability Analysis**

- Dependency Analysis needs to include all Human actions in model
- Need to evaluate feasibility for new fire-specific actions
- Need to review alarm response procedures to determine if there are any adverse actions due to procedure compliance with one spurious indication.
- All Human Failure Probabilities Must Address the impacts of the fire
  - Procedural guidance
  - Accessibility
  - Availability of Cues
  - Increased Stress levels

- **Circuit/Cable Selection**

- Breaker coordination needs to cover any circuits added to Appendix R list

# Summary

- Use of Fire PRAs for NFPA-805 before Fire Methods/Models were Developed has led to significant re-work, additional costs
- Need to Improve Process with Respect to Approving Unreviewed Analysis Methods
- Future External Events Model Development/Application should Ensure Methods/Models are in Place Prior to Pursuing Applications
- Applications should have real Pilots prior to wide-spread application



# BWR Owners' Group Lessons Learned from FPRA Peer Reviews

Robert Rishel  
BWROG IRIR Chair

Dennis W. Henneke  
GE Hitachi  
Consulting Engineer

USNRC ACRS Meeting  
July 27, 2012



# Topics

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- Peer Review Process – BWROG Specific Approach
- Lessons Learned
  - Best Practices
  - Areas for Improvement
- Summary/Closing Thoughts

# BWROG FPRA Peer Review Process

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Process follows NEI 07-12, including clarification letters:

- Identification of Unreviewed Analysis Methods (UAMs)
  - Used only twice during the BWROG peer reviews.
- Reference SR (Supporting Requirement) review guidance.
  - Resulted from BWROG initial reviews
- “Not Met” versus “Not Reviewed”



# BWROG FPRA Peer Review Process (cont.)

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## BWROG Specific Process Enhancements:

- 2 hour training on the Fire PRA standard and BWROG lessons learned required for all peer reviewers
- Completion of >40% of SR assessments prior to on-site review week
- BWROG Peer Review database includes RG 1.200 clarifications and UAM designation
- 6-7 person team
  - Includes GEH FPRA Personnel, Consultants and Utility Peers
  - Utility participation less than desired (2-3) <sub>4</sub>

# BWROG FPRA Peer Review Lessons Learned

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## Best Practices\* Noted during Reviews:

- Full Evaluation of Non-Appendix R Fire Barriers, including active fire barriers
- MSO review includes description of each scenario, components affected, status of MSO in Safe Shutdown Analysis, and existing PRA modeling
- Full Comparison between Safe Shutdown Analysis and PRA equipment scope

\* Typically Meets CC III of the Standard

# BWROG FPRA Peer Review Lessons Learned (cont.)

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## Best Practices (cont.):

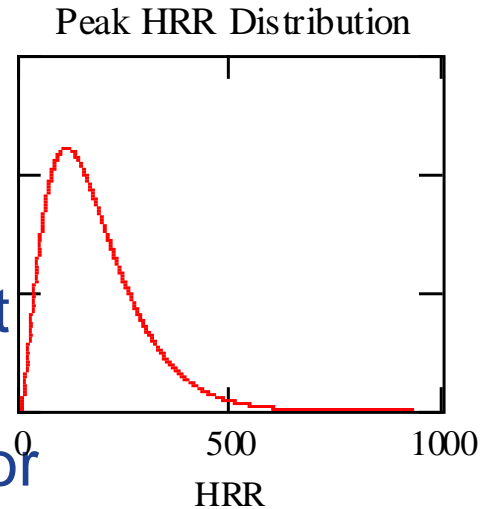
- Inclusion of all internal events PRA components into the FPRA, including cable tracing and circuit analysis
- A complete equipment listing for each possible Fire-Induced Initiating Event
- Coordination Review for all FPRA credited Power Supplies
- No limit on number of individual cables that can affect single component

# BWROG FPRA Peer Review Lessons Learned (cont.)

## Best Practices (cont.):

Multi-point fire model; Fire Heat Release Rates are varied, based on Significance:

- Single size (bounding) fire for insignificant fires
- Two fire sizes above damaging fire size for significant fires
- Three or more fire sizes for highest importance scenarios; for example
  - control room damage or evacuation scenarios.
  - Non-HEAF fire for highest importance cabinets (except where fire size does not impact results.
  - High Risk transient Fires



# BWROG FPRA Peer Review Lessons Learned (cont.)

## Best Practices (cont.):

- Time-dependent fire growth for significant cabinet and transient fires (e.g., detailed fire modeling)
- Use of Thermal Response Model to determine time to cable damage
- Detailed Analysis of all operator action HEPs

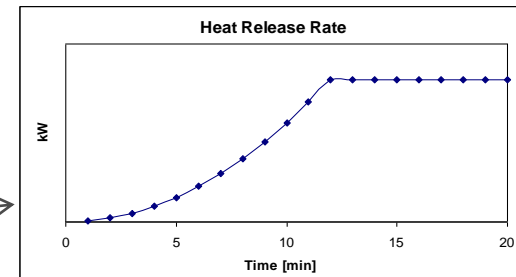


Table H-5: Failure Time-Temperature Relationship for Thermoset cables (Table A.7.1 from reference H.6).

Exposure Temperature		Time to Failure (minutes)
°C	°F	
330	625	28
350	660	13
370	700	9
390	735	7
410	770	5
430	805	4
450	840	3
470	880	2
490 (or greater)	915 (or greater)	1

# BWROG FPRA Peer Review Lessons Learned (cont.)

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## Best Practices (cont.):

- Detailed HEP analysis for control room evacuation scenarios, including actions at remote shutdown panel and impacts of spurious operation
- Development and Review of sequence cutset files similar to the internal events PRA. FPRA readiness requirements sometime were overruled by plant's inflexible 805 submittal schedules.
- Extensive and thorough HFE dependency analysis. Apply the HFE seeding process that calculates an optimal "seed" value for each HFE to be used in quantification.

# BWROG FPRA Peer Review Lessons Learned (cont.)

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## Best Practices (cont.):

- Full Characterization of uncertainties
  - Sources of uncertainty and model assumptions
  - Uncertainty Parameters for fire-specific basic events
    - Include state-of-knowledge correlation
- Documentation of FPRA limitations affecting applications

# BWROG FPRA Peer Review Lessons Learned (cont.)

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## Areas for Improvement:

- Fire PRAs not complete at time of peer review
  - Documentation typically draft or recently issued for the peer review
  - Averaging more than 50 findings and not met SRs per review
  - Significant utility effort to incorporate peer review Findings and Observations
- Even with follow-on peer reviews (focused scope), two of three reviews were performed before FPRA was final



# BWROG FPRA Peer Review Lessons Learned (cont.)

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## Areas for Improvement (cont.):

- FPRA documentation may not include consideration for reference SRs:
  - Resulting documentation is not as complete as an internal events PRA
- Utilities typically do not perform supplemental analysis (beyond NUREG/CR-6850) even if existing PRA results are unrealistic:
  - Too much time and effort to get new method “approved”

# Summary/Closing Thoughts

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BWROG FPRA Peer Review Process is comprehensive and identifying issues. Resolution of issues enhances overall FPRA quality

Many best practices are noted and shared within BWROG to improve future efforts

Main area of improvement is the need to complete FPRA before peer review

Need to encourage supplemental analysis and innovation, if FPRA is to be successful and improved



PRA Licensing Branch

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Division of Risk Assessment

Office of Nuclear Reactor Regulation

## **NFPA-805 PRA Observations**

*Technical Findings on NFPA 805 Transition*

*ACRS Reliability and PRA Subcommittee Brief*

*July 26 & 27, 2012*



# NFPA-805 PRA Observations

- NUREG/CR-6850 provided for detailed fire modeling to be used when the simpler methods to determine fire damage produce results that are believed to be too conservative.
- Some licensees that have relied on detailed fire modeling have completed LARs.
- Some licensees have tried alternative methods/assumptions to address perceived excessive conservatism which introduces additional model uncertainty.
- The NRC staff disagrees that a Peer Review team can review and accept any method/assumption by not issuing a finding on it.

# NFPA-805 PRA Observations

(Cont.)

- The NRC staff is finding that some of the new methods/assumptions are somewhat arbitrary and insufficiently justified to be used to support substantive risk-informed changes.
- Formal review and acceptance/denial of these new methods/assumptions has suffered from changing venues (i.e., FAQs to UAMs to plant specific LAR reviews).
- The NRC staff differentiates between unreviewed methods/assumptions, and formally unacceptable ones which must be removed from the PRA (by license condition if necessary).

# NFPA-805 PRA Observations

(cont.)

- Model uncertainty contained in all phases of multi-step analyses.
  - Fire Frequency
  - Magnitude of Fire
  - Effects of Fire