

Official Transcript of Proceedings
NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
 Reliability and PRA Subcommittee Meeting
 Open Session

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Tuesday, May 2, 2017

Work Order No.: NRC-3053

Pages 1-168

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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RELIABILITY AND PRA SUBCOMMITTEE

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OPEN SESSION

+ + + + +

TUESDAY

MAY 2, 2017

+ + + + +

ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear
Regulatory Commission, Two White Flint North, Room
T2B1, 11545 Rockville Pike, at 8:33 a.m., John
Stetkar, Chairman, presiding.

COMMITTEE MEMBERS:

JOHN W. STETKAR, Chairman

RONALD G. BALLINGER, Member

DENNIS C. BLEY, Member

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MICHAEL CORRADINI, Member

WALTER KIRCHNER, Member

JOY REMPE, Member

MATTHEW W. SUNSERI, Member

DESIGNATED FEDERAL OFFICIAL:

CHRISTIANA LUI

ALSO PRESENT:

MARY DROUIN, RES

FELIX GONZALEZ, RES

DONALD HELTON, RES

STACEY HENDRICKSON, SNL*

JIM KNUDSEN, INL

ALAN KURITZKY, RES

CHRIS LAFLEUR, SNL

MARVIN LEWIS, Public Participant*

NICK MELLY, RES

STEVE NOWLEN, Consultant

JOSE PIRES, RES

SELIM SANCAKTAR, RES

ANDREA D. VEIL, Executive Director, ACRS

*Present via telephone

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P R O C E E D I N G S

8:33 a.m.

CHAIRMAN STETKAR: The meeting will now come to order, or some semblance of such. This is a meeting of the Reliability and PRA Subcommittee of the Advisory Committee on Reactor Safeguards.

I'm John Stetkar, Chairman of the Subcommittee meeting. ACRS members in attendance today are Ron Ballinger, Matt Sunseri, Mike Corradini, Dennis Bley, Walt Kirchner and Joy Rempe. Christiana Lui of the ACRS staff is the designated federal official for this meeting.

The Subcommittee will hear the staff's presentation on the progress of the Level 3 PRA project, including the proposed format and contents of the planned project report.

A portion of this meeting will be closed in order to discuss and protect information that is proprietary pursuant to 5 USC 552(b)(4).

The Subcommittee will gather information -- what are you looking at me for? It says it right here.

The Subcommittee will gather information, analyze relevant issues and facts and formulate proposed positions and actions as

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1 appropriate for deliberation by the full committee.

2 The ACRS was established by statute and
3 is governed by the Federal Advisory Committee Act,
4 FACA. This means that the Committee can only speak
5 through its published letter reports. We hold
6 meetings to gather information to support our
7 deliberations.

8 Interested parties who wish to provide
9 comments can contact our offices requesting time
10 after the meeting announcement is published in the
11 Federal Register.

12 That said, we also set aside some time
13 for spur-of-the-moment comments from members of the
14 public attending to or listening to our meetings.
15 Written comments are also always welcome.

16 The ACRS section of USNRC public
17 website provides our charter bylaws, letter reports
18 and full transcripts of all full and subcommittee
19 meetings, including slides presented at the
20 meetings.

21 The rules for participation in today's
22 meeting were announced in the Federal Register on
23 Tuesday, April 25th, 2017.

24 We have received no written comments or
25 requests for time to make oral statements from

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1 members of the public regarding today's meeting.

2 We have a bridge line established for
3 interested members of the public to listen in to
4 the open session.

5 To preclude interruption of the
6 meeting, this phone bridge will be placed in the
7 listen-in mode during the presentations and
8 committee discussions.

9 We will unmute the bridge line at a
10 designated time to afford the public an opportunity
11 to make a statement or provide comments.

12 At this time, I request that everyone
13 in the room please silence your phones, any other
14 beepy devices, anything that can disrupt the
15 proceedings, please.

16 A transcript of the meeting is being
17 kept and will be made available, as stated in the
18 Federal Register Notice.

19 Therefore, we request that participants
20 in this meeting use the microphones located
21 throughout the meeting room when addressing the
22 Subcommittee.

23 The participants should first identify
24 themselves and speak with sufficient clarity and
25 volume so that they may be readily heard.

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1 Make sure that the green light on your
2 microphone for any of the people up front, is on
3 before you're speaking. And please turn it off
4 when you're not speaking, because it picks up
5 rustling the papers and other noises.

6 We'll now proceed with the meeting and
7 call upon Felix Gonzalez, had to make sure you were
8 here, to open the meeting.

9 MR. GONZALEZ: Good morning, and thank
10 you, Chairman Stetkar. I am Felix Gonzalez. I'm
11 the acting branch chief of the Probabilistic Risk
12 Assessment Branch in the office of Nuclear
13 Regulatory Research. Thank you again for this
14 opportunity to brief this committee on the Level 3
15 PRA project.

16 Back in December 2016, we had the
17 opportunity to brief you on the status of the low-
18 power shutdown Level 1 PRA for internal events, dry
19 cask storage PRA, as well as the integrated site
20 risk approach for -- and pilot obligation.

21 Today you will hear an update on the
22 project status, including milestones that we will
23 be reaching in 2017, and details on the FAR and
24 seismic PRA analysis.

25 Even though we continue to have

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1 challenges on the schedule due to several reasons
2 such as staff getting diverted to other projects,
3 we continue to advance in all areas of the Level 3
4 PRA project. And we are foreseeing that 2017 will
5 continue to be a good year in terms of reaching
6 some of our milestones.

7 With that, I will not steal anyone's
8 thunder. I will conclude my opening remarks and
9 turn it over to Alan.

10 MR. KURITZKY: Thank you, Felix.

11 Alan Kuritzky with the Division of Risk
12 Analysis in the Office of Research. I'm the
13 program manager for the Level 3 PRA project.

14 With me at the front table right now is
15 Mary Drouin. She is the principal technical
16 advisor for the project.

17 And there will be several other
18 presenters as the day wears on. We'll introduce
19 them as they come up front.

20 I wanted to also echo Felix's
21 appreciation to the Subcommittee. This is, I
22 believe, our eleventh time meeting with the
23 Subcommittee on this project.

24 We definitely appreciate the continued
25 interest and valuable feedback that we receive from

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1 the Subcommittee and we look forward to a very
2 productive meeting today as well.

3 Just to kind of echo again what Felix
4 mentioned in terms of what we're going to cover
5 today, in the open session I'll give a quick
6 overview of the project status.

7 And then I'll turn it over to Mary and
8 she'll go over some of our expected plans for the
9 NUREG report that will document the overall study
10 and be released to the public later in the project.

11 When we move into the closed session,
12 we will cover both the fire and seismic -- the
13 Level 1 fire and seismic PRAs.

14 And I won't go into many details on
15 those in my overview, because we will be covering
16 that in detail in the closed session, but I will
17 mention something about their status.

18 Okay. Moving on to the project
19 overview, as we all know by now this project has --
20 involves a lot of independent PRA models.

21 I think at one count I estimated about
22 20, for the sake of argument, 20 different PRA
23 models that go into this overall project.

24 The list of items on this slide for the
25 outline doesn't cover every single one of those

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1 models. It's not intended to, but it's essentially
2 ordered along the lines of the follow-up viewgraphs
3 I'm going to discuss.

4 So, you'll some of the -- the items
5 will be combined together. Reactor, at-power is
6 what we'll talk about first broken down by several
7 hazard categories. Then we'll move on to the
8 reactor, low-power shutdown. Followed by spent
9 fuel, dry -- spent fuel pool, dry cask storage and
10 integrated site risk modeling.

11 And at the end, I'll talk about a few
12 of the upcoming milestones for the project.

13 MEMBER BLEY: Alan, it's probably I
14 don't remember. The FTREX computer code you talk
15 about is where you're somehow mushing together all
16 the different models, it sounds like.

17 Is that something you've told us about?
18 Is that something that we ought to understand
19 what's going on there?

20 MR. KURITZKY: FTREX is a software
21 that's used by the industry in conjunction with
22 their CAFTA PRA software.

23 MEMBER BLEY: Oh, it's part of the
24 CAFTA package?

25 MR. KURITZKY: Right. For -- we're

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1 using the SAPHIRE.

2 MEMBER BLEY: Right.

3 MR. KURITZKY: So, we're not using,
4 actually, FTREX.

5 MEMBER BLEY: Oh. Well, you -- in the
6 seismic, you say you do.

7 MR. KURITZKY: Again --

8 MEMBER BLEY: That's where you say
9 that's how you put the models together for
10 different units and for fire and seismic and other
11 things to put it all into one big model.

12 MR. KURITZKY: When --

13 MEMBER BLEY: That's not true, I take
14 it.

15 MR. KURITZKY: When Selim comes up to
16 discuss the -- Selim Sancaktar comes up to discuss
17 the quantification of the seismic and the fire
18 models, and Jim Knudsen, they can let you know
19 specifically whether we're using -- I know we used
20 FTREX just experimentally early on in the project,
21 because it obviously increases -- it increases the
22 speed of quantification tremendously, but I don't
23 think that ultimately we ended up having to use it.

24 I think we're running SAPHIRE --

25 MEMBER BLEY: For everything.

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1 MR. KURITZKY: Yeah, just everything is
2 in SAPHIRE and --

3 MEMBER BLEY: Well, that's why I was
4 kind of surprised. And this kind of said that's
5 what you used to put all the different pieces
6 together, so it's -- if that's not true, I don't
7 much care, but --

8 MR. KURITZKY: Yeah. I think we may
9 have been implying -- there may be a
10 miscommunication in the slide, because the licensee
11 has done that, Southern Nuclear has used FTREX, but
12 I don't think that we have.

13 MEMBER BLEY: Read the first page of
14 the seismic report.

15 MR. KURITZKY: Okay. But, again, when
16 we get to that area later in the closed session, we
17 can address that head on.

18 MEMBER BLEY: Yeah, the implication
19 there that it wasn't seismic, it was that's where
20 you were putting all the pieces together.

21 MR. KURITZKY: No.

22 MEMBER BLEY: If that's not true,
23 that's fine.

24 CHAIRMAN STETKAR: That probably
25 explains why I didn't recognize the acronym from

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1 the fire, because I haven't seen that in the fire
2 stuff.

3 By the way, you're going to hear that
4 we tag team today. He's Mr. Seismic and I'm Mr.
5 Fire. So --

6 MR. KURITZKY: As long as it's all
7 covered, that's good.

8 CHAIRMAN STETKAR: We've got you
9 covered.

10 MR. KURITZKY: Okay. Before I go into
11 the bar chart that kind of shows the general
12 project status, I want to just refresh the
13 Subcommittee members on this slide from a previous
14 presentation, because it kind of delineates how the
15 -- all the models in this study go through several
16 phases.

17 And for the lack of -- just to --
18 actually, to make it more convenient in referring
19 to it as we continue the presentation, I'm kind of
20 going to refer to the left side as Phase 1 and the
21 right side as Phase 2.

22 But whenever we develop an initial PRA
23 model, that's just the first step. We have a lot of
24 reviews that go on. Part of our quality assurance
25 panel, we have a lot of reviews.

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1 We have internal reviews that include a
2 self-assessment. And then we have internal
3 technical reviewers. And we have project
4 management review.

5 Once that model incorporates all those
6 review comments, it moves on into what I would call
7 the second phase, and that's where we get external
8 to the project-type reviews.

9 And that include PWR Owners Group-led
10 peer reviews to the PRA standards. It involves
11 reviews by a technical advisory group. And it also
12 incorporates feedback that we receive from the ACRS
13 Subcommittee.

14 CHAIRMAN STETKAR: Alan, can you help
15 us -- because we're going to talk a lot about fire
16 and seismic later, where are you on this review
17 cycle on those two particular elements, just so we
18 know?

19 MR. KURITZKY: Thank you for that
20 question.

21 The whole reason I brought this Phase 1
22 and Phase 2 thing is because the seismic and fire
23 are on a little different track and it becomes
24 easier to discuss it when I can call it Phase 1 or
25 Phase 2 for them, because everything else has an

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1 initial model and a revised model.

2 Fire and seismic because -- and, again,
3 to remind you from previous presentations, we based
4 our fire and seismic models largely on what the
5 licensee had done, what Southern Nuclear had done.

6 In the case of the fire PRA, that was
7 one of the preconditions for picking a site for the
8 study, was one that -- we were looking for an NFPA
9 805 plant that had a fire PRA model since we did
10 not have the resources, and accessed the plant to
11 do a full fire PRA.

12 Southern -- the Vogtle plant is not an
13 NFPA 805 plant, but it does have a fully peer-
14 reviewed fire PRA. So, it essentially accomplished
15 the same thing. So, we had the licensee's peer-
16 reviewed fire PRA to start with.

17 The fire PRA, we have a process of
18 essentially mapping the multi-thousands of --

19 CHAIRMAN STETKAR: Yeah, we don't have
20 to get into --

21 MR. KURITZKY: Okay.

22 CHAIRMAN STETKAR: We'll get into those
23 details --

24 MR. KURITZKY: So, just --

25 CHAIRMAN STETKAR: I'm just trying to

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1 figure out where we are here.

2 MR. KURITZKY: All right. So, where we
3 are with that is, we --

4 MEMBER BLEY: At this high level, I'm
5 going to sneak in a couple of questions from the
6 seismic work.

7 The impression I got is you used the
8 fire PRA. But on seismic, the impression I got
9 reading the report is you used your Level 1 -- your
10 Level 1 PRA and you took fragility data and hazard
11 data from Southern and incorporated that into your
12 model.

13 First thing, is that right?

14 MR. KURITZKY: Yes.

15 MEMBER BLEY: Second is, I ready very
16 often at this stage we're doing this, which implies
17 to me there will be a revised next stage to
18 incorporate some of the things that weren't done
19 thoroughly here.

20 MR. KURITZKY: Yes, but let -- so, the
21 short answer to the question is, we were on -- we
22 are right now in that --

23 MEMBER BLEY: Can you say "yes" or "no"
24 to that?

25 MR. KURITZKY: I say "yes."

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1 MEMBER BLEY: Okay.

2 MR. KURITZKY: This is the block that
3 we're in right now. This is the block we're in
4 right now. We're actually on the internal
5 technical review phase --

6 MEMBER BLEY: Okay.

7 MR. KURITZKY: -- for both of them.
8 However, yes, to your question, Dr. Bley, but
9 there's -- there's more to it than that.

10 That was the initial input we got from
11 them. We then -- later, we got revised input from
12 them.

13 So, in the case of seismic, we -- they
14 didn't have a completed seismic PRA model when we
15 were starting our work. So, we were basing it on
16 our own internal model and doing our own work.

17 MEMBER BLEY: But they had all the
18 hazard and fragility --

19 MR. KURITZKY: They had hazard and
20 fragility pieces.

21 MEMBER BLEY: And then they got updated
22 hazard.

23 MR. KURITZKY: Then they went and
24 completed their initial seismic PRA, and then
25 provided us -- after we finished our seismic model,

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1 they provided us updated hazard and fragility
2 information and their draft seismic PRA.

3 MEMBER BLEY: But --

4 MR. KURITZKY: So, then when we did the
5 --

6 MEMBER BLEY: Let me --

7 MR. KURITZKY: So, we did a second
8 version --

9 MEMBER BLEY: Before you leave that
10 spot, the impression I got is you got that, but you
11 said; one, we don't think there's enough change to
12 bother changing our model, and; two, I got the
13 impression that Southern did not update all their
14 fragilities; is that true? Or did they, and you
15 just aren't going to do that, too?

16 MR. KURITZKY: You -- again, the
17 details of which fragilities got updated and which
18 ones might not have, I'll have to leave that to --

19 MEMBER BLEY: Okay.

20 MR. KURITZKY: -- the seismic team.
21 But in general, now my understanding is we actually
22 -- when we got the new information from Southern,
23 we did -- we redid -- we used the -- we changed our
24 hazard -- our hazard curves, and we also replaced
25 the fragility -- new, updated fragility

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1 information.

2 SPEAKER: And this report is not quite
3 up to date.

4 CHAIRMAN STETKAR: Let me see. I think
5 where Dennis is going is that on the seismic part
6 of the study from Southern Nuclear when all is said
7 and done -- forget all of the interim, intermediate
8 stuff -- you used their seismic hazard for their
9 site and fragilities that they quantified for their
10 equipment structures, whatever.

11 MR. KURITZKY: Uh-huh.

12 CHAIRMAN STETKAR: But you -- you then
13 combined the hazard and the fragilities within what
14 I will call "the staff's Level 3 PRA model" to
15 develop the conditional failure probabilities and
16 the effects from the seismic.

17 Is that correct, or not? I just want a
18 yes or --

19 MR. KURITZKY: Yes.

20 CHAIRMAN STETKAR: Okay.

21 MR. KURITZKY: That's my understanding.

22 CHAIRMAN STETKAR: In the fire, it is
23 different.

24 MR. KURITZKY: Yes.

25 CHAIRMAN STETKAR: Substantially

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1 different because from Southern Nuclear, you took
2 frequencies of fire damage states and simply
3 propagated them through the Level 3 -- the staff's
4 Level 3 PRA model.

5 You did not go back and recreate those
6 fire damage states by taking ignition frequencies,
7 evaluating fire growth severity, detection
8 suppression and parsing the fire in a compartment
9 into a variety of different damage consequences; is
10 that correct?

11 MR. KURITZKY: Yes.

12 CHAIRMAN STETKAR: Okay.

13 MR. KURITZKY: In general, yes. The
14 specifics I'll have to leave to the --

15 CHAIRMAN STETKAR: The specifics we'll
16 get into. I just want to make sure the -- what
17 we're trying to get to is the conceptual treatment
18 of fires and seismic are different.

19 MR. KURITZKY: Yes.

20 CHAIRMAN STETKAR: Okay.

21 MR. KURITZKY: Yes.

22 CHAIRMAN STETKAR: And that remains
23 true today?

24 MR. KURITZKY: Yes.

25 CHAIRMAN STETKAR: Okay.

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1 MEMBER BLEY: And probably will.

2 MR. KURITZKY: Yes. Yes. That will
3 remain true. Regardless of how many revisions we
4 go through, that will always remain true.

5 CHAIRMAN STETKAR: Perhaps.

6 MR. KURITZKY: And, again, I apologize.
7 You know, again, the version of the report that you
8 have was an in-progress report. We wanted to make
9 sure we got you something that you could look at.

10 But even today if you look at a report
11 that we would produce today, it wouldn't match
12 exactly what you have.

13 And I don't know -- that report hasn't
14 gone through any review. So, there may be typos,
15 there may be things that aren't so clear. So --

16 MEMBER BLEY: That's not unreasonable,
17 but I -- on the seismic side, that's the impression
18 I got. On the fire side, the impression John got,
19 if I may, is that it looked like you were done with
20 it.

21 CHAIRMAN STETKAR: Well --

22 MEMBER BLEY: That it was your final
23 shot. Excuse me.

24 CHAIRMAN STETKAR: My impression was
25 that the fire analyses were done, but the report

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1 needs some fixing.

2 And I can say this in the public
3 meeting: Volume 1, Volume 2 and Volume 3, at least
4 the versions that we got, I don't care about typos,
5 they don't hang together.

6 There are places where Volume 1 --
7 where information is repeated. And the good news
8 is it's repeated consistently, the bad news is it's
9 just repeated.

10 In some places, the information in
11 Volume 1 is consistent with Volume 3, but not
12 Volume 2. In some cases, the information in Volume
13 1 is consistent with Volume 2 and not Volume 3. In
14 some cases, they all seem somewhat different.

15 And we'll talk more about that in the
16 details, you know, once we get into the proprietary
17 session where I can point you to specific
18 information.

19 And the only reason I don't want to
20 mention it here is because I don't know which
21 information in which volume of the report comes
22 from a particular source.

23 I don't know which of it is Southern
24 Nuclear information, which is information that's
25 developed by, I'll call it, "the NRC staff who

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1 lives in headquarters." I don't know what
2 information may have been developed by other
3 contractors to the NRC staff.

4 So I'll just leave it at that, but the
5 -- certainly the fire documentation needs cleaning
6 up so that it hangs together better or that a
7 reader better understands what you're trying to
8 present in each of those three volumes.

9 MR. KURITZKY: Thank you for that.

10 CHAIRMAN STETKAR: And I know it's a
11 work in progress. I'm not trying to -- but keep
12 that in mind as you go back and revise that
13 documentation, because it -- quite honestly the way
14 to -- I started reading Volume 1 and I had to read
15 the report in reverse to figure out where I -- I
16 got to about page 10 in Volume 1 and then I had to
17 read Volume 3.

18 And then I got to, like, page 10-1/2 in
19 Volume 1 and I had to go back and read Volume 2 and
20 figure out why is Volume 2 different from Volume 3.

21 And then I could finally read Volume 1
22 and then I had to figure out why is Volume 1
23 different from 2 or volume 3. So, it really
24 doesn't hang together very well. And that's --

25 MEMBER BLEY: And one more just kind of

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1 general -- I was kind of surprised that none of the
2 draft material we saw, including some couple-year-
3 old backup reports, had any authors' names on it.
4 So, we don't know quite who did this stuff yet, but
5 I will hear today.

6 And looking at the agenda, I see you
7 have Stacey here to talk on the fires, but I don't
8 see anybody parallel to her to talk on the seismic.

9 Is she going to talk about the human
10 modeling for seismic, or is Selim going to handle
11 that?

12 MR. KURITZKY: I think Stacey will be
13 on the line the entire time.

14 MEMBER BLEY: Okay.

15 MR. KURITZKY: Now that Stacey is
16 listening, I can just take this opportunity and
17 say, "Stacey, you actually were -- you are actually
18 muted from your line, too, so you will not be able
19 to speak on" --

20 CHAIRMAN STETKAR: Well, she can speak.
21 We will pick it up and open the line.

22 MR. KURITZKY: Okay.

23 CHAIRMAN STETKAR: Stacey, if you want
24 to say something, just start talking and we'll see
25 that it works.

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1 (No response.)

2 CHAIRMAN STETKAR: And now we don't
3 know whether Stacey is not there or it's not
4 working.

5 (Laughter.)

6 MEMBER REMPE: Is there anyone else on
7 the line?

8 CHAIRMAN STETKAR: Yeah, we'll try
9 that.

10 If anybody is out there listening in,
11 just please say something to -- so we can make sure
12 that our process works here.

13 (No response.)

14 CHAIRMAN STETKAR: Well, that also --
15 the null set doesn't really prove anything.

16 MR. KURITZKY: And, also, it wouldn't
17 necessarily prove anything, because Stacey is on a
18 separate line. She's on a separate line.

19 MEMBER BLEY: Separate line. So, she
20 should be able to talk.

21 MR. KURITZKY: Right. Right. But she
22 -- if someone else on the other line speaks,
23 doesn't mean it's Stacey.

24 MEMBER BLEY: We'll have to make sure.

25 CHAIRMAN STETKAR: That's the way our

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1 process works. If anyone speaks, it is supposed to
2 start coming through. No need to --

3 MS. HENDRICKSON: Hi.

4 CHAIRMAN STETKAR: There we are.

5 MS. HENDRICKSON: So, this is Stacey.
6 I'm on the line.

7 CHAIRMAN STETKAR: Good. Thanks.

8 MS. HENDRICKSON: Sure.

9 MR. KURITZKY: Okay. So, now to get
10 back to Dr. Bley's question.

11 So, Stacey would be the person to talk
12 to about details at HRA. However, initially Selim
13 will talk about the HRA for the seismic, in
14 general, what we've done. But if there is more
15 detailed HRA guts-type stuff, then Stacey will be
16 available, too.

17 MEMBER BLEY: Is the author of the 2014
18 report model adjustment for human error
19 probabilities and seismic PRA here or on the line,
20 or is that Stacey?

21 MR. KURITZKY: I don't know. That may
22 be Selim. Selim is in the audience.

23 Selim, are you the author of that
24 document? Yes. He shook his head yes. So, he
25 will be available at the front table. Okay.

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1 MEMBER REMPE: Before you leave that
2 slide, remind us -- it's been a while since we last
3 met -- how you interact with the folks from
4 Southern Nuclear in this whole process.

5 MR. KURITZKY: Okay. Southern Nuclear
6 -- this is meant to just show the various review
7 cycles, but Southern Nuclear primarily supplied us
8 a tremendous amount of information that goes into
9 the initial -- the modeling, as well as they have
10 hosted us on many, many site visits with large
11 numbers of people. And so, that's how we got the
12 basic information from them.

13 In terms of our information whenever we
14 have a -- generally when we have the report in, in
15 this phase right here, this -- after the internal
16 reviews and review the model when it goes -- ready
17 to be sent out to the TAG and to do the peer
18 review, we generally send that down to Southern
19 Nuclear also.

20 MEMBER REMPE: Okay. That's what I was
21 wondering.

22 MR. KURITZKY: Actually, we send it
23 down to Southern Nuclear actually when we're doing
24 the management review.

25 We actually send it to Southern Nuclear

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1 before we actually send it out --

2 MEMBER REMPE: Okay.

3 MR. KURITZKY: -- to the PWR Owners
4 Group.

5 MEMBER REMPE: That's what I was trying
6 to find out.

7 MR. KURITZKY: So, during that phase.

8 MEMBER REMPE: Thank you.

9 MEMBER CORRADINI: Okay. So, since Joy
10 asked general questions, can you go back a slide?

11 MR. KURITZKY: Yeah.

12 MEMBER CORRADINI: That list, are they
13 individually following that pathway, or are they
14 doing it as a group?

15 MR. KURITZKY: Who is they?

16 MEMBER CORRADINI: I've got reactor,
17 at-power, internal events; reactor, at-power,
18 internal fires; reactor, at-power, high winds.

19 Are each one of those proceeding
20 through -- I've got it right here. Are each one of
21 those proceeding through the blocks, or are they
22 first gathered together and then proceed through
23 the blocks?

24 MR. KURITZKY: No, actually -- let me
25 go --

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1 MEMBER CORRADINI: I'm still confused.

2 MR. KURITZKY: So, it -- for internal
3 events, it's its own -- internal events, Level 1,
4 goes by itself. Internal flood went by itself.

5 For Level 2 and 3, internal event and
6 internal flood were combined. So, you had a single
7 Level 2 internal event/internal flood model that
8 went through this process. Same for Level 3.

9 Okay. Seismic fire and high winds were
10 all individual for Level 1. They went through this
11 process individually for Level 1.

12 MEMBER CORRADINI: Okay.

13 MR. KURITZKY: When they go to Level 2
14 and Level 3, they will all be combined.

15 MEMBER CORRADINI: Okay. So, then if
16 somebody asks for progress, each one of them has
17 their own progress through the block diagram.

18 MR. KURITZKY: Yes.

19 MEMBER CORRADINI: Okay.

20 MR. KURITZKY: Yes.

21 CHAIRMAN STETKAR: Alan -- I'm trying
22 to keep this at the appropriate level -- you said
23 you combine it all when it goes through Level 2 and
24 Level 3.

25 Without going into excruciating

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1 details, do you lose information from the Level 1
2 models by doing that?

3 In other words, just because a core
4 damage sequence goes to hot pressure with maybe
5 feedwater available to one steam generator, doesn't
6 necessarily mean that operator actions in the Level
7 2 models or the timing of the sequence will be the
8 same if it's caused by a fire or a seismic event
9 or, you know, high wind damage compared to a plain
10 vanilla reactor trip.

11 MR. KURITZKY: So, let me clarify a
12 little bit.

13 I say that they are combined together,
14 but I mean that it's like a single task that we're
15 doing. But, in fact, they are -- will have
16 separate Level 2 results and Level 3 results for
17 high wind or --

18 CHAIRMAN STETKAR: Okay. So, you do
19 keep the --

20 (Simultaneous speaking.)

21 CHAIRMAN STETKAR: Okay. Thanks.
22 That's good enough.

23 MR. KURITZKY: In the SAPHIRE model,
24 you can turn off whatever event that you want so
25 that it's --

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1 CHAIRMAN STETKAR: Okay.

2 MR. KURITZKY: -- it's separate -- it's
3 separatable.

4 Okay. So, moving on to the project
5 status, and this goes along to what Dr. Corradini
6 was just saying, the -- when we look at the status
7 at this level, and, I mean, theoretically we could
8 make it much more detailed, which we could have
9 many more bars and we could show progress of each
10 individual one.

11 But for communication purposes, we felt
12 it was better just to collapse them into a more
13 manageable number here that fit on one viewgraph.

14 So, what you're seeing here is the
15 project status collectively of the model
16 development and the documentation, as well as all
17 the review and revision cycles. And in addition,
18 you notice that there's no PRA level on the column
19 or the row labels.

20 So, Level 1, Level 2 and Level 3 models
21 are all included here on their weight average based
22 on our assessment of what percent of the total
23 level of effort is associated with the Level 1
24 model versus Level 2 versus Level 3.

25 So, essentially, in order to get a bar

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1 that is moving far to the right, you have to really
2 be involved with all the Level 2 and 3 by this time
3 to -- or otherwise you would be more on the left
4 side of the row.

5 So, many of the ones that you see just
6 on the left side where they don't look like they
7 have as much progress, is because we haven't really
8 moved into Level 2 and Level 3 for those yet. So,
9 they might be very far along under Level 1, but we
10 haven't done Level 2 or 3.

11 For the reactor, at-power, internal
12 events and floods, the Level 1, 2 and 3 models --
13 and I'll go into the details of these. That's
14 exactly what the following slides are going to go
15 into, the details of where we are with each of
16 these.

17 But for the reactor, at-power, internal
18 events and floods, all the Level 1, 2 and 3 models
19 have been completed. Where I'll call that Phase 1
20 model, has had the peer review and other reviews.

21 We're into Phase 2 right now and some
22 of those are complete, some of those are still
23 being reviewed, but -- so, you see a lot of
24 progress for that, because we've done Level 1, 2
25 and 3 models for all those.

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1 Dry cask storage was one thing
2 combined. So, it took Level 1, 2 and 3 all under
3 one study at one time. So, that also is fairly far
4 along.

5 Most of the other ones up to now focus
6 primarily on the Level 1. We haven't really moved
7 much into Level 2 and 3 space for the other
8 hazards.

9 MEMBER CORRADINI: What's the
10 difference between the first two bars?

11 MR. KURITZKY: The first bar is
12 internal -- just -- they're both reactor, at-power,
13 but the first bar is internal event and floods, and
14 the second bar is all the other hazards, which is
15 internal fire, seismic events, high winds --

16 MEMBER CORRADINI: Okay.

17 MR. KURITZKY: -- and other hazards.

18 MEMBER CORRADINI: Thank you.

19 MR. KURITZKY: It's just kind of an
20 arbitrary breakdown.

21 And the takeaway from this slide is
22 we're roughly a little over halfway done. And I
23 would mention that the reason that a lot -- there's
24 many reasons why we're only halfway done, but one
25 of the reasons that we do have quite a bit of work

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1 to do, as shown on this diagram, is because of all
2 the review cycles that we go through.

3 And because of some changes in how
4 we're going to deal with some of the review, we may
5 scale back some of that review and revision cycles.
6 And so, we actually might be more further along
7 than might be implied by this figure.

8 MEMBER BLEY: My memory fails at times.
9 On the Level 1, the internal events work and
10 floods, I seem to recall that you actually --
11 industry participated in the peer review. They did
12 a --

13 MR. KURITZKY: Yes.

14 MEMBER BLEY: -- one of their peer
15 reviews on the work.

16 MR. KURITZKY: Yes.

17 MEMBER BLEY: Are they going to do that
18 on the fire and seismic, too?

19 MR. KURITZKY: That's a very good
20 question and I'm going to talk to that in one --

21 MEMBER BLEY: Okay.

22 MR. KURITZKY: On the next slide we'll
23 hit the first part of your question. And then the
24 next slide will hit the second part of your
25 question.

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1 Okay. So, moving on to reactor, at-
2 power, internal events and floods, all three PRA
3 levels, 1, 2 and 3, as we were just discussing,
4 they've all been through the PRA -- the PWR Owners
5 Group-led peer review based on the PRA standards,
6 the ASME/ANS PRA standards. So, that essentially
7 is the Phase 1 into the Phase 2.

8 The Phase 2 is incorporating all that
9 feedback from the TAG, from the peer review, from
10 the ACRS Subcommittee. And those substantial
11 updates to the Level 1, 2 and 3 models are in
12 various stages of completion.

13 Level 1 is completed -- the whole Phase
14 2 work is completed and has been signed off. So,
15 Level 1, at-power, internal event model is done.

16 Okay. The internal flood one is
17 essentially done. There's a little bit of more
18 documentation that has to be cleaned up. However,
19 the lead for that work is also the lead for our
20 low-power shutdown effort.

21 And right now we're rushing and trying
22 to get that low-power shutdown effort into its
23 review phase. And until that happens, that person
24 is focused purely on low-power shutdown.

25 Once that's moved off his desk, he'll

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1 go back and wrap up the internal flood. So, that
2 will hopefully happen in the next -- about a month
3 or so.

4 MEMBER CORRADINI: So, I have a
5 question.

6 You said you're 50 percent done,
7 approximately -- kind of like reactor construction.
8 I'll let you define what "done" is, right?

9 MR. KURITZKY: And we can go bankrupt
10 before we're done, also.

11 MEMBER CORRADINI: So, there's a lot of
12 similarities.

13 How many person -- how many person-
14 hours to get to 50 percent?

15 MR. KURITZKY: I couldn't pull that out
16 of my pocket, but it's been -- it's been a lot of
17 person-hours. A lot more than we anticipated for a
18 couple of reasons. One is --

19 MEMBER CORRADINI: 1,000? 20,000?
20 50,000? What? I'm looking for a number. And the
21 reason I'm asking a number is, how much of that is
22 learning on the job versus essentially --

23 MR. KURITZKY: That's --

24 MEMBER CORRADINI: -- the more
25 experienced of your team that knew what to do, but

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1 were teaching younger members or different members
2 of the team to do it.

3 So, I'm curious about --

4 MEMBER BLEY: Yeah. And are you
5 getting the training benefit you had hoped for?

6 MR. KURITZKY: Yes. That's a good
7 question. When we brief the office directors,
8 maybe even the Commission, we have a slide that
9 goes over all the resource things. They're not
10 what we generally put in a public presentation.

11 MEMBER CORRADINI: Okay. Fine.

12 MR. KURITZKY: However, to directly
13 answer your question is, yes, a large percentage of
14 it is because of the learning curve and the
15 training aspect, because that is one of the main
16 objectives of the study. And that's an objective
17 that we feel we have accomplished -- done very well
18 in accomplishing.

19 We've trained a lot of people across
20 the board, both junior people who have gotten hands
21 -- inexperience -- hands-on experience doing PRA.
22 Even mid-level people who may have been involved in
23 reviewing PRAs or reviewing applications of PRAs in
24 the past have now gotten involved in actually
25 constructing PRA models.

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1 And even senior people who have done a
2 lot of PRAs in the past, have gotten work in maybe
3 some areas that they may not have worked on before
4 like spent fuel pool or Level 3, et cetera, or a
5 different hazard.

6 So, yes, we have -- we've spent a lot
7 of effort in training up people. It's been a big
8 resource cost, but it also has helped us very
9 strongly accomplish one of the main objectives of
10 the study.

11 MEMBER BLEY: Okay.

12 MEMBER KIRCHNER: Alan, could you just
13 elaborate on your generic flowchart? Do the same
14 people do the internal review on the second phase
15 on the right-hand side?

16 MR. KURITZKY: Ideally, yes. Being a
17 fluid organization like --

18 MEMBER KIRCHNER: So, they're learning
19 on the left -- part of that is on the left side,
20 the training you mentioned. And then you come back
21 after you've had external review and then go
22 through it again?

23 MR. KURITZKY: Right.

24 MEMBER KIRCHNER: Do you bring in any
25 new people there with different eyes or a different

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1 look?

2 MR. KURITZKY: No. The idea there is -
3 - the reason we have that second -- this -- this
4 second internal review phase is really because of
5 substantial changes in this after these external
6 reviews.

7 If there was not that much that changed
8 after these external reviews, we would not feel
9 inclined to even go through a second set of
10 internal reviews. We just have the authors update
11 the model here and probably management could sign
12 off on it.

13 But to date, there's been substantial
14 changes that have occurred for all the ones that
15 have gone through that external review phase. So,
16 we felt it was appropriate to have another
17 technical -- to have the technical reviewer go
18 through it again also.

19 We want the same, actually, technical
20 reviewer on both cases, because it's a lot more
21 work when somebody is coming at it brand new.

22 The other person knows what they
23 reviewed initially. Hopefully when they get the
24 revised model, it's been pointed out to them what
25 are the major areas of change, they can focus on

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1 those and then we move forward.

2 As it turns out, on occasion, somebody
3 who was involved in the review in, I'll call it,
4 Phase 1 has since moved on to some other project,
5 may have left the Agency, just may be too busy to
6 take on that duty at that time.

7 And so, in some cases we are forced to
8 use a different reviewer. And we do lose some
9 efficiency there, because that person is coming to
10 it cold and has to do a longer effort to review the
11 product.

12 It gets the advantage of new eyes,
13 certainly, but it's also -- obviously, costs a lot
14 more in terms of resources.

15 MEMBER KIRCHNER: So, in general, do
16 you see substantive changes on the right side where
17 the three -- where the three come from that middle
18 review?

19 MR. KURITZKY: Yes. We, up to date,
20 have seen substantial changes.

21 MEMBER KIRCHNER: Okay.

22 MR. KURITZKY: And not to point fingers
23 anywhere, but somebody in this room is responsible
24 for a lot of those changes, but I'm not going to
25 say where they're sitting.

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1 MEMBER BLEY: Is it near him?

2 MR. KURITZKY: He's close to the
3 hammer. He's close to the hammer. Getting warm.
4 Getting warm.

5 MEMBER BLEY: Perhaps the need for them
6 came from elsewhere, though.

7 MR. KURITZKY: Yes. Quite honestly,
8 all the comments were extremely valuable. That's
9 why I mentioned in the beginning, the feedback we
10 received from the Subcommittee members has been
11 extremely valuable in improving the quality of the
12 models.

13 Of course it takes longer to get the
14 study done, but it has been extremely valuable. We
15 would not want you to hold back on our account.

16 MEMBER BLEY: Okay.

17 MR. KURITZKY: Like that would ever
18 happen.

19 (Laughter.)

20 MR. KURITZKY: Okay. So, going back to
21 the internal event/internal floods, as I mentioned,
22 the Level 1 models are essentially done now, both
23 phases signed off.

24 Level 2, we've completed the revised
25 model and main report and that's now undergoing the

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1 second phase of technical review.

2 In parallel, the Level 2 team is also
3 fixing up and finalizing some supporting
4 documentation, but that, hopefully, will, in the
5 next month or so, we hope to have the Level 2 for
6 the internal event/internal flood locked down on
7 some final version.

8 For the -- and for the Level 3, we
9 actually provided the source term to the Level 3
10 team quite some time ago. But because of other,
11 higher priority work, they haven't really had a
12 chance to work much on it up until now.

13 Now, they're engaging a lot more
14 strongly. So, we hope to have that work moving
15 forward more rapidly going forward. And hopefully
16 in a few months' time we'll have the level -- the
17 revision to the Level 3 internal event/internal
18 flood model completed also.

19 The only other thing I want to mention
20 in terms of internal events was -- it's something
21 that we briefed the Subcommittee on, I think, a
22 couple of meetings ago and that was the expert
23 elicitation that we held for interfacing systems
24 LOCA.

25 As we discussed in previous meetings,

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1 ISLOCA has the potential to be a big contributor in
2 terms of risk even though it's frequency is
3 generally low, because the consequences can be very
4 high.

5 And in our case, we had some data we
6 were using that ended up giving values for
7 frequencies that were way higher than we would
8 expect.

9 We decided to do an expert elicitation
10 to come up with a better handle on the frequencies
11 of those events.

12 And we completed that expert
13 elicitation and we've incorporated the findings of
14 that expert elicitation into our internal event
15 model. So, the final internal event, Level 1
16 model, includes the results of that expert
17 elicitation.

18 So, now moving on to internal fires and
19 seismic events -- and this gets to the other
20 question that you had earlier as to, you know,
21 where do we stand in terms of fires and seismic
22 events in the revisions?

23 So, in this case, as I was mentioning
24 early on, we had models for both internal fires and
25 seismic events that we completed a couple years

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1 ago.

2 We then received either a whole new
3 model from Southern Nuclear, or new information in
4 terms of seismic.

5 And so, the information was
6 substantially -- was different enough that we felt
7 we had to go redo the models.

8 So, we had to redo the fire model, redo
9 the seismic model and now we have those revised
10 models. And so, I called them Phase 1. And so,
11 it's not the revised like on the other side of that
12 diagram, it's still -- it's a revised on the left
13 side of that diagram.

14 And so, now those models are going
15 through internal review -- in fact, if I just go
16 back here, they're right now in this phase here
17 doing the internal technical review.

18 When that's completed, both of those
19 cases, hopefully by the end of this month, will
20 move to management review. And then we'll be ready
21 to go to the major review section here in the
22 middle.

23 So, in both cases, you're going to hear
24 a lot more details about where we are with those of
25 course in the closed session. So, I'm not going to

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1 belabor them.

2 One thing that has just dragged out the
3 fire PRA -- oh, and that comes back to something
4 previously, Dr. Bley, you mentioned -- you were
5 saying -- or Chairman Stetkar was mentioning the
6 fire -- your understanding was the fire PRA, the
7 model was done, but we're just working on the
8 documentation.

9 In the case of the fire PRA, we thought
10 the model was done for some time, but we keep
11 working with the HRA because we're getting results
12 that we're not comfortable with. We believe --

13 MEMBER BLEY: This is fire?

14 MR. KURITZKY: For fire. That there's
15 -- the way either conservativisms in the application
16 of the HRA or the way the approaches work in a
17 broad sense may not really make sense in a specific
18 context.

19 And so, we're having some
20 uncomfortableness with the results coming out of
21 that. So, we're constantly then relooking at
22 different ways to approach that to see if we can
23 get what we would believe to be more realistic
24 results.

25 I think at this point, we've pretty

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1 much come to the realization that we're going to be
2 where we're going to be and we're ready to just
3 call it quits and document it, but --

4 MEMBER BLEY: I'll ask Selim about
5 this, but let me read it to you right now: In the
6 current -- the version of the seismic report I was
7 given, it says that "Fragility analyses using the
8 2012, the older PSAJ for Vogtle, is used even
9 though the 2014 was based on new information.
10 That's because these are time-consuming analyses
11 and may not need to be repeated to account for the
12 2014 update." [as read]

13 So, it reads to me as if you didn't do
14 anything with the new fragilities.

15 MR. KURITZKY: Yeah, we -- again,
16 actually, that will be a question you should ask
17 Jose --

18 MEMBER BLEY: I will.

19 MR. KURITZKY: -- Pires when he comes
20 up.

21 MEMBER BLEY: Oh.

22 MR. KURITZKY: And he'll present --

23 MEMBER BLEY: He's fragilities, too?

24 MR. KURITZKY: Yes.

25 MEMBER BLEY: Okay.

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1 MR. KURITZKY: He'll present before
2 Selim and he'll talk about the hazards and the
3 fragilities.

4 MEMBER BLEY: Okay.

5 MR. KURITZKY: And he can talk to you
6 directly about that.

7 MEMBER BLEY: Okay.

8 MR. KURITZKY: So, I don't want --

9 MEMBER BLEY: Because that seems to
10 contradict what you just said.

11 MR. KURITZKY: Right. I don't want to,
12 you know, I don't want to say anything -- I'll
13 just Jose respond to that.

14 MEMBER BLEY: Fair enough.

15 MR. KURITZKY: Okay. So, again,
16 seismic and fire are both going through internal
17 technical review right now.

18 And we also have just recently started
19 -- kicked off the Level 2 work for these other
20 hazards for fires and seismic and we already
21 recognize one challenge that we're going to have to
22 face.

23 Because we directly linked the Level 1
24 and Level 2 models, we end up with a lot of Level 2
25 accident sequences.

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1 Even for the internal event and flood
2 models, we were having trouble doing the
3 quantification step because there were so many
4 sequences that were jamming into the -- into our
5 software, into SAPHIRE.

6 And so, we know that once we start to
7 incorporate these other hazards into the model,
8 that we're going to have a real issue, particularly
9 the fire.

10 We have 210 fire entries. So, when
11 those things get jammed into the overall model,
12 it's going to be -- and then linked to the Level 2,
13 we're going to have a sequence explosion that we're
14 just -- that we're not going to be able to put it
15 all in there and turn the crank.

16 There's going to have to be some
17 approach to come up with, a simplified approach or
18 some type of structure approach or systematic
19 approach to quantify the model other than just
20 turning the crank on the whole thing.

21 MEMBER BLEY: Let me ask a -- I have a
22 fault tree implementation question. And I expect
23 in some of especially the seismic scenarios, maybe
24 fire, maybe some others especially in Level 2, that
25 rare event assumptions no longer hold and you have

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1 to look at likelihood of success as well as
2 likelihood of failure, which often blows up PRA
3 computer codes.

4 Are you having trouble with that?

5 MR. KURITZKY: We had -- that has --
6 initially, we've run across -- that has caused us
7 some trouble. Right now we are --

8 MEMBER BLEY: But you are accounting
9 for it.

10 MR. KURITZKY: You can specify event
11 types, and one of those is to put in success
12 events. And so, when we've had cases where there
13 are very high failure problems, we had to
14 incorporate that aspect.

15 MEMBER BLEY: Something over 0.1, yeah.

16 MR. KURITZKY: Right. You don't want --
17 -- we obviously aren't doing it for all the events,
18 or we would -- we would bring the whole thing
19 crashing down, but we have done it selectively for
20 where we felt we needed and we've had to play with
21 it a little bit to make it all work out.

22 So, it's something we -- the more we do
23 that, the more we have to be careful about
24 reviewing the concepts and making sure everything
25 is working appropriately.

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1 So, yes, it's a challenge we faced. So
2 far we've been able to overcome it. As we move
3 further along in the seismic work, particularly as
4 it goes into Level 2, I don't know -- again, that's
5 one big -- that's the biggest challenge that we're
6 facing right now with that. And our Level 2 team
7 is already looking at ways to come up with a
8 practical way to quantify.

9 Moving on to the high winds and other
10 hazards, these also are studies that went through
11 the PRA --

12 MS. DROUIN: So, you had raised the
13 question about the peer reviews on the internal
14 fire and seismic?

15 MEMBER BLEY: I was waiting, yeah.

16 MS. DROUIN: Unfortunately, the PRW
17 Owners Group budget was slashed severely. So,
18 they're having to cut back on the peer review
19 efforts to be providing this and right now that's
20 on hold.

21 MEMBER BLEY: Both fire and seismic?

22 MS. DROUIN: Yes.

23 MEMBER BLEY: You're looking for
24 volunteers or anything?

25 MS. DROUIN: Well, they can support us

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1 in a limited way. The big thing on doing the
2 industry peer review is the lead for the peer
3 review work.

4 MEMBER BLEY: Right.

5 MS. DROUIN: And that has to come from
6 someone who has experience and done it.

7 MEMBER BLEY: Right.

8 MS. DROUIN: And that person, they pay
9 for his labor, his travel and that's quite
10 expensive. So, if we could pay for that, we could
11 do it, but it's not in our budget also to pay for
12 that.

13 I mean, they could pay for the other
14 peer reviewers, because it would just be covering
15 the cost of their travel and their lodging. Would
16 not be paying for their labor, but for the lead.
17 And that --

18 MEMBER BLEY: So, we potentially have a
19 gap in the peer review process --

20 MS. DROUIN: For this, yes.

21 MEMBER BLEY: -- because of budgeting.

22 MS. DROUIN: Yes.

23 MEMBER BLEY: Okay. Do we have a full
24 committee meeting coming up on any of this?

25 CHAIRMAN STETKAR: No.

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1 MEMBER BLEY: Okay. So, we can't write
2 a letter about it.

3 CHAIRMAN STETKAR: No. No, not in the
4 near future, but -- no.

5 MR. KURITZKY: But, again -- and thank
6 you, Mary, because that was the question -- I knew
7 there was a question that Dr. Bley had and I
8 couldn't remember what it was when I got to fire
9 and seismic. So, thank you.

10 And I'm going to talk about that later
11 in this presentation when we get to the upcoming
12 milestones and stuff, because as Mary mentioned, we
13 have a gap in our review.

14 That phase right now that was in the
15 set here, this peer review, we refer to it now,
16 you'll see in this slide, the technical adequacy
17 review, which we were relying on these PWR Owners
18 Group-led peer reviews to the standards to
19 accomplish.

20 Now, we're going to lose that. We are
21 debating -- we are discussing essentially how to
22 address that.

23 I think what might be the solution is
24 that we may just have to rely more on our technical
25 advisory group reviews, have to do a more formal

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1 review using the standard possibly. So, we'll get
2 --

3 MEMBER BLEY: That's in-house people?

4 MR. KURITZKY: That's in-house people -
5 - mostly in-house people. We have two members
6 from outside. We have EPRI and Westinghouse have
7 provided experts for that panel -- for that group.

8 Okay. So back to the high winds and
9 other hazards. Most have been through the
10 standard-based reviews.

11 The "other hazards" report has already
12 now incorporated all the feedback from the TAG,
13 from the peer review, et cetera, and it's a
14 screening analysis and it has now been completed
15 and it's going through it's final review. So, it
16 essentially is in this phase right here.

17 So, once we go through the internal
18 review of that and project management review, it
19 will be finalized.

20 And as for the high winds, that is also
21 right now ready for its update, because we have the
22 feedback from the peer review and the TAG. Most of
23 that feedback has been incorporated into revision
24 of the report.

25 The model had not changed. However, we

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1 also have employed -- applied research associates
2 to do a high-wind walkdown at Vogtle, as well as
3 provide some follow-up analyses.

4 And so, we have some new wind fragility
5 information and wind hazard information that we
6 want to incorporate into the model. So, we are
7 going to change the model.

8 And because of plant diversion and
9 double-booking, essentially, we haven't been able
10 to work on that yet. But starting this month,
11 we're going to start moving forward on the revision
12 to the high wind PRA model. And so we hope to in
13 the next couple of months, have that one.

14 MEMBER BLEY: Let me ask you -- I'm
15 just thinking about the last thing you said. When
16 you bring in the industry group for the peer
17 review, these are all people who are not associated
18 with the project in any way. So, they're really
19 fresh eyes.

20 MR. KURITZKY: Correct.

21 MEMBER BLEY: And seeing the TAG review
22 -- well, the TAG has been involved all the way
23 through this process, I assume. So, they are much
24 closer to the work than bringing in the outside
25 group.

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1 Is that true, or are they not quite
2 close to it?

3 MR. KURITZKY: It's --

4 MEMBER BLEY: Well, I don't know how
5 you'd really interact with the TAG.

6 MR. KURITZKY: Right. It's true --
7 it's more true in some cases, less true in other
8 cases. We don't have a hard --

9 MEMBER BLEY: So, you get some benefit,
10 but you don't have as much independence.

11 MR. KURITZKY: Right. We don't have an
12 actual rule that says a TAG has to be completely
13 independent on the project to do the reviews.

14 And, in fact, since the TAG has had
15 somewhat of a rotating membership -- some of the
16 people involved in the TAG were part of the
17 project, some of the people on the project -- on
18 the TAG are now still having to do reviews or other
19 work for us. They may recuse themselves from other
20 TAG activities for that part of the project, they
21 may not, depending on the nature of it.

22 Up to now, the TAG reviews haven't been
23 as quite as formal. So, going forward, like I
24 said, we'll probably have to make them more formal.

25 To the extent we can keep those reviews

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1 using only people that are independent of the
2 project work up to that point, we will.

3 Unfortunately, in some of the areas,
4 the staff has very little expertise and so --

5 MEMBER BLEY: Yeah, that's what I was
6 going to say. Do you have people with seismic and
7 fire PRA experience who are not already involved in
8 the project?

9 MR. KURITZKY: Yeah, that's an issue.
10 There might be some. Again, what we'll probably
11 have to do, we might use -- the TAG has done this
12 in the past, they've reached out to other people in
13 the Agency that were not involved in the project
14 just to supplement their expertise.

15 They also, theoretically, we could get
16 -- to the extent our budget will allow, could get
17 some contractor support for them if we needed some
18 independent person to supplement their review.

19 So, that's all the stuff that has to be
20 worked out. We haven't reached that bridge yet,
21 but we're going to be coming up to -- as I
22 mentioned shortly, we're going to come up to it
23 very soon and we're going to have to work out
24 exactly how we're going to go forward with those
25 technical adequacy reviews.

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1 MEMBER BLEY: Thanks.

2 MR. KURITZKY: Also, the last thing
3 I'll just point out that ultimately we do plan to
4 have an independent review, expert review of the
5 NUREG report, which will be the public available
6 information.

7 It will not be a detailed technical
8 review that we have for these models here, but it
9 will be another layer of review that will be
10 independent.

11 CHAIRMAN STETKAR: Not likely at that
12 stage you're going to go back and make substantive
13 changes to the models.

14 MR. KURITZKY: No, we -- even if they
15 identify things, it's not likely that we would do
16 that.

17 CHAIRMAN STETKAR: We need to be
18 cognizant -- we have a heck of a lot of material to
19 cover today and I'd like to get done by about 6:00,
20 if not earlier.

21 MR. KURITZKY: We'll do our best.

22 Okay. So, moving out of the reactor,
23 at-power and to low-power and shutdown, this you
24 were briefed on in December -- the Subcommittee was
25 briefed in December on this.

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1 We really haven't gotten that much
2 further along than we did in December, because
3 we've been redoing a lot of the HRA work.

4 We recognize that there was a lot more
5 documentation that needed to be done to support the
6 HRA work.

7 Some of the events -- there's a lot of,
8 obviously, operative actions involved in a low-
9 power shutdown modeling and we recognized that a
10 lot of them were not consistently documented. So,
11 we were doing a much more detailed relook at
12 documenting those events.

13 Unfortunately, in doing that, we also
14 recognized that there was some applications of
15 assigning values to perform shaping factors that
16 weren't quite done consistently either. And so,
17 therefore, we're actually changing some of the
18 ACPs. And accordingly, they're also going to have
19 to redo the dependency analysis because of that.

20 So, even though it's primarily a
21 documentation issue, we are going to go ahead and
22 requantify the low-power shutdown model again once
23 we have the updated ACPs and dependency analysis.

24 So, honestly, we're pretty much --
25 where we thought we were back in December, we're

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1 pretty much along the same point right now, but we
2 do have to have that wrapped up in the next month
3 or so.

4 CHAIRMAN STETKAR: Alan, just -- and
5 make this short, please -- do you have a plan for
6 performing the internal fire analyses for shutdown?

7 MR. KURITZKY: Right now we don't have
8 an exact plan for that.

9 CHAIRMAN STETKAR: Okay. Thanks.
10 That's all I need.

11 MR. KURITZKY: Okay. Also, while the -
12 -

13 MEMBER BLEY: Same question on seismic.

14 MR. KURITZKY: Same answer. And high
15 wind, for that matter.

16 Okay. So, while we're completing the
17 HRA for the low-power shutdown Level 1 model, we
18 are in parallel working on the Level 2 aspects of
19 the low-power shutdown model.

20 We have completed the MELCOR model for
21 low power and shutdown. We've also completed the
22 bridge trees and the plant damage state trees and
23 have identified the perspective list of
24 representative sequences that we'll then use for
25 the deterministic modeling used in the MELCOR

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1 model. So, work on the Level 2 is working in
2 parallel to completing the Level 1.

3 The last thing I want to mention on
4 low-power shutdown is something I think we alluded
5 to in the December briefing. And that was that we
6 were going to perform expert elicitation,
7 specifically a phenomena identification and ranking
8 technique, a PART-type panel, to identify the key
9 areas to focus on in a low-power shutdown PRA if
10 you were somewhat limited in resources and
11 schedule, just like we are with this study.

12 In order to meet the timeliness of this
13 project, we informally met with a TAG member, kind
14 of informal expert elicitation with our TAG, our
15 technical advisory group, to come up with their
16 idea of what we should focus on.

17 But in the meantime, we've had Pacific
18 Northwest National Laboratories organize and lead a
19 PART overall for this.

20 They have just recently completed that
21 work and provided us their report. We are looking
22 at it internally.

23 Because some of the information in that
24 report involves Vogtle-specific information and is
25 proprietary, that report will probably remain

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1 internal.

2 But because some of the information
3 from this study in terms of the approach and some
4 of the more generically applicable findings, we
5 think we can produce in a public report. So, we're
6 going to actually go through and hopefully produce
7 a NUREG/CR that we can then release publicly about
8 that PART.

9 MEMBER BLEY: I'm not sure if I'm
10 surprised. It seems an odd time to be dealing with
11 a PART. You didn't do it first, so you're doing it
12 after you have preliminary results.

13 MR. KURITZKY: Yeah. Well, the PART is
14 completed already. We've completed the PART.

15 MEMBER BLEY: Before the modeling.

16 MR. KURITZKY: No -- you are correct.
17 It was -- the idea was that we'd have initial
18 results from the PART while we're doing the
19 modeling -- while we still had time to change the
20 modeling.

21 But as it became evident that the
22 contractual aspects of getting it going were taking
23 longer than we had hoped, so we -- as I mentioned,
24 we did an informal expert elicitation with the TAG.

25 Many of the people on the PART were the

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1 same people that were in our informal expert
2 elicitation that we did internally.

3 So, we had the --

4 MEMBER BLEY: You might not want to
5 talk about this in the open session, but at some
6 point I'd be interested in seeing if you're
7 learning things now that are surprises that would
8 have been really good to know before you started.

9 MR. KURITZKY: Right. So, this I can
10 say in the open session: The findings, really, of
11 that PART were nothing -- there was nothing that --
12 really out of the ordinary.

13 There was a ranking of the plant
14 operating state in terms of what would be the most
15 important ones to focus on broken down in a number
16 of categories, both contribution to core damage
17 versus release. Because obviously in some cases
18 you have containment open and so there could be
19 different relative importances.

20 And then it was also broken down by
21 hazard category, internal events, internal flood,
22 internal fires and seismic. So, we have the
23 ranking of the various plant operating states.

24 The results were kind of as expected.
25 Those cases where you have limited -- or reduced

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1 RCS inventory were the ones that were the most
2 important. Particularly things like mid-LOOP
3 operation over in the levels near the vessel head
4 flange. Those were the ones that were coming out
5 of --

6 CHAIRMAN STETKAR: Those are the
7 traditional things that everybody has always looked
8 at since the first PRAs are done.

9 Later PRAs have identified that those
10 aren't always the case. So, you know, just --
11 anyway --

12 MR. KURITZKY: Right.

13 CHAIRMAN STETKAR: -- we need to get
14 through this.

15 MR. KURITZKY: But that's why we held
16 the PART. And the experts that we --

17 CHAIRMAN STETKAR: Who had the
18 unlimited numbers of low-power and shutdown studies
19 and rely on the first ones that were done 25 years
20 ago that identified mid-LOOP as a problem?

21 My whole point is other studies and
22 other people have identified other plant operating
23 states as important to both core damage and
24 releases that are not the usual suspects, because
25 it all depends on the plant -- how they run an

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1 outage at the plant and things like that.

2 So, just having a PART reconfirm the
3 fact that loss of offsite power and station
4 blackout are always most important to Level 1
5 results and that mid-LOOP operation is always most
6 important to shutdown results has been shown to be
7 not true at plant-specific PRAs.

8 So, you know, the -- we can go on.
9 That's -- just go on. I just wanted to get that on
10 the record.

11 MR. KURITZKY: And sort of respond to
12 that on the record, too. So, we -- and that's true
13 and we understand that.

14 And our PART came up with a certain
15 ranking. And if we had paneled a different PART,
16 I'm sure the ranking wouldn't actually match up
17 exactly the same. And, again, as you mentioned, it
18 can be very plant-specific.

19 This one was done for Vogtle. And so,
20 it might not match for another plant with different
21 procedures. So, we recognize the limitations
22 there, but thank you.

23 Okay. So, moving on from the reactor
24 world into the spent fuel pool world, this is an
25 area of the project that has languished a little

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1 bit because of personnel being involved with
2 multiple activities, but we have recently shuffled
3 the lineup a little bit.

4 We now have a lead for this that has a
5 little more availability. We also have secured
6 support from Sandia National Laboratories to help
7 accelerate the work on this -- in this area.

8 We had previously constructed a MELCOR
9 model to continue to shake it down and make
10 necessary modifications to it.

11 We also went through a process of
12 categorizing all the potential initiating events
13 for spent fuel pool PRA into different tiers
14 through a number of criteria.

15 The most important one was --
16 essentially it was the time for draindown, how
17 quickly the fuel would be uncovered.

18 And with that, realistically, the Tier
19 1 which are the ones that have the fastest
20 draindown, are really the ones that we're only
21 going to have time to focus on ourselves. So,
22 we'll probably just focus on the Tier 1 events.

23 And in the Tier 1, the large seismic
24 events are really the main drivers there. So, most
25 of the work has been done on the large seismic

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1 events.

2 We have for those events, defined leak
3 rates and locations. The leak rates are pretty
4 much consistent with the previous NRC spent fuel
5 pool study though the rates themselves have been
6 adjusted somewhat to account for the Vogtle-
7 specific spent fuel pool wall thickness sizes.

8 MEMBER CORRADINI: So, if I might just
9 ask, so the difference between this and the spent
10 fuel pool study is just the geometric arrangement
11 specific to Vogtle, but the approach is similar to
12 what we've seen in the past?

13 MR. KURITZKY: I don't want to state --
14 I have not been detailed -- heavily involved in the
15 spent fuel pool study. We haven't presented on it
16 yet, but I think, in a large part, that is correct.

17 I think we're borrowing, in a large
18 part, on the same approaches that we used for the
19 previous one.

20 Don, do you want to speak?

21 MR. HELTON: Don Helton, Office of
22 Nuclear Regulatory Research.

23 Deterministically speaking, the methods
24 and models are very similar. Obviously the overall
25 approach is different, because with the spent fuel

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1 pool study we were looking at a particular seismic
2 event.

3 MEMBER CORRADINI: Sure.

4 MR. HELTON: Here, we're looking more
5 broadly.

6 MEMBER CORRADINI: Okay. So, the
7 initiators may be different, the holes may be in
8 different places, the rates, et cetera, but you're
9 making it geometrically similar to Vogtle. But
10 given a geometric configuration, the analysis
11 technique would be similar.

12 MR. HELTON: In that we would be
13 relying on the MELCOR code to do the accident
14 progression analysis, yes.

15 MEMBER CORRADINI: Yes.

16 MR. HELTON: And max to do the offsite
17 consequence analysis.

18 MEMBER BLEY: I point out -- I don't
19 know where you stand on this now. In the spent
20 fuel pool study, the human reliability analysis was
21 a paste-on after the fact that ignored all of the
22 conditions that would have been generated by the
23 earthquake that would have led to such a problem in
24 the spent fuel pool and you better do something
25 much more appropriate this time around.

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1 MR. HELTON: So, the HRA is a -- is
2 part of the study this time as opposed to an
3 additional piece.

4 MEMBER BLEY: Excellent.

5 MR. KURITZKY: Okay. Thank you, Don.

6 All right. Moving on to the dry cask
7 storage PRA, this, again, is something that we
8 briefed the Subcommittee on in December as fuel
9 expansion and we're essentially done with that
10 model.

11 We were going through a revision of the
12 consequence analysis to make it more Vogtle-
13 specific. That's been redone.

14 Because it changed the results a lot,
15 we also sent it back to NMSS, our technical review
16 team, and they've re-reviewed it and it's now back
17 and going through project management review. So,
18 it will soon be ready for its technical adequacy
19 review, whatever that entails.

20 The last technical item we have is the
21 integrated site PRA. Again, one that we briefed
22 the Subcommittee back in December on.

23 As we said then, we developed an
24 approach based on the results and insights from the
25 single-source models. And we did pilot

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1 applications using our internal event, Level 1
2 model; and an internal event and flood, Level 2
3 model. We are now doing a pilot application using
4 our Level 1 seismic model.

5 Also something that came out of the
6 discussion with the Subcommittee back in December
7 was some concern that if we focus entirely on the
8 insights and results of the single-source models,
9 we may miss something that could be important to
10 multi-source scenarios or modeling that just wasn't
11 a part of the single-source modeling.

12 So, what we have done recently is held
13 a -- kind of a brainstorming session with selected
14 members of our technical advisory group, as well as
15 our big contractor in the area, Energy Research
16 Incorporated, to look at different approaches that
17 we could take to increase our assurance that we
18 haven't missed something important.

19 And so, a number of items were
20 identified that we're going to pursue, things
21 looking at operating experience databases for
22 events that have affected more than one source at a
23 site, looking at operator actions in the single-
24 source models that might be negatively impacted by
25 something occurring at a different source located

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1 at that site. So, a number of other areas that
2 we're pursuing to try and get more confidence.

3 We're also looking to things that we
4 screened out from the single-source models to look
5 at them again now in the perspective of could they
6 be more important from either a frequency or a
7 consequence point of view in a multi-source
8 context.

9 So, those are some of the approaches
10 that we're going to follow going forward and try
11 and raise that assurance level that we haven't
12 missed anything important.

13 And just a few of the key milestones.
14 We discussed some of this coming up now. Again, as
15 Barry mentioned, the technical adequacy review is
16 one that's open because the PWR Owners Group can no
17 longer support us on the peer reviews. So, we're
18 kind of debating how we're going to, you know, fill
19 that gap.

20 Again, as I mentioned, we may end up
21 relying more heavily on the technical advisory
22 group. No decision has been made yet, but one will
23 be forthcoming soon because we have -- as you can
24 see from this viewgraph, there are a number of
25 parts of the study that are getting ready to move

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1 into that phase.

2 The Level 1 seismic and fire studies
3 are going into that phase probably by the end of
4 this month, as well as the dry cask storage. So,
5 we have to kind of decide how we want to move
6 forward with that.

7 Coming up in June, we should also
8 hopefully have a complete redo of the Level 2 model
9 for internal events and internal floods. And also,
10 the other hazard screening evaluation should be
11 totally signed off by then.

12 About a month later, we hope to have
13 the low-power shutdown, Level 1, internal event
14 model ready for its next stage review, whatever
15 that entails.

16 And the last thing I want to mention is
17 just as has been the case throughout the -- since
18 the beginning of the project, there were certain
19 challenges that have been essentially chronic that
20 have plagued us all along.

21 Diversion of key staff, the biggest
22 one. Just people get pulled off on higher priority
23 work. And so, they have to put this aside. And
24 so, we have trouble maintaining momentum in some
25 cases.

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1 Also, we've had the same issue with
2 some of our contractor staff who have had to work
3 on multiple things. And so, we haven't been able
4 to necessarily maintain momentum as much we'd like.

5 Technical adequacy reviews is the thing
6 we just mentioned about the fact without the PWR
7 Owners Group we have to figure out how to plug that
8 gap.

9 And any project of this size and as
10 technically detailed as this one, it's obvious
11 you're going to have certain technical issues that
12 are going to come up and hit you and cause you to
13 strain or cause challenges for the schedule.

14 Right now by coincidence, I think, HRA
15 has been one of the number of the areas that has
16 just been hitting us. Whether it be low-power
17 shutdown or fire, it's been one that's been causing
18 us to have to redo some of our work.

19 But nonetheless we are -- as Felix
20 mentioned at the beginning of the meeting, we are
21 making headway in all areas of the study and will
22 continue to hopefully put points on the board.

23 The last thing I want to mention is
24 just to acknowledge all the support we've had from
25 all the different organizations supporting the

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1 project.

2 First and foremost, Southern Nuclear,
3 as we mentioned earlier, has been a tremendous
4 support to us in terms of all the information they
5 provided us and all the support they've given us
6 both onsite and offsite.

7 The PWR Owners Group even though
8 they're having budget trouble now, but they did a
9 wonderful job supporting us and funding these peer
10 reviews to the standards that were performed in the
11 previous couple years.

12 Westinghouse and EPRI, as we mentioned,
13 have supplied someone to our technical advisory
14 group. Most of the technical -- main technical
15 offices in the NRC have been involved in this
16 project in one way or another, either putting
17 people on rotation that we could use for the
18 project team or being on review panels or doing
19 review of documentation or just providing
20 information and feedback to us.

21 In terms of contractors, the National
22 Laboratories, which involved Idaho National Lab,
23 has been our prime laboratory we've gone to. We've
24 also gotten substantial contributions from Sandia
25 National Laboratories and Pacific Northwest

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1 National Laboratories.

2 And going forward, we get to the more
3 overview -- the expert review of the NUREG, we'll
4 be leaning towards Brookhaven National Laboratory
5 to run that for us.

6 In terms of commercial contractors,
7 Energy Research Incorporated has been our prime
8 contractor. They have been involved in many areas
9 of the study and given us tremendous support there.

10 And they've also subcontracted out to
11 Applied Research Associates and IESS who also
12 support us in specific area. So, it's been a huge
13 team effort and we appreciate everybody's
14 contributions. And that's it.

15 CHAIRMAN STETKAR: Great. Thank you.
16 Let's transition to Mary. And, Mary, I notice you
17 have 33 slides here, which at the rate we typically
18 go, is about two-and-a-half hours. So, if you can
19 kind of hit the highlights --

20 MS. DROUIN: A lot of the slides you're
21 not meant to have any discussion.

22 CHAIRMAN STETKAR: Okie-dokie. Thanks.
23 Let's see if we can keep it to a half an hour or by
24 10:15 or so.

25 MS. DROUIN: Okay. I'm going to try

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1 and walk you through the NUREG report, exactly
2 where we are.

3 You know, with many projects, you wait
4 until the very end to write the report, and you're
5 out of time and out of money.

6 So, we're trying not to have that occur
7 on this project. So, we are actively writing the
8 NUREG now and -- so that when the project is
9 finished, our documentation -- as the technical
10 work is concluded, the documentation is concluded
11 almost at the same time.

12 So, I'm just going to quickly kind of
13 remind you, you know, what was the purpose, the
14 different types, and the kinds of improvements that
15 we're thinking of, because that was one of the
16 objectives, was to improve documentation.

17 But the bulk of my talk is going to
18 focus on the NUREG report going through the goals
19 and challenges, how we're organizing it and where
20 we are on particularly Parts 1 and 2, and then
21 ultimately the overall status.

22 So, when you think about the purpose of
23 the documentation, you know, you want us to be
24 transparent, you want it to be user-friendly. Can
25 somebody pick this up and follow it and understand

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1 it, you know? Is it accessible? Is the
2 information everything, you know, retrievable,
3 understandable and how well have we communicated?
4 So, all of these things have presented a tremendous
5 challenge in this report.

6 When you look back at 1150, you know,
7 1150 might have been five plants, but it was just
8 one, you know, reactor, Level 1, and just internal
9 events. So, this thing is, as using Alan's
10 analogy, this Rubik's cube that we've been faced
11 with.

12 So, we have two levels of
13 documentation. Now, the first one is going to be
14 the publicly available NUREG report. It's in red
15 here, because that's what I'm going to focus on.

16 And then the other is the non-publicly
17 available technical reports, which you're very much
18 aware of. You've been reading the FAR and the
19 seismic.

20 Also, in terms of documentation we have
21 these working files. And we had created at the
22 very beginning of the project, all these forms and
23 templates to try and identify all the different
24 types of documentation. We wanted to capture
25 decisions that were made.

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1 A lot of times these things are lost in
2 a study. And then when you come back five years
3 afterwards, it's hard to recreate because decisions
4 were made and that was not documented, like, for
5 example, you know, the list of issues, assumptions
6 and their bases, decisions and their bases.

7 And then, you know, we have a lot of
8 computer code input and output files and databases,
9 et cetera. So, just to give you a little bit of a
10 flavor of the types of documentation we have.

11 MEMBER KIRCHNER: Mary, may I ask a
12 question? I was going to ask Alan earlier.

13 So, when you go through this review
14 process, in a generic sense, what are you learning?
15 Alan, you kind of inferred that there were areas
16 where you didn't like the results or the results
17 weren't what you expected.

18 When you go through this do loop of
19 reviews and such, what -- can you share and would
20 this report document what you learned -- what were
21 the key learning things from this process in terms
22 of was it how you handled human reliability, was it
23 how you constructed the fault trees, you didn't
24 have enough data?

25 Is that going to somehow factor into

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1 the documentation so that you extract lessons
2 learned from going through these --

3 MS. DROUIN: Well, it's documented --

4 MEMBER KIRCHNER: -- processes?

5 MS. DROUIN: -- in a more, I would say,
6 implicit way. We certainly are creating, like, a
7 list of issues. This thing gets into the lessons
8 learned, the issues we had. And so --

9 MEMBER KIRCHNER: That's not going to
10 be publicly available, is it? Is there a way to
11 capture that for the --

12 MS. DROUIN: No, those kinds of things
13 --

14 MEMBER KIRCHNER: -- say, the layperson
15 and PRA world?

16 MS. DROUIN: There will be. Let me get
17 to another slide, because one part of the NUREG
18 document is future research.

19 So, some of these more key things will
20 be documented in the NUREG of what you may want to
21 do down the road in the future.

22 MEMBER KIRCHNER: So, the issues and
23 problems you encounter then rework through with
24 your process.

25 These are going to then -- those open

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1 items -- not open items, but those areas that were
2 problematical will then be identified as future
3 research areas?

4 MS. DROUIN: Some of them will, but I
5 don't want to mislead you and tell you that every
6 single little problem that we encounter is --

7 MEMBER KIRCHNER: No, I'm not asking
8 that. In general, though, I would guess that you
9 find certain -- pick something, fire analysis, you
10 find certain aspects of analyzing that particular
11 set of problems, this is a dominant contributor or
12 impacts risk frequency, whatever.

13 Are there those kind of lessons learned
14 when you capture --

15 MS. DROUIN: Those --

16 MR. KURITZKY: If I could -- so, yes.
17 Those type of things -- in each of the interim
18 reports that Mary was referring to, we will -- we
19 identify things that are insights and things that
20 we've learned.

21 Whether it came during the initial work
22 itself, like, for instance, the issue about the
23 fire HRA, that didn't -- that wasn't so much the
24 review, it was more just the results didn't sit
25 well with us and we have to look into why. But

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1 even -- but from the review, there may be other
2 things that we pick up.

3 So, all those things that we come up
4 with as insights that we feel drive the results
5 either rightly or wrongly, or other things that we
6 run across in terms of limitations, those get
7 documented in the interim reports.

8 And when we go and do the NUREG report,
9 most of that information, actually, we do want to
10 put in the NUREG report.

11 I mean, if there was something that
12 gets to the level of technical detail that it
13 involves a lot of Southern Nuclear proprietary
14 information, then we would have to sanitize it.

15 But in most of the cases, these things
16 would be more general -- I don't know what the word
17 -- general sizeable or whatever.

18 MEMBER KIRCHNER: Generic.

19 MR. KURITZKY: So, we can --

20 MEMBER KIRCHNER: Application of PRA.

21 MR. KURITZKY: Right. So, we can put
22 those into the NUREG report.

23 MEMBER KIRCHNER: That's what I was
24 searching for.

25 MR. KURITZKY: But I think our

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1 intention --

2 MEMBER KIRCHNER: When it doesn't sit
3 well with you, can you give a non-closed example of
4 what category if things didn't sit well with you?

5 MR. KURITZKY: Right.

6 MEMBER KIRCHNER: Was it your modeling
7 approach? Was it lack of data? Was it --

8 MR. KURITZKY: I would say this one
9 example that -- and we're going to get into it in
10 the close session, but I think I can say something
11 about it now, is when we applied the general time-
12 dependent HRA modeling techniques and we're using,
13 I think, the human cognitive -- HCR/ORE, human
14 cognitive response -- whatever the O-R-E is. I
15 don't remember exactly right now.

16 But we applied that and we come up in
17 some cases for a particular event where the failure
18 probability is extremely high, which is
19 understandable, because the event has to occur
20 relatively quickly.

21 There are some reasons why we believe
22 there's more time available for the operator to do
23 it than the modeling would apply.

24 And so, we think you're dealing with a
25 broad rush where you could -- or more focused,

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1 nuanced look would show that maybe it's not as time
2 critical to the extent that the model is telling
3 us.

4 In addition to dependency of other
5 actions on that one, we also believe that when we
6 apply our dependency model, it might give a certain
7 level of dependence even at a very low dependent
8 level.

9 If you say "low dependence," the
10 failure probably is still substantially higher than
11 the independent fire probability.

12 And in these cases, we feel that there
13 might be reasons why the first action would be
14 totally distinct from the second action. It really
15 shouldn't apply to dependence even though our model
16 makes us do it.

17 So, there's examples where the broad
18 application of our HRA method is forcing us to put
19 numbers in that we don't necessarily believe are
20 entirely accurate. And so, that's an example.

21 MEMBER KIRCHNER: Thank you.

22 MS. DROUIN: Okay. When you look at
23 the NUREG report, one of the things that we're
24 doing that -- and when we set up the whole outline
25 for this, we did go look at 1150 as a starting

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1 point and how could we improve on, you know, what
2 was in 1150, you know? What was good about 1150,
3 what was bad, and, you know, what we might want to
4 do differently.

5 So, two of the things is that we're
6 including a much more detailed discussion of the
7 design and operation of the plant.

8 When you start thinking about the
9 results, part of the report, you know,
10 understanding those reports, putting them into
11 context really means you need to understand the
12 plant.

13 And you also need to understand the
14 approach that we used to build that model. So,
15 that's another thing we're doing in this is a much
16 more detailed -- it's still a high-level discussion
17 of the approach.

18 So, all the details are down in the
19 technical reports, but, you know, we are putting in
20 a description of the approach that was used kind of
21 focusing in on the key assumptions that were made
22 in building each of the individual models and the
23 integrated model.

24 The other thing we're going to try and
25 do is to have an index of key words at the back of

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1 the document. Whether or not we'll be able to make
2 that electronic, I don't know at this point, but we
3 are talking about doing that.

4 The other thing we've discussed about
5 pursuing is having a separate volume that is a
6 detailed roadmap to all the volumes. So, you don't
7 have to go to the beginning of each report.

8 And in part of that volume, we are
9 thinking about trying to maybe have a part that has
10 these frequently asked questions we think people
11 might ask. And then that would point you where to
12 go find this type of information. So, those are
13 the things that we're thinking about right now.

14 So, now we're getting directly into the
15 NUREG report. What are goals and challenges? You
16 know, you want to make sure you have enough
17 sufficient information to look at the design and
18 operation, the technical approach, the major
19 results, major insights and perspectives, potential
20 uses and then potential future work, getting back
21 to the discussion we just had, you know, because
22 we're having to make some key discussions on the
23 scope of things we can't do or things we found and
24 we can't fix, because it's just too late, or a lot
25 of different reasons. So, documenting that, you

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1 know.

2 And then we have the major challenge
3 is, you know, just the amount of information
4 because of the size of this project and looking at,
5 you know, the proprietary concerns, having to
6 capture that, you know, what do we include and what
7 we don't include in here.

8 So, again, it's just a very complex
9 model that has a lot of facets to it. So, trying
10 to figure out, you know, how to catch that and go
11 back and, you know, make sure that this thing is
12 user-friendly and it's traceable and all that good
13 stuff.

14 So, we had shown this slide before.
15 This is right now the general outline that we're
16 looking at for this NUREG report.

17 It may be different volumes. Right now
18 it's shown as three volumes, but, you know, that --
19 it could turn out that Part 1 is more than one
20 volume. It's all going to depend on the size of
21 this.

22 But right now we are focused on Part 1
23 and you'll hear at the very end we're almost done
24 with writing Part 1 and we're starting hopefully in
25 the next several weeks to start on Part 2.

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1 So, let's get right away -- I'm not
2 going to go through Section 1, you know. It's the
3 introduction and objectives and scope and all the
4 type of introductory material.

5 MEMBER BLEY: If you're almost done
6 with Part 1, when are you going to share that with
7 us?

8 MS. DROUIN: I would tend to say to
9 share -- oh, sorry, when you said "Part 1," I
10 heard, "introduction, Section 1."

11 Probably, you know, this summer. Early
12 summer.

13 MEMBER BLEY: Great.

14 MS. DROUIN: I mean, we haven't
15 discussed that yet, but I would --

16 MR. KURITZKY: Actually, I'll have to
17 correct Mary on that, because we're not meeting
18 with you in early summer, but the next time will be
19 --

20 CHAIRMAN STETKAR: A, you're right. We
21 don't have to meet. And; B, we can always -- well,
22 I won't say "always," but oftentimes we can find a
23 hole for a meeting especially if it's a half a day,
24 for example.

25 MR. KURITZKY: Yes. What we'll do is

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1 we'll discuss later about what the next things we
2 want to present to the Subcommittee.

3 We'll obviously leave it to you to
4 decide what you would like us to talk to you about.

5 MEMBER BLEY: I expect it's not
6 something I'm going to want to read in two days,
7 you know, that I want to go at it slowly, but okay.

8 MR. KURITZKY: You want to enjoy it
9 before bed every night.

10 (Laughter.)

11 MR. KURITZKY: It will help put you to
12 sleep.

13 So, in any case, yeah, we can discuss
14 later what kind of schedule for providing that
15 information and what are the topics that we want to
16 discuss.

17 We have on the calendar already a
18 meeting scheduled for, I think, October 20th, was
19 the next one we had. So, we can discuss later what
20 you might want us to cover.

21 And then if there is some preliminary
22 meeting or something else you want, then we can
23 discuss that, too.

24 MS. DROUIN: Okay. So, in Section 2,
25 which is a summary of the plant design and

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1 operation, we have a description of the site, the
2 reactors, the spent fuel pool, the dry cask storage
3 and all of the systems and structures associated
4 with that.

5 So, for each one, you know, we're
6 trying to provide the purpose and function, the
7 configuration of it, you know, the actuation --
8 both what initiates it, but what also may trip the
9 system -- the success criteria and dependencies.

10 So, we have developed a simplified
11 schematic and a simplified dependency diagram for
12 every system and structure, but we do not provide
13 the actual system layout nor plant-specific
14 labeling, because that brings in the proprietary
15 nature. And we have removed all that kind of stuff
16 from the NUREG report.

17 so, the next -- this one is just an
18 example of the level of detail of a system
19 description. I picked the shortest one so it could
20 fit on the slide.

21 Of course when you get into the other
22 systems, the system description, you know, is a lot
23 lengthier.

24 The next slides, again these are just
25 examples. I was not going to discuss them, but

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1 just to give you a feeling for the level of detail
2 that's going in these schematics.

3 This is the reactor one for the overall
4 -- the next one, there's the auxiliary feedwater
5 system to show it to you.

6 Here's an example of a dependency
7 diagram for the high-pressure injection system.

8 CHAIRMAN STETKAR: Mary?

9 MS. DROUIN: Yes.

10 CHAIRMAN STETKAR: On the dependency
11 diagrams, this one shows what we typically call a
12 support-to-frontline dependency.

13 Are you going to show support-to-
14 support also, I assume?

15 MS. DROUIN: There are ones for that,
16 yes.

17 CHAIRMAN STETKAR: Okay.

18 MS. DROUIN: Yes.

19 CHAIRMAN STETKAR: So, it will be for
20 every system?

21 MS. DROUIN: For every system. For
22 every system.

23 CHAIRMAN STETKAR: Sometimes people
24 don't show those support-to-support --

25 MS. DROUIN: No, no, we have the

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1 support-to-support.

2 (Simultaneous speaking.)

3 CHAIRMAN STETKAR: Okay.

4 MS. DROUIN: Yes. Here, I just wanted
5 to show you just one of the many ones on spent fuel
6 pool because, you know, I -- you know, coming into
7 the study like me, for example, spent fuel pool was
8 just a pool with a bunch of fuel in it. And it's a
9 lot more complex than that. So, this is just to,
10 you know, show that -- but there will be quite a
11 few more schematics on the spent fuel pool.

12 MEMBER BLEY: I'm kind of glad you said
13 that, because I sometimes get the impression people
14 only think about tearing a hole in the pool and
15 don't worry about the connected stuff.

16 MS. DROUIN: Right. Right.

17 And then on the next one, which is the
18 dry cask storage, this is just one. There's
19 probably a good 30 drawings of the dry cask storage
20 schematics in the report.

21 Okay. So, that was just a quick
22 overview of Section 2 on the summary of plant
23 design. And at this point, you'll hear it again
24 later, but I'll just go ahead and give you a
25 preview, you know, Section 2 is pretty much written

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1 at this point in time. We just have a few minor
2 cleanups to do.

3 So, now on the summary of the approach,
4 it is divvied up into several different sections.
5 Section 3.1, which is the overall approach -- and
6 it's more of a high-level discussion of how we
7 constructed the various individual models.

8 And then going into Section 3.2 is
9 where we talk about all the different technical
10 analyses done across the study.

11 And for each technical analysis, we're
12 going to try and give you, you know, the purpose
13 and the objective, the major steps associated with
14 the analysis and what the output and products of
15 that analysis are.

16 So, then Sections 3.3 through 3.6 go
17 through each of the major sources; the reactor, the
18 spent fuel pool, the dry cask storage and the site
19 -- the integrated site.

20 And what we try and do here is we have
21 our overall approach we've already discussed, we
22 have all the technical analyses, and now what we're
23 doing in these sections is how did all of that pull
24 together to build the various reactor models?

25 And what you see here is a little

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1 figure that I'm sure you can't read it. I can't
2 even read it on my copy, but under, like, for
3 example, Section 3.3, it's going to be organized by
4 plant-operating states. So, under Reactor you're
5 going to have at-power and low-power.

6 And then under the At-Power, you'll
7 have level 1, 2, and 3. And under each level, you
8 know, the various hazards.

9 So, it will go into each of the
10 assumptions that were done -- made in constructing
11 -- this is not getting into the assumptions on the
12 technical analyses, but the assumptions of how we
13 approach the problem.

14 CHAIRMAN STETKAR: It would be -- just
15 to make sure I understand, it would be like what we
16 were discussing before like on seismic analyses.
17 You took the hazard and fragility from this --

18 MS. DROUIN: Yes.

19 CHAIRMAN STETKAR: -- point. On the
20 fire analyses, you took other information
21 differently at that level.

22 MS. DROUIN: Yes.

23 CHAIRMAN STETKAR: Okay.

24 MS. DROUIN: So, now just to give you -
25 - in Section 3.1, this is a figure that tries to

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1 show at a high level the overall approach.

2 So, if you look and you see that blue
3 box, you know, we built a reactor, at-power,
4 internal events Level 1 PRA model. And we built an
5 internal flood, at-power, Level 1. Those two were
6 integrated together to give a Level 2. And then
7 that went over to a Level 3.

8 So, I'm not going to walk through this
9 whole figure, but this is showing the construction
10 from the beginning all the way until we finally get
11 to an integrated risk model.

12 So, 3.1, this figure will be in 3.1,
13 and then there will be quite a bit of discussion
14 explaining, you know, walking through this figure
15 and how we approach the problem.

16 MR. KURITZKY: And, Mary, if I could
17 interrupt for one second, this goes back to a
18 question earlier on that I think Chairman Stetkar
19 had about the -- when we do the Level 2 and combine
20 things together.

21 Because we actually do -- in this case,
22 we did a Level 2 model for the internal
23 event/internal flood sequences and cut sets
24 combined together. It was a single Level 2 model.

25 When we get to fire and seismic and

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1 these other hazards in that lower blue box, we're
2 going to actually have -- there will be a separate
3 Level 2 quantification because things are going to
4 -- might be different when looking -- in a fire
5 scenario versus a seismic scenario.

6 So, those individual aspects, hazard-
7 specific aspects will be accommodated in the -- on
8 the model.

9 we're only going to, you know, we'll do
10 it as a collective task, so to speak, but they're
11 actually going to be separate submodels in there as
12 we're doing that, that are going to be hazard-
13 specific.

14 MS. DROUIN: Yes. And the report will
15 talk to that.

16 MR. KURITZKY: Okay.

17 MS. DROUIN: Okay. Then we move into
18 Section 3.2 and what this figure is trying to show
19 is across all the sources, whether it's, you know,
20 your reactor, your spent fuel pool, your dry cask
21 storage, all the different technical analyses that
22 are performed.

23 So, we are going to have a discussion
24 on each one of these technical analyses. But from
25 a high level, more generic approach, you know,

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1 like, for example, everybody does data analysis,
2 you know. How did we approach the data analysis on
3 this project?

4 And there might be nuances, you know,
5 depending on the reactor source that we will
6 capture here, but that's what we're trying to do in
7 Section 3.2.

8 And the next slide just shows an
9 example of here's what we've written up on
10 parameter estimation analyses, you know, the kind
11 of level of detail we're getting into.

12 But, you know, I don't want to imply
13 because this is so little, that there's not a lot
14 here, because there's a lot of technical analyses,
15 you know, that are done.

16 Then you get into Section 3.3 and this
17 is just to give you some examples, you know, of the
18 type of high-level assumptions that we're going to
19 be talking about, you know, in this report.

20 You know, for example, when you're
21 looking at the licensee, the Level 1, at-power, you
22 know, we went in and we assumed that the Southern
23 Nuclear model was adequate. And then we
24 transferred it to SAPHIRE.

25 And then based on feedback from our TAG

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1 and other reviews, we modified it. So, that's kind
2 of the approach.

3 And I'm not trying to say this will be
4 the only assumption that will be written up on the
5 Level 1, internal events, but these are the, you
6 know, types of assumptions, you know, that we're
7 talking about, you know.

8 We assume the licensee seismic hazard
9 and fragility analyses were adequate based on staff
10 reviews, we mapped the fire sequences from the
11 Vogtle fire PRA into a manageable number, you know,
12 et cetera. so, I won't, you know, go through all
13 of these assumptions.

14 So, then we get to the summary of the
15 results. This is the real, you know, as
16 challenges, we might thought about, you know, how
17 to write up the design, and particularly the
18 approach, and capture that, this part is going to
19 be really challenging.

20 And so, we're starting to think about
21 it right now, because we have a Level 1 study
22 that's wrapping up.

23 And so, we're going to be ready to
24 start writing, you know, Part 2 of the NUREG this
25 summer, you know, come June.

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1 So, first of all, you know, the
2 quantitative results, you know, what are those
3 going to include?

4 So, it will include, you know, for
5 example, like, core damage frequency and then the
6 relative contributions including importance
7 measures.

8 We're only planning right now to report
9 the mean with the 95th and 5th percentile
10 contributions, you know, and perhaps a
11 distribution.

12 We are not, at this point in time,
13 proposing to show any median values or point
14 estimates. Now, how we plan to present these
15 results, there's a lot of options available to us.

16 So, if we first look at -- and I'll
17 come back to that in a minute, but let's quickly go
18 through each source.

19 When it comes to the site risk, you
20 know, all we're talking about reporting are the
21 health effects from each source.

22 You know, you cannot report, you know,
23 cost, you know, what are the different operating
24 states, because that becomes meaningless when
25 you're talking about operating states for the

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1 reactor versus the spent fuel pool versus the dry
2 cask storage in an integrated manner.

3 And the same thing with, you know, the
4 PRA levels. They take on different meaning
5 depending on the source.

6 So, in terms of the results that we'll
7 be reporting for, the site risk, that will stay
8 more likely at the health effects level.

9 CHAIRMAN STETKAR: Mary, I was just
10 thinking I -- I'm a little slow. Before you said
11 you were going to present means, 5th and 95th.
12 Those are certainly important.

13 MS. DROUIN: Right.

14 CHAIRMAN STETKAR: Why did you -- point
15 estimate is meaningless, so that -- why did you
16 decide not to publish the medians?

17 Many people, you know, to understand
18 that there's a 50 percent probability that it's
19 less than its value, a 50 percent that it's lower,
20 most folks who read this are not familiar with the
21 nuances of skewed distributions and why the mean
22 might be closer to, you know, the 80th percentile,
23 for example.

24 MS. DROUIN: You know, this -- you
25 know, now I'm revisiting all these discussions back

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1 in 1150 on this.

2 CHAIRMAN STETKAR: Just --

3 MS. DROUIN: But I'll tell you my
4 reason is that this is an NRC regulatory report.
5 NRC does not deal with medians. All of our
6 decisions are based on means.

7 So, in terms of this being used -- yes,
8 to the general public or to certain people a median
9 might have some interest, but --

10 CHAIRMAN STETKAR: Well, to me it would
11 have some interest, for example --

12 MS. DROUIN: And --

13 CHAIRMAN STETKAR: -- you know. To
14 know that the mean is --

15 MS. DROUIN: And I wasn't going to say
16 your name in particular.

17 CHAIRMAN STETKAR: -- 30 percent higher
18 than the median is sort of interesting.

19 MS. DROUIN: But it --

20 MEMBER BLEY: You'll still see that
21 without it, but --

22 CHAIRMAN STETKAR: You will.

23 MEMBER BLEY: -- I kind of agree it's
24 nice to see the picture --

25 CHAIRMAN STETKAR: The point estimate

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1 is only confusing and is --

2 MS. DROUIN: Right.

3 CHAIRMAN STETKAR: -- irrelevant,
4 obviously.

5 MS. DROUIN: But it's something --

6 CHAIRMAN STETKAR: It's on the record,
7 I made a comment.

8 MS. DROUIN: -- we can think about.
9 Okay.

10 So, the point -- okay. Then we go to
11 the reactor risk, you know. Okay. So, now for,
12 you know, each of the levels for each, you know, we
13 have results for each hazard and across hazards.
14 And the same thing for Level 2 and Level 3.

15 For low-power shutdown results, we're
16 only talking about Level 1, 2 and 3 for internal
17 events, because more qualitative analyses are being
18 done for the others.

19 But for all of these, whether it's the
20 at-power or low-power shutdown, you know, we're
21 talking about being able to provide, for example,
22 you know, accident sequence contributions, SSC
23 contribution from your basic events, you know,
24 where that's appropriate.

25 We may not have an integrated model for

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1 at-power and low-power shutdown. That isn't yet to
2 be, you know, we haven't determined whether or not
3 we're going to have that.

4 So, going to the next slide --

5 CHAIRMAN STETKAR: When you say you
6 might not have an integrated model, you will have
7 results that are internally consistent with one
8 another regardless of how you do the bookkeeping.

9 MS. DROUIN: We may not have an
10 integrated quantitative model.

11 MR. KURITZKY: Let me just clarify,
12 too. We will have in our SAPHIRE model platform,
13 we will have the internal event -- the low-power
14 shutdown model in there also with the at-power
15 model for internal events, but we are not likely
16 going to have a fully quantified low-power shutdown
17 model for the other hazards beyond internal events.

18 So, it just wouldn't be -- so, we're
19 just not going to have the full spectrum of hazards
20 in an integrated low-power shutdown power, because
21 you're probably not going to have all the fully
22 quantified results for the other hazards for low-
23 power shutdown.

24 MEMBER BLEY: So, fire and seismic
25 won't be there for low-power shutdown.

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1 MR. KURITZKY: Unlikely to have a
2 quantified model to the detail of the other
3 aspects.

4 MEMBER BLEY: Oh.

5 CHAIRMAN STETKAR: All we're going to
6 really be interested in seeing, we -- as soon as
7 you figure out how you're going to do fire and
8 seismic in enough detail so that we can understand
9 what you're really going to do, not conceptual,
10 we'd like to hear about that.

11 MR. KURITZKY: We'll come back to you
12 with that.

13 CHAIRMAN STETKAR: And not, you know,
14 not after all of the decimal points are in there,
15 but how you're really going to do that.

16 MR. KURITZKY: Yeah. In this case,
17 it's less the decimal points, it's more the dollar
18 sign to begin with.

19 CHAIRMAN STETKAR: Yeah. Well, it's --

20 MS. DROUIN: And time.

21 Okay. Next slide. Okay. For --

22 MEMBER BLEY: Let me at least state an
23 assumption.

24 MS. DROUIN: Okay.

25 MEMBER BLEY: And the assumption is you

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1 will at least acknowledge the potential
2 significance of what's not in the model.

3 MS. DROUIN: Yes.

4 MEMBER BLEY: Rather than just saying
5 it's not there.

6 MS. DROUIN: Yes.

7 MEMBER BLEY: Okay.

8 MS. DROUIN: For the spent fuel pool,
9 you know, we're looking at fuel damage frequency,
10 you know, reactor release frequency and the health
11 effects, you know, for the combined hazards and
12 combined operating states. For the dry cask
13 storage, though, we're looking at just the health
14 effects.

15 Now, for both of them, you know, we
16 would be able to provide, you know, accident
17 sequence contributions and SSC contributions, you
18 know, where appropriate.

19 Okay. These next several slides are
20 just to show you all the different options that are
21 available to us, you know.

22 We haven't, you know, they all look
23 great. We can't, you know, do them all. So, it's
24 going to be, you know, which one do we think is the
25 most informative in communicating information.

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1 You know, on the first one, you know,
2 you could do a bar chart. The light blue is at-
3 power. The dark blue, I don't know why it didn't
4 show up, is, like, low-power shutdown. So, we
5 could do something like that.

6 There's all different versions of pie
7 charts, you know, we could do. You know, those are
8 three there.

9 On the next slide, you can take these
10 pie charts and you can expand them out to show, you
11 know, here's -- on that one percent, you know,
12 here's its relative contribution. So, a lot of
13 neat things you can do there.

14 Then we got these things, you know,
15 that are -- the top one, this is what you saw in
16 1150, the line charts, you know, which are showing
17 your -- here, the main and the 95th and the 5th
18 percentile.

19 You can do a type of sample chart.
20 Those were also in 1150. And then you have, you
21 know, what we call the curve charts. Those were
22 also in 1150.

23 So, this is just a quick, you know,
24 table just kind of showing you the disadvantages --
25 I don't know if it's disadvantages, but what each

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1 one of them can do, you know, if you look at, you
2 know, the bar chart, pie, line, curve and sample
3 chart, you know, the different things you get from
4 these different presentations.

5 So, we may do all of these. We may do
6 some of them. I don't know yet. We're only right
7 now starting to explore the different ways.

8 So, you know, the questions are, you
9 know, do we just provide numerical results on
10 figures, no figures at all, just some tables? Of
11 course neither one of those, I think, will go down
12 that route.

13 So, I'm sure we're going to have a
14 combination of figures and tables and what exactly
15 would be that combination. That's what we're going
16 to struggle with --

17 MEMBER BLEY: Do you want some
18 thoughts?

19 MS. DROUIN: Absolutely. That's why
20 we're, you know, you don't have to give them to us
21 today.

22 MEMBER BLEY: Yeah, I will think about
23 these. But one thing I will say for sure, if you
24 go back to page 30, you need some of this kind of
25 information to convey the uncertainty.

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1 MS. DROUIN: Right.

2 MEMBER BLEY: And tables don't -- at
3 least for me, tables don't do it.

4 MS. DROUIN: I agree.

5 MEMBER BLEY: Any of these pictures
6 kind of does it for me and I think you're going to
7 need a mix. But, you know, for some that top one,
8 the line charts, really lets you see comparisons.

9 We'll think about it and get back to
10 you, but at least some of this kind of information
11 is essential because it doesn't communicate from
12 tables, at least for some of us.

13 MS. DROUIN: I agree. We're going to
14 have to have figures and tables.

15 MEMBER BLEY: Tables don't --

16 MS. DROUIN: But, you know, the
17 challenge is not just only what figure, but, like,
18 if you look at that line chart, you know, here,
19 this is reactor, you know, at-power showing the
20 different hazards for at-power and low-power
21 shutdown.

22 Now, we may not have that, as we showed
23 earlier, for low-power shutdown. So, if -- what do
24 we put, how much information relative in terms of
25 comparison, you know?

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1 I mean, we could just have, okay,
2 here's a figure for internal events and that's, you
3 know, and then a figure for -- it's when we start
4 combining some of this stuff, what kind of
5 combinations do we want to do?

6 MEMBER BLEY: Yeah. And I think --
7 this is just off the top of my head. In cases
8 where you haven't done all the work yet, some hint
9 of what it might be based on judgment of the team,
10 might be worthwhile if you can make that clear.

11 I'm thinking of a few phase studies
12 that were done where that was tried and then tested
13 against final results later on, and it helped.

14 We'll think more about it and talk to
15 you more later, because this is just popped at us
16 and --

17 MS. DROUIN: Right. So, I wasn't
18 looking for an answer today on this. But for
19 y'all, you know, we absolutely welcome your input
20 on the type of figures --

21 MEMBER BLEY: Well, this isn't enough
22 help. Just for me, that doesn't -- that doesn't
23 get to what -- it's really the nuances of these
24 different presentations that --

25 MS. DROUIN; Yes. Yes.

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1 MEMBER BLEY: -- what they convey. And
2 we'll think about that and maybe jot some notes on
3 it.

4 CHAIRMAN STETKAR: One other quick
5 comment on -- bar charts are -- I can read them,
6 but I often get fooled.

7 This will be a public report. They
8 don't convey the information that ought to be
9 conveyed, you know.

10 People tend to look at it and forget
11 the fact that that's a logarithmic scale on the y-
12 axis and that the -- if you really plotted those
13 things, you would see huge, huge differences in
14 those heights.

15 MEMBER BLEY: Of course that happens on
16 the probability curves, too.

17 CHAIRMAN STETKAR: It does. It does,
18 too. It does, too.

19 MEMBER BLEY: You might think --
20 something you haven't shown us, you might think --
21 and I've seen people do this, of having, whether
22 it's a bar chart or pie chart or whatever or curve,
23 both a logarithmic -- semi-log one and a linear one
24 so you really do pop these things at you that, you
25 know, we're seeing detail in this logarithmic kind

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1 of display, but really this one sticks way the hell
2 up over the other one. Just think about it. Play
3 with it.

4 MS. DROUIN: Yeah.

5 CHAIRMAN STETKAR: One of the displays
6 -- well, again, play with it. The -- I found it
7 quite effective to display curves, probability
8 distribution functions, but -- density functions on
9 a logarithmic scale and plot --

10 MS. DROUIN: Yeah. I didn't show that
11 one.

12 CHAIRMAN STETKAR: -- and plot them,
13 because --

14 MS. DROUIN: I didn't show that on
15 here.

16 CHAIRMAN STETKAR: -- there you can
17 visually see the uncertainty, for example. And one
18 contributor spans maybe five orders of magnitude --

19 MS. DROUIN: Yes.

20 CHAIRMAN STETKAR: -- versus something
21 else that's very peaked and show, then, how the
22 means stack up.

23 MEMBER BLEY: But you're still fooled
24 by the --

25 CHAIRMAN STETKAR: You're still fooled

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1 by the logarithmic. You can't get away from that.
2 You can't.

3 MEMBER BLEY: You can do both.

4 CHAIRMAN STETKAR: You can do both.

5 MS. DROUIN: But I think y'all
6 appreciate, you know, this is going to be a
7 challenge to figure out how to present these
8 results.

9 So, last one, so where are we? And
10 I've kind of told you where we are, you know. On
11 part 1, Section 1, introduction is complete.
12 Section 2 is complete. And section 3 is 90 percent
13 complete and we expect to be complete by the end of
14 May.

15 Part 2 on the summary of results, we're
16 initiating that right now. And that's why, you
17 know, how we're going to display these results
18 critical, you know. We need to be making some of
19 these decisions and it doesn't mean we can't revise
20 them.

21 And I'm sure as we start writing the
22 Results section, you know, that we'll probably have
23 an iterative process on deciding what to do here.

24 Volume 3 we didn't really talk about.
25 I talked about it at a previous presentation, but

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1 this is where, you know, it's going to talk about,
2 you know, the perspectives and uses. Future
3 research, for example, would be in this section.

4 So, I'm not real sure when we're going
5 to start working on Part 3. Hopefully maybe
6 sometime this summer, start really giving it some
7 serious thought.

8 So, that's all I was -- I believe that
9 was the last slide.

10 MR. KURITZKY: Sorry, Mary, let me --
11 this is to Dr. Kirchner. I think this volume --
12 Part 3, Volume 3, is probably where some of the
13 information you were asking about --

14 MS. DROUIN: Yes.

15 MR. KURITZKY: -- will probably show up
16 in that volume.

17 MEMBER KIRCHNER: Thank you.

18 CHAIRMAN STETKAR: Mary, thank you for
19 the heroic effort. I said, "Let's try to finish by
20 10:15," and you're like --

21 MS. DROUIN: And you let me do it.

22 CHAIRMAN STETKAR: -- 18 seconds early.

23 Now, this will end the open session of
24 today's meetings. So, what I'd like to do first is
25 ask if we have any members of the public in the

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1 room who would like to make a comment. And if so,
2 please come up to the microphone and do so.

3 (Pause.)

4 CHAIRMAN STETKAR: Not seeing the
5 stampede, I will ask are there any members of the
6 public on the bridge line who would like to make a
7 comment? And if so, please speak up, identify
8 yourself and make a comment.

9 MR. LEWIS: Marvin Lewis, member of the
10 public.

11 CHAIRMAN STETKAR: Hello, Mr. Lewis.

12 MR. LEWIS: Oh, wonderful. Okay.
13 Thank you for the welcome.

14 Yes, PRA Level 3, finally I seem to see
15 the light and understand what you're talking about
16 as the consequences.

17 Here's my problem with it, though. I -
18 - there as guy named Hartman down at Three Mile
19 Island Number 2, who was a technician, and
20 subsequently gave testimony in Three Mile Island's
21 Number 2 hearings.

22 What his job was, is he measures the
23 leakage. And he used a tank. He could bubble
24 hydrogen through it and the hydrogen was used to
25 control some oxidation or corrosion, whatever you

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1 want to call it, but that's -- his boss told him to
2 do it -- in fact, ordered him to do.

3 And he went on the record with that was
4 to bubble the hydrogen through the tank to increase
5 the volume of the water in the tank so that the
6 readings would look like there was a minimum -- or
7 an allowable leakage instead of greater than
8 allowable leakage.

9 And of course if the readings had been
10 taken without bubbling hydrogen through the tank,
11 the reactor would have been off and there would
12 have been no Three Mile Island Number 2 accident
13 back in '79.

14 Well, this is my problem: I look at
15 these things, I see all these writings, I see all
16 these numbers being presented from one to the
17 other. I see the licensee come in with numbers and
18 numbers and numbers and I see the staff going
19 through the numbers.

20 And then at the end, the work product
21 does not have the actual name of the engineer or
22 technician running out the numbers or feeding it
23 through the computer or getting the numbers from
24 whatever source they're getting the numbers to.

25 So, although it looks like a beautiful

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1 presentation and of course it meets the
2 requirements and the regulations and the rules, I
3 don't see where these numbers come from except
4 perhaps from the licensee unchecked --
5 unquestioned.

6 Now, that's my feeling on it. I do not
7 know how close to the truth I am. I hope I'm not,
8 but that's the way I feel about it. Thank you.

9 CHAIRMAN STETKAR: Great. Thank you
10 very much for that comment. I appreciate that very
11 much.

12 Are there any other members of the
13 public on the line? If so, please identify
14 yourself and make a comment.

15 (Pause.)

16 CHAIRMAN STETKAR: Not hearing any, to
17 close out the public section, as we usually do, I'd
18 like to go around the table and see if any members
19 have any final comments that you'd like to make.

20 And I'll start with Ron.

21 MEMBER BALLINGER: No further comments.

22 CHAIRMAN STETKAR: Thank you.

23 Matt.

24 MEMBER SUNSERI: I have no comments.

25 Thank you.

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1 CHAIRMAN STETKAR: Dennis.

2 MEMBER BLEY: Nothing beyond what I've
3 said. Thanks.

4 CHAIRMAN STETKAR: Walt.

5 MEMBER KIRCHNER: Thank you, no.
6 Nothing at this point.

7 CHAIRMAN STETKAR: And, Joy?

8 MEMBER REMPE: I just wanted to thank
9 everyone for their presentations and hard work and
10 no comments.

11 CHAIRMAN STETKAR: And I'd like to echo
12 that. Thank you very much. With that, we are
13 going to close the open session, recess, and we
14 will come back in closed session at 10:35.

15 (Whereupon, the above-entitled matter
16 went off the record at 10:19 a.m.)

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Full-Scope Site Level 3 PRA

Advisory Committee on Reactor Safeguards
Reliability and PRA Subcommittee

May 2, 2017
(Open Session)

Alan Kuritzky
Division of Risk Analysis
Office of Nuclear Regulatory Research
(301-415-1552, Alan.Kuritzky@nrc.gov)

Outline

- Open Session
 - Project status overview
 - Draft report – Format and Contents
- Closed Session
 - Fire PRA
 - Review of SNC fire PRA
 - NRC scoping study
 - Scenario mapping and quantification
 - Seismic PRA
 - Seismic hazard and fragilities
 - PRA model and quantification



Level 3 PRA Project Status Overview

May 2, 2017

Alan Kuritzky

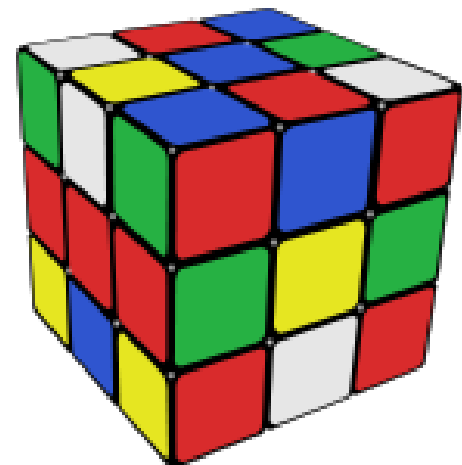
Division of Risk Analysis

Office of Nuclear Regulatory Research

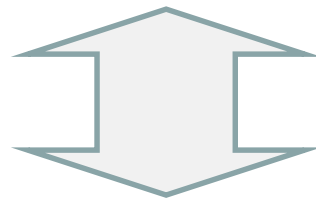
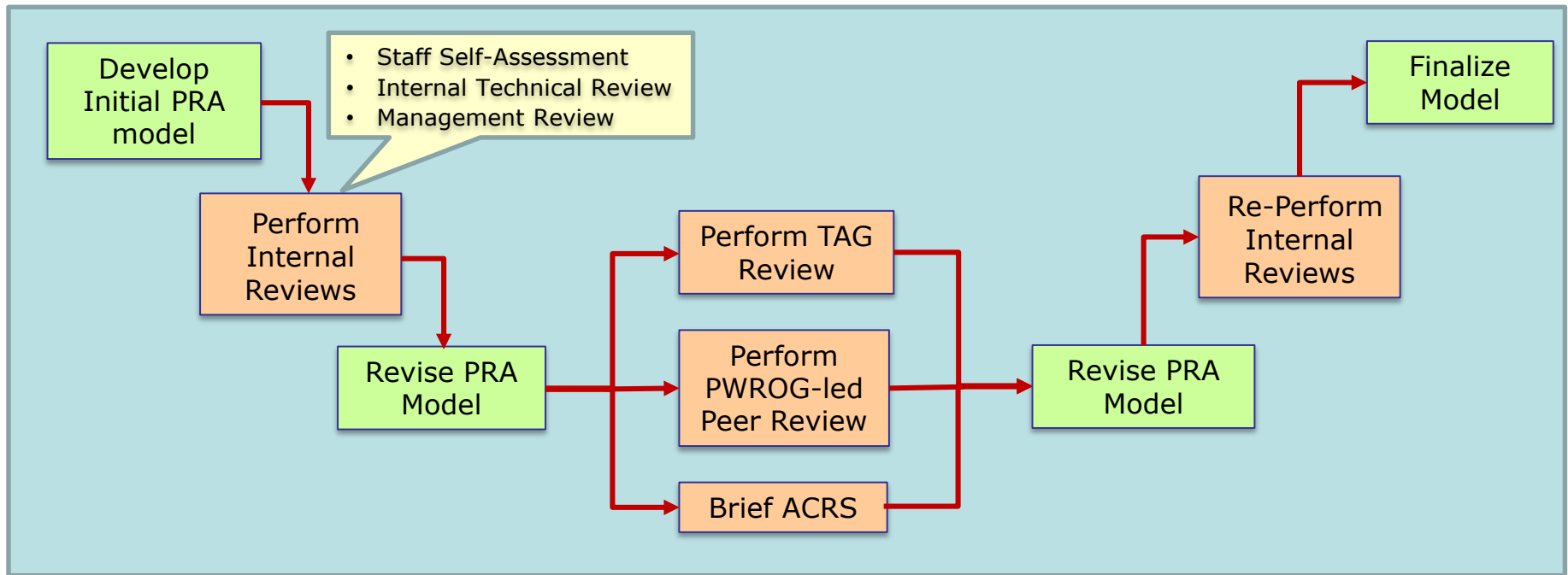
(301-415-1552, Alan.Kuritzky@nrc.gov)

Outline of Presentation

- Reactor, at-power, internal events and floods
- Reactor, at-power, internal fires and seismic events
- Reactor, at-power, high winds and other hazards
- Reactor, low power and shutdown
- Spent fuel pool
- Dry cask storage
- Integrated site
- Path Forward



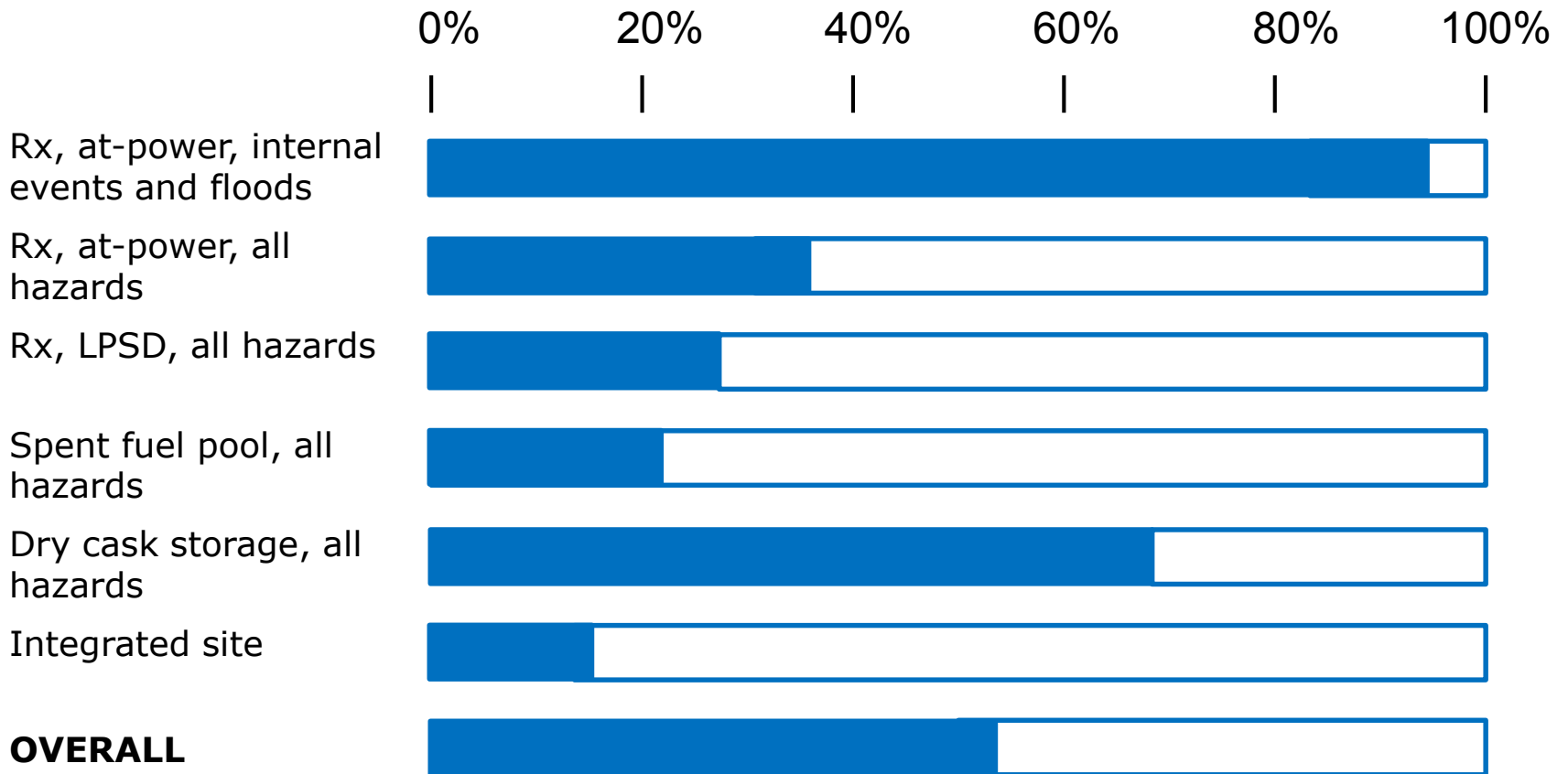
Generic Process for PRA Model Development



Develop Documentation

Project Status

Combined status of model development, project reviews, and project documentation



Reactor, At-Power, Internal Events and Floods

- Completed ASME/ANS PRA standard-based peer review of Level 1, 2, and 3 PRAs, led by PWR Owners Group
- Completed substantive update to Level 1 and 2 PRAs to address peer review and other comments
 - Level 1 internal flood report nearing completion
 - Level 2 internal event and flood PRA undergoing internal technical review
- Performing substantive update to Level 3 PRA to reflect revised source terms and address peer review and other comments
- Completed expert elicitation for interfacing systems LOCA

Reactor, At-Power, Internal Fires and Seismic Events

- Completed initial revision of Level 1 fire and seismic PRA models and documentation based on new input from SNC
- Performed additional human reliability analysis to address internal consistency of human error probabilities for internal events and internal fires
- Currently resolving internal technical review comments for both studies
- Recently initiated Level 2 modeling for internal fires and seismic events

Reactor, At-Power, High Winds and Other Hazards

- Completed ASME/ANS PRA standard-based peer review, led by PWROG
- Completed substantive update to “Other Hazards” report to address peer review and other comments
 - Currently undergoing internal technical review
- Performing substantial update of high wind PRA to address peer review and other comments, as well as incorporate additional information obtained from high wind walkdown and follow-on analyses performed by ARA

Reactor, Low Power and Shutdown

- Initial LPSD Level 1 PRA model for internal events nearing completion
 - Major update to HRA documentation (some HEPs changing)
 - Need to re-perform HRA dependency analysis
- Work continuing on LPSD Level 2 PRA
 - Completed MELCOR model development
 - Completed bridge tree and plant damage state (PDS) modeling
 - Completed provisional PDS quantification and selection of representative accident sequences (for deterministic modeling)
- Performed a Phenomena Identification and Ranking Technique (PIRT) expert elicitation to identify ranked list of focus areas for LPSD PRA
 - Recently received contractor report (internal)
 - Planning to also prepare NUREG/CR

Spent Fuel Pool PRA

- Initiated contract with SNL to speed progress
- Continuing to construct and shakedown accident progression model (MELCOR)
- Screened several initiating events
- For large seismic events (primary event of concern):
 - Defined leak rates and locations
 - Continue to refine modelling assumptions

Dry Cask Storage PRA

- Completed initial Level 1/2/3 model and documentation for all hazards
- Revised consequence analysis to be Vogtle-specific
- Completed internal technical review (NMSS)
- Currently undergoing Level 3 PRA management review

Integrated Site PRA

- Developed an approach for an integrated site PRA model using single-source PRA model results and risk insights to prioritize the systematic identification and modeling of multi-source accident scenarios and inter-source dependencies
- Completed pilot applications of the approach for:
 - Reactor Units 1 & 2, at-power, internal events, Level 1 PRA
 - Reactor Units 1 & 2, at-power, internal events and floods, Level 2 PRA
- Currently performing a pilot application of the approach for Reactor Units 1 & 2, at-power, seismic events, Level 1 PRA
- Recently held a brainstorming session with TAG members on addressing known limitations of using single-source PRA models to identify and prioritize multi-source accident scenarios

Path Forward (1 of 2)

- Key upcoming milestones
 - Reactor, at-power, Level 1, seismic event PRA ready for technical adequacy review (May 2017)
 - Reactor, at-power, Level 1, internal fire PRA ready for technical adequacy review (May 2017)
 - Dry cask storage, Level 1, 2, and 3 PRA ready for technical adequacy review (May 2017)
 - Complete updated reactor, at-power, Level 2, internal event and flood PRA (June 2017)
 - Complete updated reactor, at-power, other hazards report (June 2017)
 - Reactor, LPSD, Level 1, internal event PRA ready for technical adequacy review (July 2017)

Path Forward (2 of 2)


- Schedule challenges
 - Diversion of key staff
 - Contractor staff availability
 - Technical adequacy reviews
 - Resolution of key technical issues

Acknowledgements

- SNC
- PWR Owners Group
- Westinghouse
- EPRI
- NSIR, NRO, NRR, NMSS, Regions, TTC
- National Laboratories (INL, SNL, PNNL, BNL)
- Commercial Contractors (ERI, ARA, IESS)

Acronyms and Definitions

ANS	American Nuclear Society
ARA	Applied Research Associates
ASME	American Society of Mechanical Engineers
BNL	Brookhaven National Laboratory
EPRI	Electric Power Research Institute
ERI	Energy Research, Inc.
HEP	Human error probability
HRA	Human reliability analysis
IESS	Innovative Engineering & Safety Solutions, LLC
INL	Idaho National Laboratory
LOCA	Loss of coolant accident
LPSD	Low power and shutdown
PDS	Plant damage state
PIRT	Phenomena Identification and Ranking Technique
PNNL	Pacific Northwest National Laboratories
PRA	Probabilistic risk assessment
PWROG	PWR Owners Group
SNC	Southern Nuclear Operating Company
SNL	Sandia National Laboratories
TAG	Technical Advisory Group



Level 3 PRA Project Draft Report – Format and Content

Advisory Committee on Reactor Safeguards
Reliability and PRA Subcommittee

May 2, 2017
(Open Session)

Mary Drouin
Division of Risk Analysis
Office of Nuclear Regulatory Research
(301-415-2091, Mary.Drouin@nrc.gov)

Outline

- Documentation
 - Purpose
 - Types
 - Improvements
- NUREG Report
 - Goals and challenges
 - Organization
 - Part 1 – examples
 - Part 2 – plan and options
- Status

Purpose of Documentation

- Transparency of work
- User friendly
- Accessible
- Retrievable
- Understandable
- Communication

Documentation

- Two levels of documentation
 - Reports
 - ***Publicly available NUREG report***
 - Non-publicly available detailed technical reports
 - Working files
 - Variety of “forms” created to document information; for example
 - List of issues
 - Assumptions and bases
 - Decisions and bases
 - Computer code input/outputs files, databases, etc.

Example Improvements

- In the NUREG report
 - More detailed discussion of the design and operation of the plant
 - High level discussion on the approach
 - Discussion on key assumptions
 - Include index of “key words”
- Volume that provides a detailed roadmap to both the NUREG and all the technical reports
 - Option – include “frequently asked questions” with pointer/links to specific location in the report(s)



NUREG Report

Goals and Challenges

- Contains sufficient information to understand:
 - Design and operation of the plant
 - The technical approach
 - Major assumptions
 - Major results
 - Major insights and perspectives
 - Potential uses
 - Potential future work
- Major challenges
 - The level of detail of information in the report recognizing concern regarding propriety information
 - The significant amount of information – what to and not to include – so as not to overwhelm the reader but remain informative
 - How to represent the information in an efficient and understandable manner for a “four dimensional” PRA model that addresses multiple sources, multiple hazards, multiple operating states, and all three PRA levels

TABLE OF CONTENTS

NUREG-xxxx, “An Assessment of Site Risk for the Vogtle Electric Generating Plant, Units 1 and 2”

Part 1 (Volume 1)

Introduction and Summary of Approach and Plant Description

Executive Summary

1. Introduction
 - 1.1 Background
 - 1.2 Objectives
 - 1.3 Scope of Risk Analysis
 - 1.4 Assumptions and Limitations
 - 1.4 Structure of NUREG
2. Summary of Plant Design and Operation
 - 2.1 Site
 - 2.2 Reactor Units
 - 2.3 Spent Fuel Pool
 - 2.4 Dry Cask Storage
3. Summary of Approach*
 - 3.1 Overall Approach
 - 3.2 Technical Analyses
 - 3.3 Reactor Risk Model
 - 3.4 Spent Fuel Pool Risk Model
 - 3.5 Dry Cask Storage Risk Model
 - 3.6 Site Risk Model

*Approach addresses the different hazards and operating states

Part 2 (Volume 2)

Summary of Results

4. Reactor Risk Results*
 - 4.1 Level 1
 - 4.2 Level 2
 - 4.3 Level 3
5. Spent Fuel Pool Risk Results*
 - 5.1 Level 1/2
 - 5.2 Level 3
6. Dry Cask Storage Risk Results*
 - 6.1 Level 1/2
 - 6.2 Level 3
7. Site Risk Results*
 - 7.1 Level 1
 - 7.2 Level 2
 - 7.3 Level 3

*Results are presented for the different hazards and operating states

Appendices (Volume 4)

- A. Glossary
- B. Project Organization
- C. Quality Assurance
- D. Results of Independent Expert Review and Public Review

Part 3 (Volume 3)

Perspectives and Uses

8. Overall Perspectives
 - Significant accident sequences
 - Significant contributors
 - Important design and operational features
 - Significant uncertainties
9. Reactor Risk Perspectives*
10. Spent Fuel Pool Risk Results*
11. Dry Cask Storage Risk Results*
12. Site Risk Results*
13. Comparison to Previous Studies
 - 13.1 Reactor Safety Study
 - 13.2 NUREG-1150
 - 13.3 IPE/IPEEE Results
14. NUREG-xxxx as a Resource Document
 - 14.1 Guidance for Enhancing the Technical Basis for the Use of Risk Information
 - 14.2 Guidance for Improving the PRA State-of-Practice
 - 14.3 Identifying Safety and Regulatory Improvements
 - 14.4 Supporting Knowledge Management
15. Potential Future Research

*Same subset of perspectives as listed for Section 8

Section 2 – Summary of Plant Design and Operation

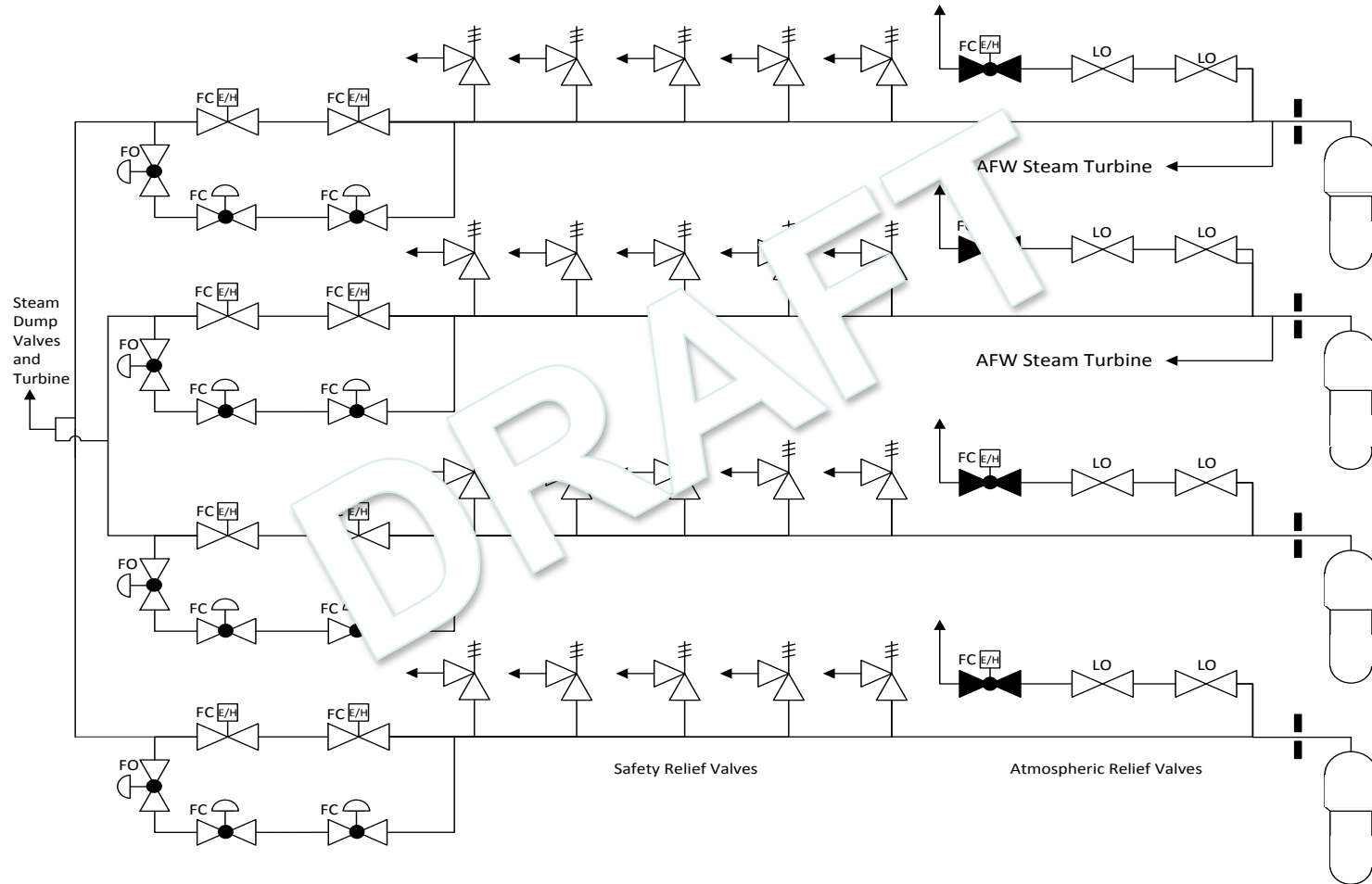
- Description of site, reactors, spent fuel pools, dry cask storage
- Brief description provided for each structure and system modeled
 - Purpose and function
 - Configuration
 - Actuation
 - Success criteria
 - Dependencies
- Simplified schematic provided for each structure and system
- Dependency diagram provided for each system
- No actual system layout provided nor plant-specific labeling

Example System Description – Accumulator Injection System

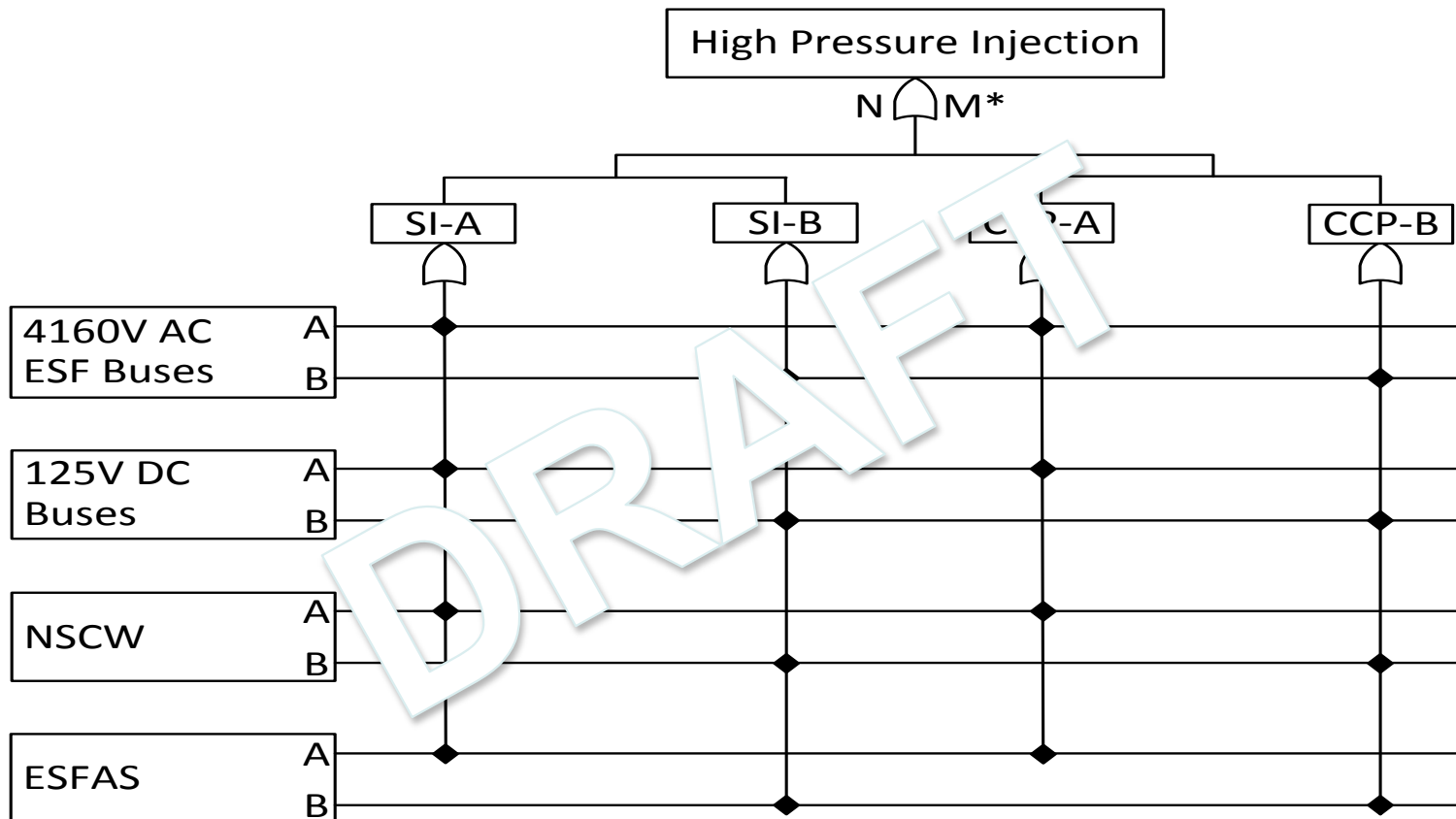
The accumulators provide a means for the passive injection of borated water into the reactor vessel to preserve fuel integrity in the event of a loss-of-coolant accident (LOCA). Each of the four accumulators discharges through a separate line into a cold leg of the reactor coolant system (RCS). Each discharge line contains two check valves and one motor-operated valve (MOV) which is normally open with power removed at the motor control center (MCC). Each MOV receives a confirmatory safety injection (SI) signal to open. Each accumulator contains borated water and is pressurized with a nitrogen blanket. The nitrogen pressure is used to propel the accumulator contents into the cold leg when RCS pressure drops below the accumulator pressure (approximately 650 psig).

A simplified schematic and an associated dependency diagram are shown in Figures 2-4 and 2-5, respectively, in Section 2.3.

Example Schematic – Auxiliary Feedwater

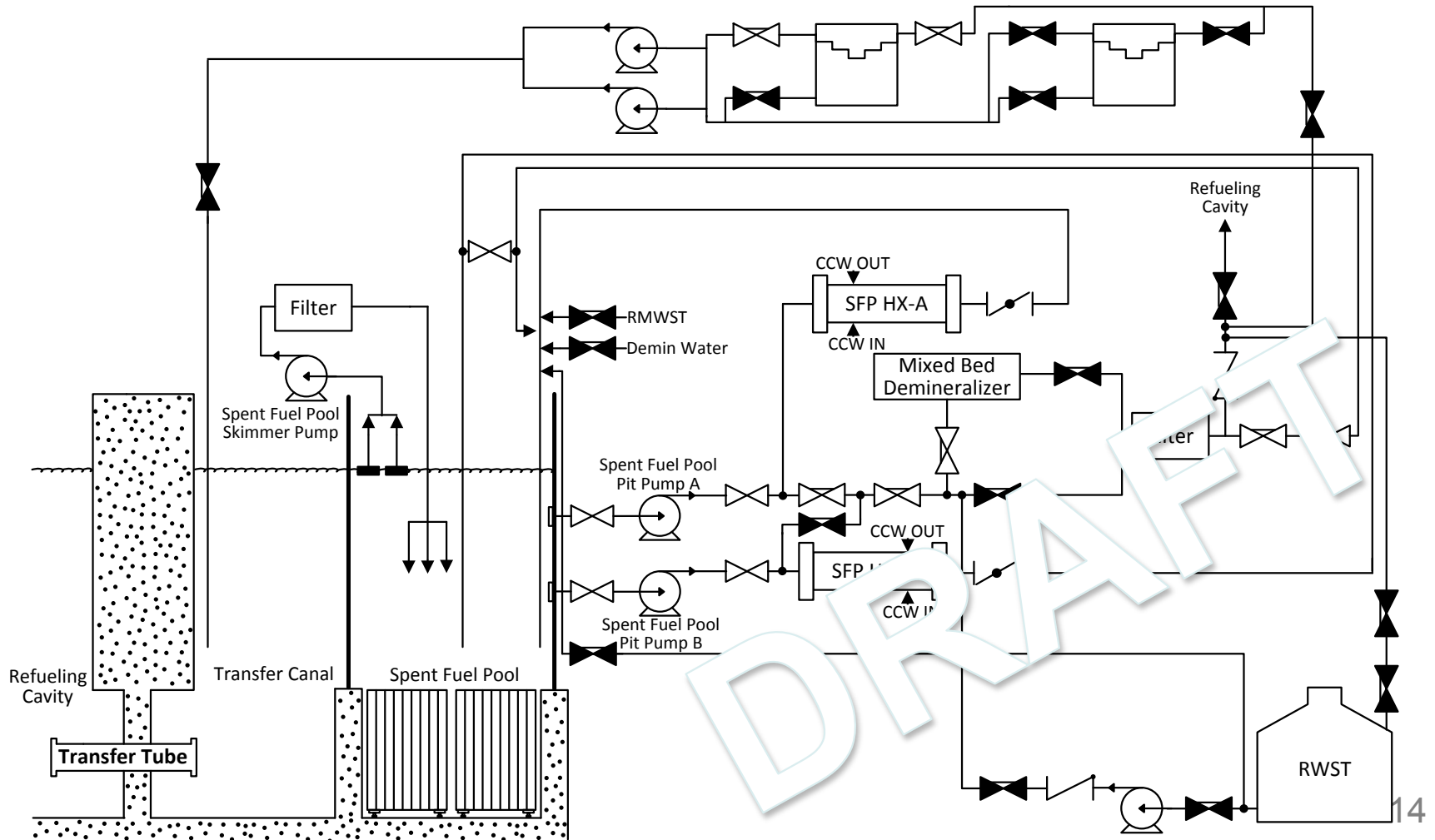


Example Dependency Diagram – High Pressure Injection

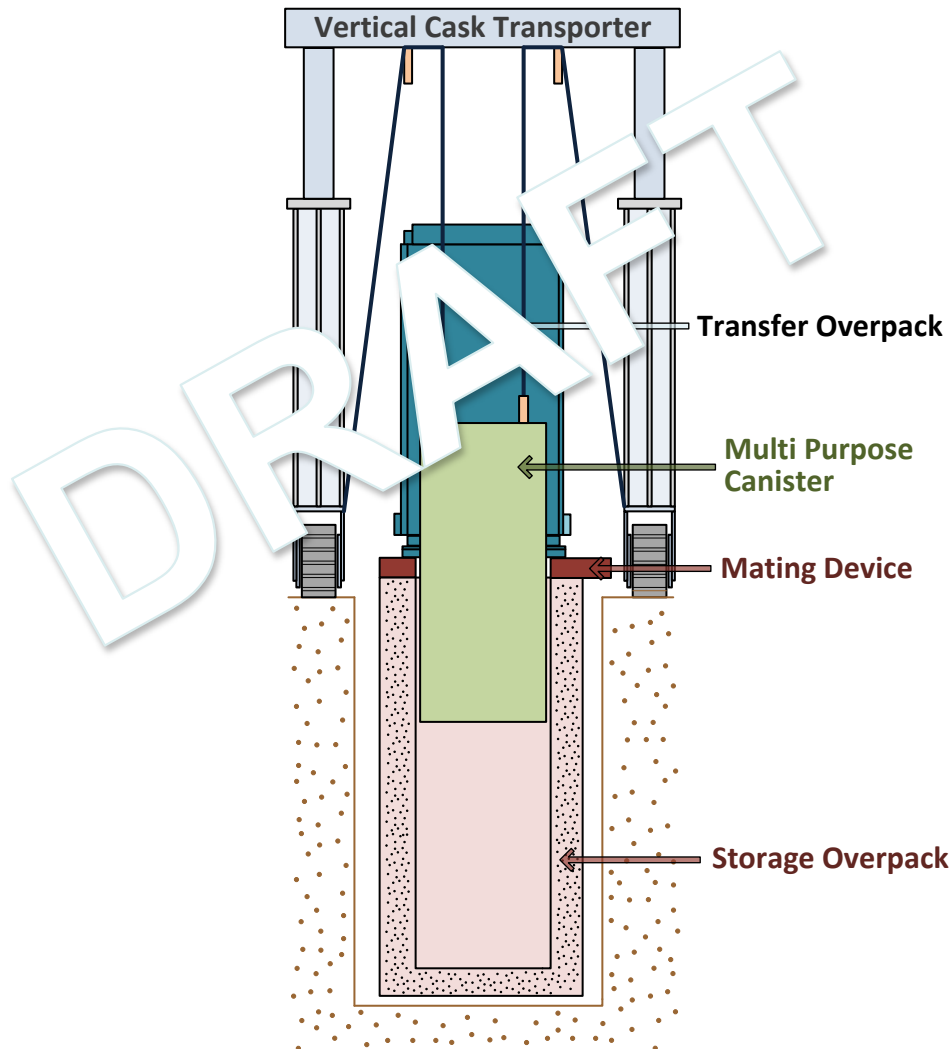


*Note: N/M Gate (required to fail HPI)
 SLOCA: 4/4
 MLOCA: 3/4

Example Schematic – Spent Fuel Pool



Example Schematic – Dry Cask Storage

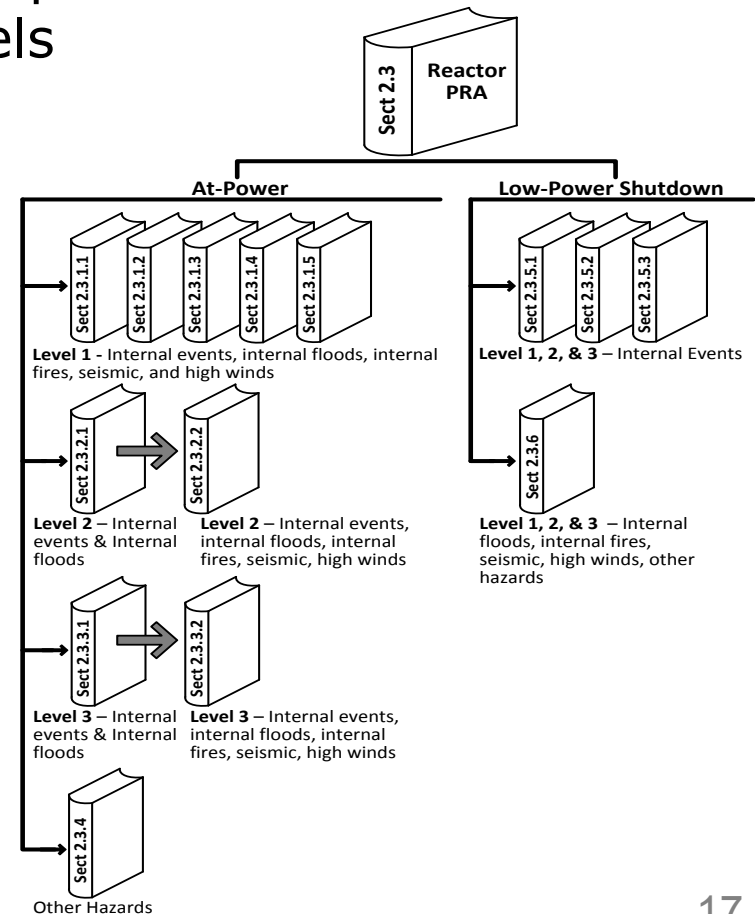


Section 3 – Summary of Approach (1/2)

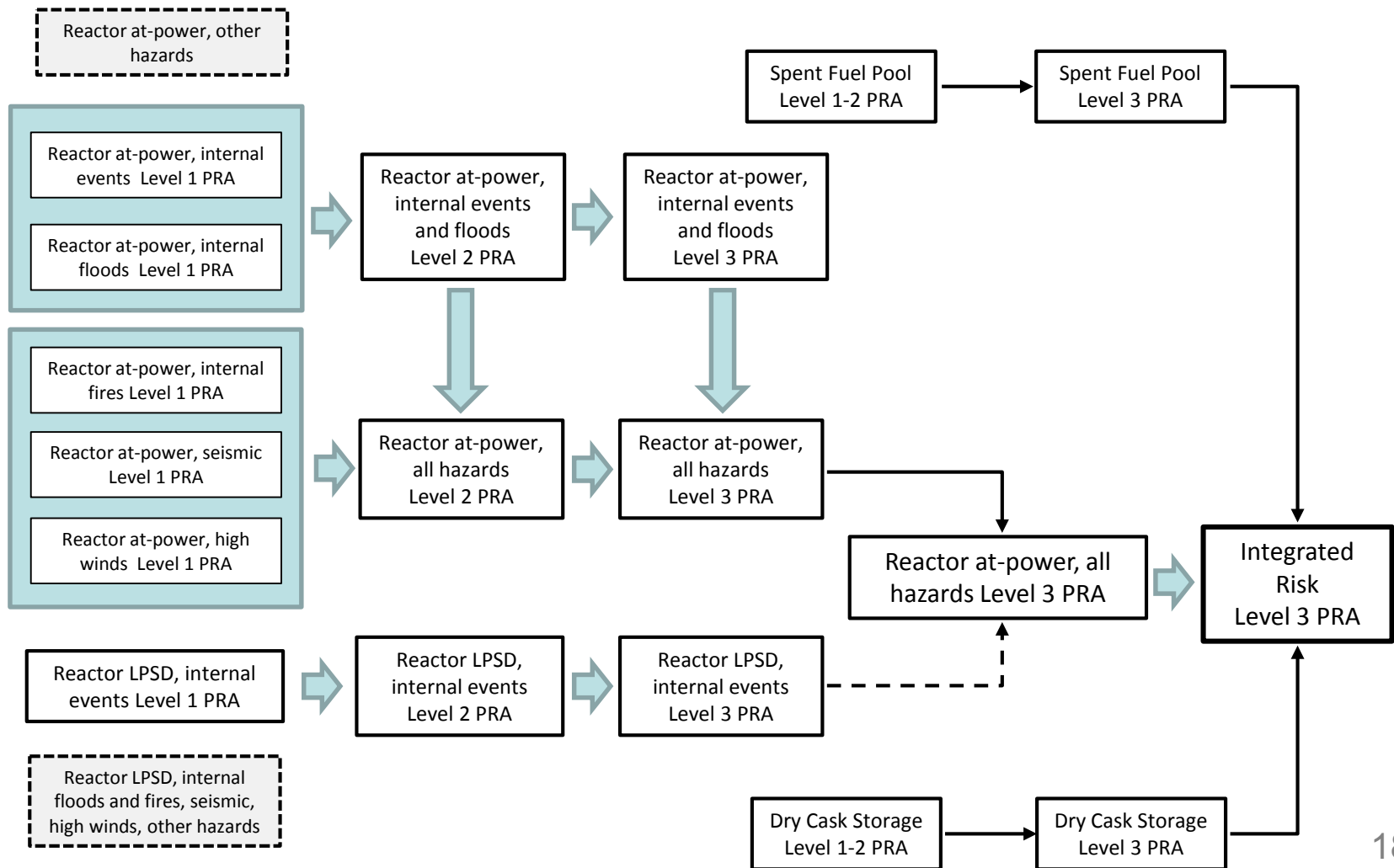
- Section 3.1 – Overall Approach
 - Discussion of the construction of the various individual models
- Section 3.2 – Technical Analysis
 - Discussion of the supporting technical analyses (e.g., systems analysis) for the different sources, hazards, and risk levels
 - Purpose/objectives of analysis
 - Major steps associated with analysis
 - Output/products of the analysis

Section 3 – Summary of Approach (2/2)

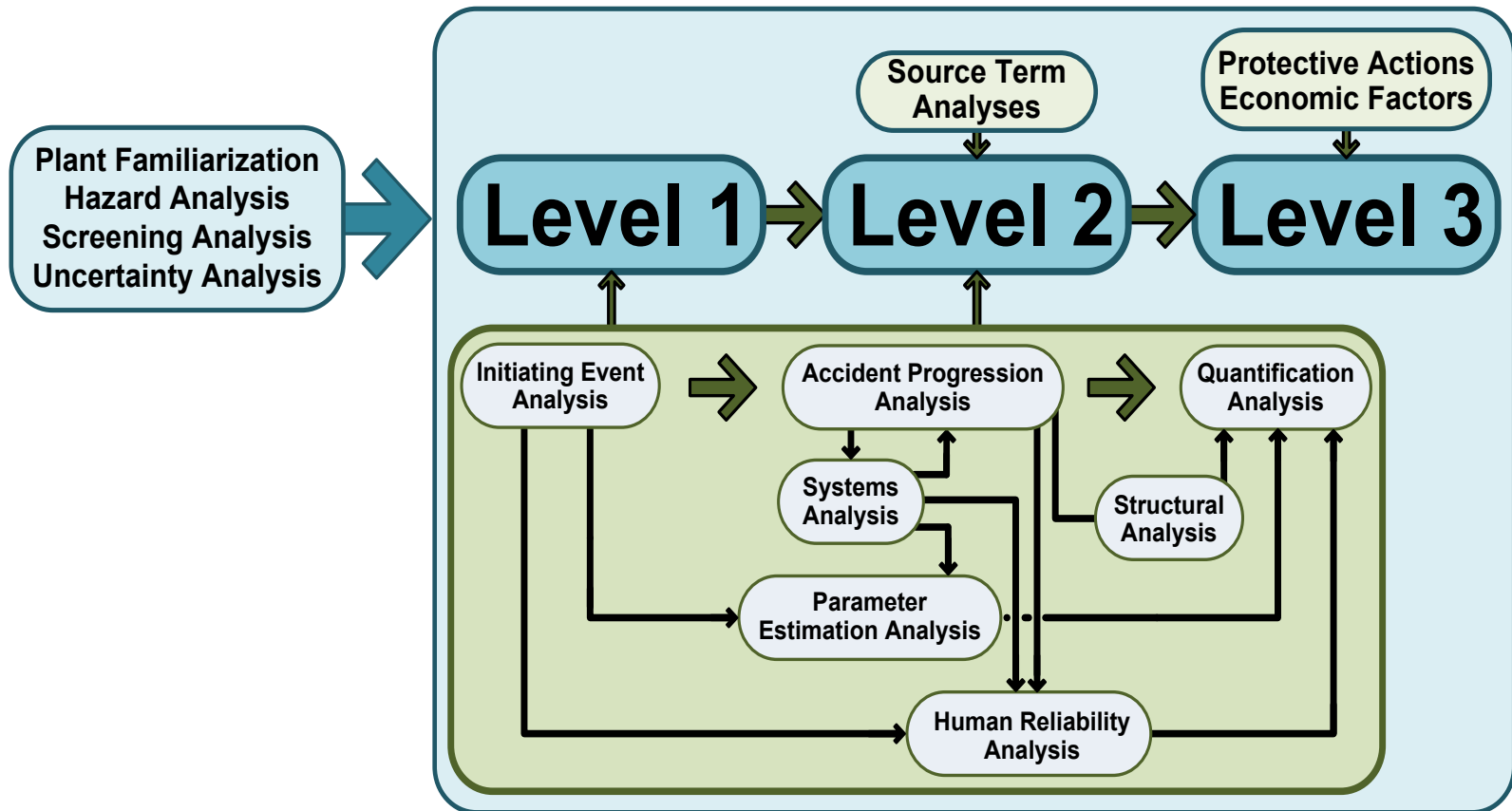
- Section 3.3 thru 3.6 – Key assumptions for the construction of the models
 - 3.3 – reactor
 - 3.4 – spent fuel pool
 - 3.5 – dry cask storage
 - 3.6 – integrated site
- Organized by plant operating state, risk level, and hazard



Section 3.1 – Overall Approach



Section 3.2 --Technical Analyses



Example Description – Parameter Estimation Analysis

Parameter estimation analysis quantified the frequencies of the initiating events, as well as the equipment (and structure) failure probabilities and equipment unavailabilities of the modeled systems (i.e., basic events). The estimation process included a mechanism for addressing uncertainties and has the ability to combine different sources of data in a coherent manner, including the actual operating history and experience of the plant when it is of sufficient quality, as well as applicable generic experience. For the basic events, the needed parameters estimated (e.g., failure on demand) and the required data was identified and their boundaries were established consistent with the systems analysis. The various equipment (components) were grouped into a homogeneous population for parameter estimation based on their design, environmental and service conditions. Both generic and plant-specific data was collected consistent with the defined component boundary conditions and the component groups. Plant records were reviewed to obtain the data necessary to perform the parameter estimation. The estimations were based on an integration of both generic and plant-specific data.

Examples of Key Assumptions (1/3)

- Assumed licensee Level 1 at-power reactor internal events PRA model was adequate as a starting point
 - Model was transferred onto the SAPHIRE platform and modified based on the feedback from the ACRS, ANS/ASME PRA Standard peer review, and internal reviews
- Assumed licensee seismic hazard and fragility analyzes were adequate based on staff review
- Fire scenarios
 - Mapped fire sequences from Vogtle fire PRA into manageable number of fire scenarios based on similar plant response to fire

Examples of Key Assumptions (2/3)

- Level 1 low power shutdown model implemented a prioritization scheme based on containment status, time to boiling and event frequency to determine plant operating modes
- Low ambient temperature hazard
 - Assumed risk is dominated by human error versus equipment failure
- Airborne pathway
 - Focused on airborne radiological releases only, e.g., only airborne releases are passed to the offsite consequence analysis
 - Past experience indicates that airborne releases generally dominate relative to other pathways

Example of Key Assumptions (3/3)

- **Dry cask storage**
 - Modeled in detail all known hypothetical hazards/events that had the potential to challenge systems and result in radionuclide release
 - Screened hazards/events based on previous experience
- **Integrated site risk**
 - Assumed risk dominated by dependencies among risk sources and significant contributors from individual risk sources

Part 2 – Summary of Results

- Challenge regarding which results to report and how to present results
- Quantitative results would include
 - “Risk” results (e.g., core damage frequency), relative contributions including importance measures
 - Mean values with 95% and 5% and distribution (not proposing to show medians or point estimates)
- Several options available

Quantitative Results– Site Risk

- Health effect results from each source
- No similarities of plant operating states among risk sources
- No similarities in PRA level quantification among risk sources

Quantitative Results – Reactor Risk

- At-Power Results
 - Level 1
 - For each hazard (i.e., internal hazards, seismic, high winds) and across hazards – core damage frequency
 - Level 2
 - For each hazard and across hazards – radionuclide release frequency (RRF) and conditional containment probabilities
 - Level 3
 - For each hazard and across hazards – health effect results (fatalities, population dose)
- LPSD Results
 - Level 1, 2, and 3 results for internal events
- For each of the above, would provide accident sequence contributions and SSC contribution, where appropriate
- May not have an integrated model for at-power and low power shutdown conditions

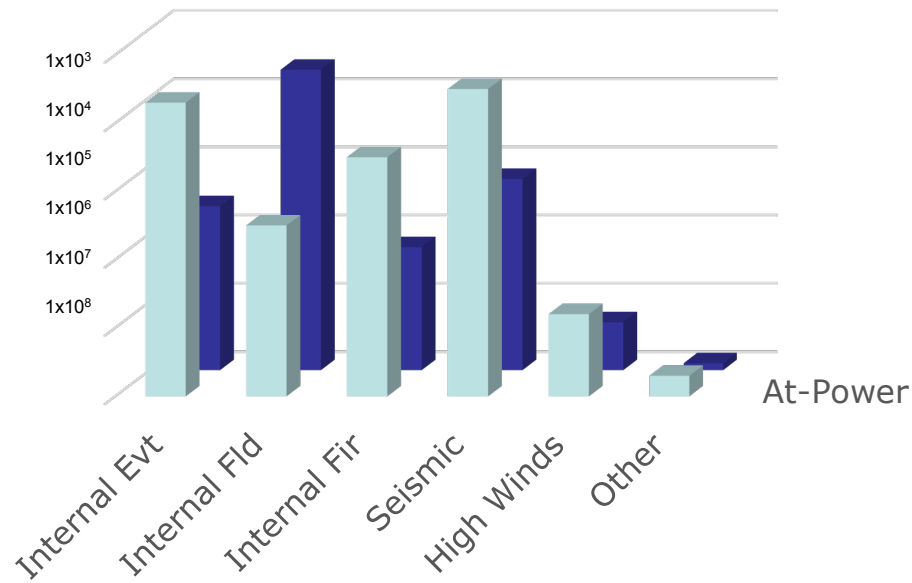
Quantitative Results – SFP and DCS Risk

- Spent Fuel Pool Risk
 - Fuel damage frequency, RRF, and health effect results for combined hazards and combined operating states
- Dry Cask Storage Risk
 - Health effect results for combined hazards and combined operating states
- For each of the above, would provide accident sequence contributions and SSC contribution, where appropriate

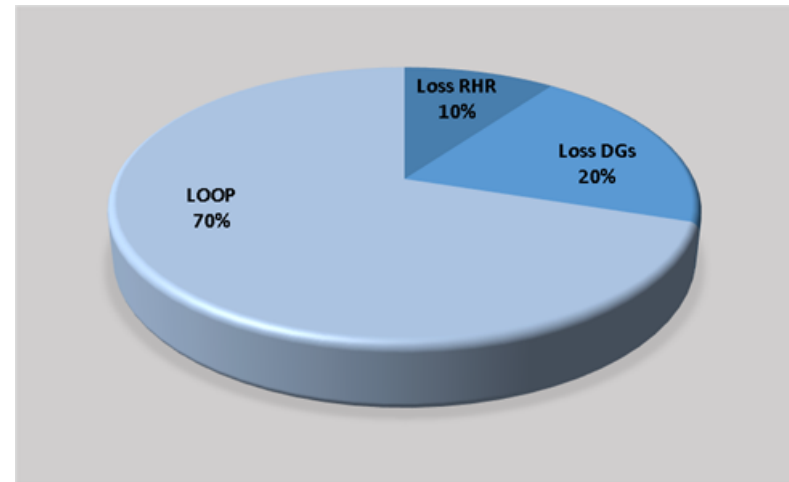
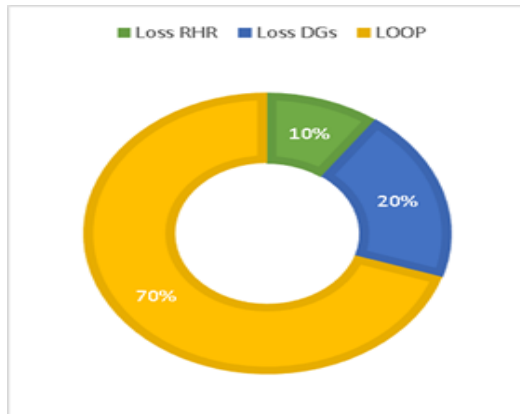
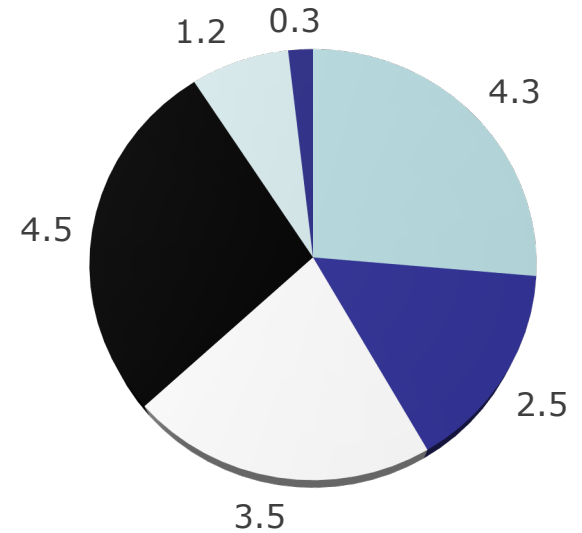
Presentation Options (1/3)

(numbers are meaningless, only for illustration)

Bar Chart

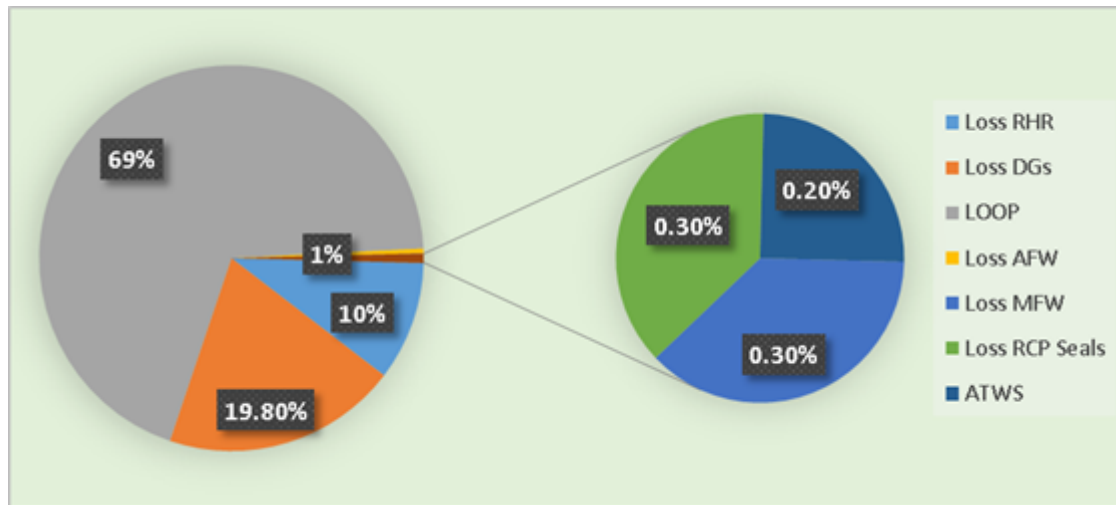


Pie Charts

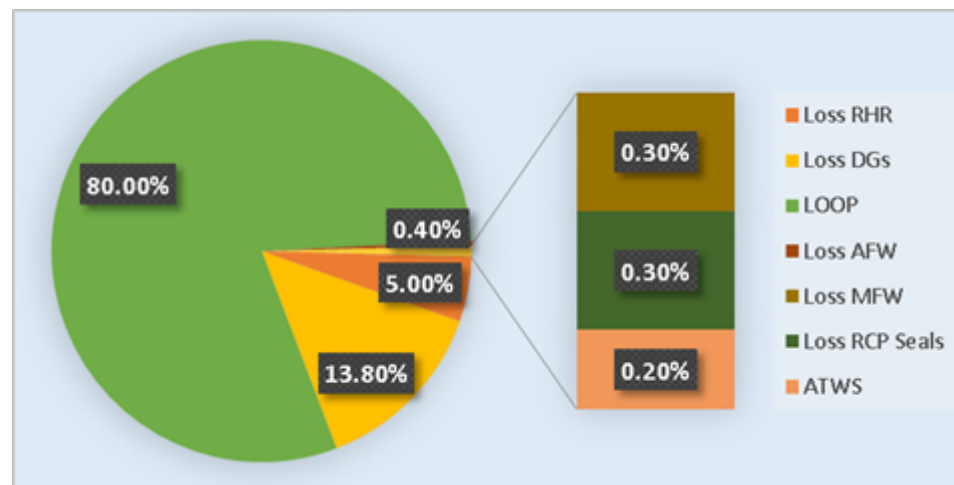


Presentation Options (2/3)

(numbers are meaningless, only for illustration)



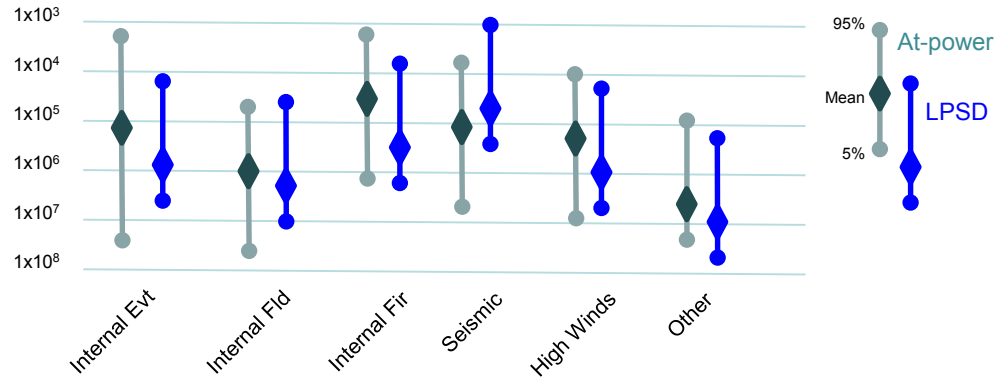
Pie Charts



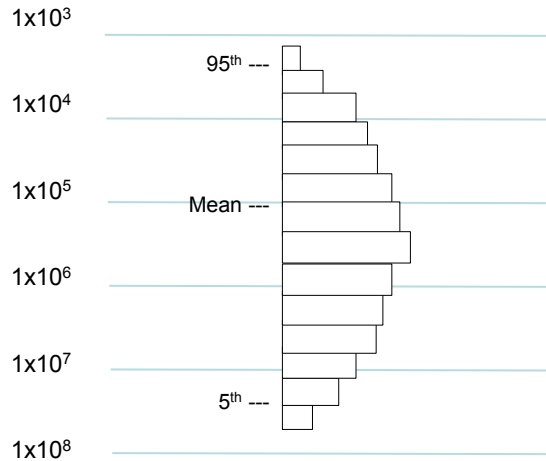
Presentation Options (3/3)

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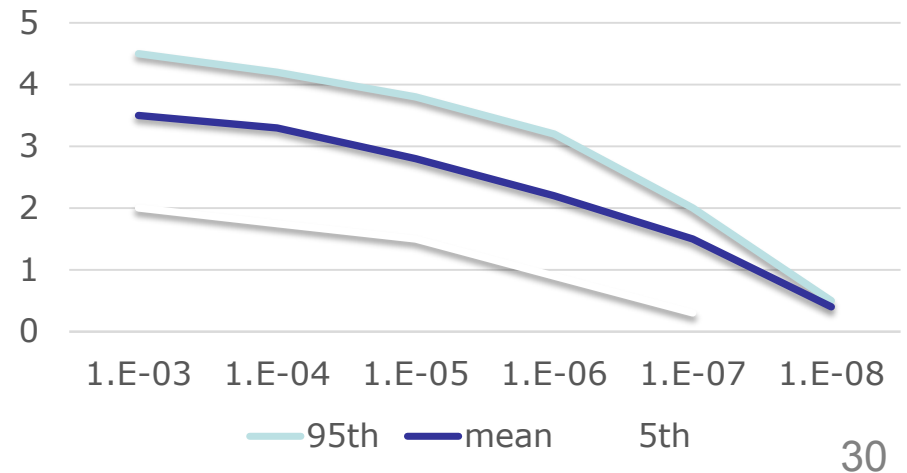
Line Chart



Sample Chart



Curve Chart



Presentation Options – Advantages and Disadvantages

Item	Bar	Pie	Line	Curve	Sample
Hazards	✓	✓	✓	✗	✓
Plant States	✓	✗	✓	✗	✗
Mean Value	✓	✓	✓	✓	✓
% Contribution	✗	✓	✗	✗	✗
95%/5%	✗	✗	✓	✓	✓
Distribution	✗	✗	✗	✓	✓

Numerical Presentation Options

- Just provide numerical results on figures?
- No figures, just provide in tables?
- Provide a combination of figures and tables?
 - What would be the combination?

NUREG REPORT Status

- **Part 1 (Volume 1)** -- Introduction and Summary of Approach and Plant Description
 - Section 1 – Introduction – **Draft complete**
 - Section 2 – Summary of Plant Design and Operation – **Draft complete**
 - Section 3 – Summary of Technical Approach – **Draft 90% complete**
- **Part 2 (Volume 2)** -- Summary of Results – **Initiating**
- **Part 3 (Volume 3)** -- Perspectives and Uses – **To be started**