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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 FIRE PRA REALISM WORKSHOP

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6 WEDNESDAY,

7 OCTOBER 4, 2017

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9 The meeting was convened in the Auditorium
10 of Two White Flint North, 11545 Rockville Pike,
11 Rockville, Maryland, at 8:30 a.m., Daniel Mussatti,
12 NRC Facilitator, presiding.

13

14 INDUSTRY MEMBERS PRESENT:

15 VICTORIA ANDERSON, NEI

16 DOUGLAS BUCKNELL, Enercon Services

17 MICHELLE CARR, Scientech, Curtiss-Wright

18 ROBERT CAVEDO, Exelon

19 CATHY CHAN, Duke Energy

20 JOELLE DeJOSEPH, Jensen-Hughes

21 USAMA FARRADJ, Jensen-Hughes

22 FERNANDO FERRANTE, EPRI

23 JASON FLOYD, Jensen-Hughes

24 YOUNG JO, Southern Nuclear*

25 FRANCISCO JOGLAR, Jensen-Hughes

GREGORY KRUEGER, NEI
BRIAN KRYSTEK, EPM*
GREGORY KVAMME, Xcel Energy
ASHLEY LINDEMAN, EPRI
DAVID MISKIEWICZ, EPM
OLE OLSON, Nebraska Public Power District*
FRANCESCO PELLIZZARI, EPM
PATRICIA PRINGLE, Exelon*
ANDREW RATCHFORD, Jensen-Hughes
JOSEPH RENNER, Jensen-Hughes
JOSHUA ROSS, FENOC
MARK SCHAIRER, EPM
DENIS SHUMAKER, PSEG Nuclear
HAROLD STILES, Duke Energy
JEFFREY STONE, Exelon
RICHARD STREMPLE, FENOC
KEITH VINCENT, NextEra Energy, Florida Power & Light
KELLI VOELSING, EPRI
KIANG ZEE, Jensen-Hughes

NRC STAFF PRESENT:

DANIEL MUSSATTI, NRO/DSEA/RENV; Facilitator
HAROLD BARRETT, NRR/DRA/APLA
GREG CASTO, NRR/DRA/APLB

1 KEVIN COYNE, RES/DRA/PRB
2 THINH DINH, NRO/DSRA/SPSB
3 ADRIENNE DRIVER, NRR/DRA/APLA
4 DANIEL FRUMKIN, NRR/DRA/APLB
5 KENNETH HAMBURGER, RES/DRA/FXHAB
6 J.S. HYSLOP, NRR/DRA/APLB
7 BRIAN METZGER, NRR/DRA/APLB
8 TAMMIE RIVERA, RES/DRA/FXHAB
9 MARK HENRY SALLEY, RES/DRA/FXHAB
10 NATHAN SIU, RES/DRA
11 DAVID STROUP, RES/DRA/FXHAB
12 SUNIL WEERAKKODY, NRR/DRA/APHB
13
14 * = Present via telephone
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P R O C E E D I N G S

8:30 a.m.

MR. MUSSATTI: Okay, everybody. Let's get started for this morning. I'd like to welcome you to the second day of our Category 3 public meeting to improve the realism in fire PRAs. This is a workshop. It's meant for us to gather information from industry, which means that you guys are going to be doing most of the presentations and we're going to be asking a handful of questions and taking very scrupulous notes so that we can take the next steps from there. And we want to get that information from you.

I'm a facilitator here to help make this meeting go smoothly, informatively, productively, and on time. Of all of those different metrics, the only one that I can really use as a solid measurement of how well I did is on time, so we're going to try and keep to the schedule as much as possible.

I'm Dan Mussatti. For the record again, that's spelled M-U-S-S-A-T-T-I, and that will become apparent in a second when I review the rules for what we're going to do today.

First of all, the reason your microphones are sticking up in the air, if you weren't here yesterday, is that these mikes are 100-percent hot.

1 There's no on/off switch on them, so we aim them up in
2 the air so that you can have sidebar conversations
3 without having any sort of a feedback or overriding
4 what's going on in here. And we ask that you point
5 the mike down towards yourself when you're going to
6 speak. Try to speak into the microphone, rather than
7 having the microphone in front of you and then turning
8 your head away from it to speak to the podium instead
9 because what happens then is that we don't get the
10 full effect of your voice into the microphone and we
11 can get ourselves a garbled transcript out of this,
12 and it takes a little bit more effort for our
13 wonderful court reporter, that's Allegra in the back
14 of the room, and she's taking a transcript, making a
15 transcript of this whole meeting. So we want to speak
16 clearly into the microphones when we talk, and we want
17 to speak slowly. If you have a long acronym that is
18 something that is sort of a term of art for the fire
19 PRAs but is not known to normal people, then what we
20 would like to do is have you state that acronym very
21 carefully so that it will be recorded accurately and
22 possibly even give us the content of what that acronym
23 is. The NRC is the Nuclear Regulatory Commission, as
24 an example.
25 When you start speaking, start with your

1 name. Spell your name if it's kind of confusing how
2 to spell it or there might be some errors involved in
3 that, and also state your affiliation, whether you're
4 with industry and which group or whether you're with
5 the NRC and which office.
6 And as we go through the day, I don't
7 think I see any real new faces in here, but I've got
8 a real good memory, but it's short, so there may be
9 people in here that weren't here yesterday. We need
10 you to sign the sign-up sheet outside. It's not just
11 a way for us to be able to put a checkbox in that we
12 had X number of people at the meeting. That's not
13 important. What is important, and you should, you
14 know, consider this to be rather pertinent to what
15 you're doing here, is it's for fire safety. If we
16 have to evacuate the building for any reason, the only
17 way we know that you got out of the building is by
18 doing a headcount when we get out to our common area
19 outside. And if your name is on that list, you could
20 be left behind and we wouldn't know about it. So we
21 would appreciate it if you would sign that list
22 outside when you get a moment, and that way, if we do
23 have to evacuate, what we do is we go up the stairs,
24 out the back doors that came in today, the little
25 revolving door that's over by the elevator, and go

1 over to where the cars are checked and sort of crowd
2 around over in that area so that we're all in a common
3 spot so that we can do the headcount.
4 The next thing on the list is visitor
5 access rules. Most of you already understand that on
6 this floor you don't need to be escorted anywhere.
7 Restrooms are directly across from us on the far side
8 of the staircase, and there's a fountain out there for
9 getting a sip of water. But if you want something
10 stronger, a cup of coffee or something like that, you
11 need access to the upstairs floor, and the only way to
12 do that is if you're escorted.
13 Once you're in the lobby of the main area
14 upstairs, you're a free person again. You can wander
15 around. You don't need to be escorted. But to leave
16 the lobby area, which is kind of the boundary of where
17 the cafeteria ends and the hallways begin, to get from
18 that point down to here, you'll need to be escorted
19 again. So escorted up to go to the cafeteria, to the
20 gift shop, to the ATM machine, and escorted back down
21 again to be able to get back to this fascinating
22 meeting.
23 Okay. We are on a webcast, and the
24 participants again, we urge you strongly to not use
25 the audio of the webcast, because that's a lot of

1 bandwidth and it garbles a lot, but to use the call-in
2 number that you had to be able to listen in by
3 telephone. That will also facilitate us if we are in
4 the position where you've got a comment or question
5 that you want to ask. It will give us a much clearer
6 signal for the court reporter.
7 Okay. Last thing. If it buzzes, beeps,
8 barks, squeaks, anything like that, please shut it off
9 or put it on mute. If your job is the type that needs
10 to have, you need to have your phone on at all times
11 so that you can be reached instantly and you have to
12 answer that call when it comes in, I ask that you kind
13 of scurry out beyond this back wall behind me before
14 you start talking to make as small a disruption as
15 possible. It's not that we're going to lose our train
16 of thought or anything like that. Mainly, it's
17 because any sort of information that comes over the
18 microphone, it gets into our recorded record and it
19 makes it harder for the court reporter to be able to
20 get a clean copy of this, and we really want a clean
21 copy of what we're doing.
22 I don't have any other business for the
23 day, but I've invited Victoria to make a few
24 statements just so that we can get started this
25 morning and we've got our wheels spinning at the same

1 speed. So let's have a great meeting.

2 MS. ANDERSON: Sure. So I hope everyone

3 had a good day yesterday and came away with a lot of

4 new information about some of the specific potential

5 conservatisms we're looking at trying to tackle in our

6 next round of research efforts.

7 So I think yesterday we talked about all

8 the specific areas we're looking at investigation.

9 Today, we're going to do something that somebody

10 commented I really wish you guys would do this, and I

11 said that's great, come back tomorrow, and I actually

12 don't see that individual in the room today. So

13 hopefully they're coming back.

14 But what that person said was we really

15 need to understand how these all fit together and how

16 they affect a plant's PRA numbers, and I said that's

17 great, tomorrow we're going to learn about that, so

18 that's today. We have several utilities that have

19 volunteered to look at how all of the potential

20 conservatisms affect their results, and what we hope

21 to do is have that inform our discussion this

22 afternoon where we're going to talk about what areas

23 of research we might want to tackle and what

24 priorities we might want to give everything. And I

25 believe Ashley is going to have a couple of slides

1 pulled together on the specific areas of work we might
2 be able to do just to give us a visual to look at
3 while we're having that discussion this afternoon.
4 And I think that's, really one of the big goals of
5 this workshop is to have that that discussion and make
6 sure we have a common understanding of what we want to
7 work on.
8 So with that, I think we're ready to talk
9 about the plant-specific insights.
10 MR. CAVEDO: Actually, before we start on
11 the plant-specific insights, I just wanted to make a
12 comment/request, which is there was a little bit of a
13 logistical issue when we were making the slides for
14 the methods. In some cases, the evaluations for the
15 benefits of the method were based on just discussions
16 before the slides were finalized. So if the utility
17 didn't follow exactly what was in the methods
18 development slides, if maybe that could be pointed out
19 for each method what the deviations were because that
20 obviously affects the numbers and we want to make sure
21 that we're all talking apples to apples.
22 MR. VINCENT: Hi, good morning. My name
23 is Keith Vincent. I am with NextEra Energy, Florida
24 Power & Light. I am their fire PRA technical lead,
25 and I get the joy of starting this conversation about

1 plant risk insights.

2 We presented a whole lot of different

3 items yesterday and, in order to try to evaluate all

4 of it, in evaluating all of them, some of them were

5 not necessarily ones that could be easily performed by

6 us. So you'll see some things that say estimated risk

7 value or the double dash, which we did not actually

8 perform the quantification. But there's no actual

9 cognitive flow based on the agenda from earlier, so I

10 tried to group these a little bit to bend them

11 according to a similar narrative.

12 So the first one that we're looking at

13 here is the electrical cabinets, things that were

14 related to electrical cabinets specifically. In this

15 case, you can see that, from all of our risk results,

16 the three dominant areas here would be the time to

17 growth and the non-suppression curves, the basis of

18 confinement versus actually extinguishment of the

19 flames.

20 Those three items, the middle three that

21 are on the screen have the greatest impacts overall to

22 the entire, it's all of our fire PRAs that we

23 evaluated here. Not much else done on this slide.

24 The stays in cabinet and things like that, there are

25 some that do provide some very small impacts, but this

1 is a site-specific evaluation method. And so in some
2 cases, one site doesn't necessarily have to, didn't
3 have to look at it the same rigor as some of the other
4 ones. You can see that there's no real change in risk
5 for two of our sites, and one of them had some slight
6 change in risk.
7 Apparently, I did not update the header to
8 this slide. I apologize for that. It's not supposed
9 to be electrical cabinet specific methods anymore. In
10 this case, we see things where the uniqueness of each
11 plant's design and/or evaluation process that we went
12 through as part of our SE or LAR has changed the
13 insights that we get. For instance, one of our
14 stations or two of our stations, the HEAF, well, it's
15 also called zone of influence, the HEAF fraction, what
16 percentage of HEAFs are assigned to safety-related
17 equipment and non-safety-related equipment had a major
18 impact; and, essentially, we had a higher contribution
19 from HEAF events at that station due to the design of
20 it.
21 Also, transient growth is very heavily
22 dependent upon how your cable trays or other features
23 are routed in the plant. Older vintage plants tend to
24 have cables potentially routed in lower
25 configurations, just as we -- you know, as we

1 developed and built nuclear power plants, we learned
2 some insights. Things changed. Things got better.
3 And so if you have a plant with cable trays that are
4 located within five feet of the floor, there's a much
5 higher probability that your transient fire is going
6 to impact them versus another one where you have very
7 tall ceilings, the cable risers are routed, you know,
8 cable trays are routed 15 feet off the floor, there's
9 very little impact.
10 Other method improvements. Just as a
11 point, we actually do have the 500-degree C FAQ that
12 we have postulated in four of our nuclear plants. So
13 there was no impact to those. And the other ones,
14 they were Jason's. I think he's too smart for me to
15 understand what he's doing, so I couldn't understand
16 everything, so we had to estimate his risk.
17 But those kind of show the numerical
18 impacts, and there's really three high level, three of
19 those items, the growth curves and the non-suppression
20 probability and the HEAF, that really impacted our
21 risk numbers, made a tangible risk benefit. So when
22 you look at the overall NextEra fleet, clearly the
23 growth and suppression curves are a vital, not a vital
24 impact but they will greatly influence our overall
25 risk profile. The other ones did not necessarily show

1 the same amount of risk impact.

2 Again, the change, the amount of change

3 that we had is very dependent upon what was accepted

4 by the SE. For four of the sites, you know, we have

5 the flame tip impingement, but the other ones don't.

6 So we didn't have time to do the analysis. There

7 could be a lot of a delta there. But those are all

8 based on the fact that we had different reviews and

9 different overall acceptance of methodologies from our

10 sites.

11 So as I said, site-specifically, transient

12 growth, that's a very site-specific, configuration-

13 specific risk insight for the HEAF. Again, all these

14 things are about the way the plant was constructed,

15 how things were routed, and the actual decisions that

16 were made in the construction process.

17 So when we talk about it, what is the

18 impact of all of these, we'll call them conservatisms

19 or the areas of uncertainty that we have with respect

20 to the way the fire models were built? When we treat

21 fire, and I'll use the more realistically, I don't

22 know if that's the right term, but when we treat fire

23 with a more realistic method, we generate results that

24 are more at least in line with what we have seen in

25 operating experience.

1 Clearly, you go to a site and people
2 understand the cable spreading room is of high risk.
3 But is the cable spreading room 99 percent of this?
4 You know, are we creating a sense of all your risk is
5 encapsulated in some areas versus other areas? So are
6 we artificially biasing the numbers in specific areas
7 and ignoring other areas where fires have occurred,
8 transient work does occur? Things that are
9 potentially much more realistic to occur in the day-
10 to-day operation of the plant, are we ignoring them
11 and transitioning those resources away from those
12 areas? So when we talk with operations, we talk with
13 work control, we talk with management of the plant.
14 That's one of the harder challenges to overcome is
15 they don't see necessarily the same insights because
16 they're looking at a number, and the number is what
17 we're managing. They're not managing the reality of
18 the plant's operation. And our numbers don't match
19 the reality of the plant operation right now.
20 Also, I think Rob brought this up
21 yesterday, doing change evaluations, like adding
22 electrical panels. The amount of additional burden
23 and resources associated with some of these change
24 evaluations that we do are fairly, can be fairly
25 extensive based on some of the methodologies that we

1 have to employ.

2 So that's my presentation. I guess, at

3 this point, I guess you should open up to questions.

4 MR. METZGER: Brian in NRR. You know, I

5 think this is an insightful exercise. I do have some

6 concerns about this approach of just simply doubling

7 the fire growth time because I think, I think we all

8 agree that at the heart of this whole realism topic is

9 that what you're seeing in the field and at the plants

10 doesn't match what you're seeing in the models or the

11 assumptions or the analyses necessarily.

12 And so with that said, I do think we need

13 to be careful not to misrepresent or misconstrue what

14 you are seeing. For instance, it's not so much that

15 you're seeing fires with really long growth periods.

16 It's that you're not seeing fires or you're not seeing

17 large fires. And the results in this are really

18 simply saying that if we just have a much smaller fire

19 we get a lot less damage in our analysis, right? And

20 that makes perfect sense.

21 So I think one of the challenges we always

22 have here in NRR is attaching a method to a valid

23 technical basis, and there's going to be a challenge

24 with this method because we can't locate a basis for

25 just doubling or quadrupling the fire growth time. I

1 understand the intent and the need to do this, but I
2 think, you know, I'm not sure we can justify doing it
3 that way.
4 MR. VINCENT: Well, now, remember the
5 basis that we tried here is not to produce an actual
6 tangible result, like let's go tomorrow to 18-minute
7 growth curves. But it is attempting to at least give
8 you a rough bounding assessment of there's a large
9 potential risk reduction, and I'm going to back up in
10 the slides. For our stations, all of them are showing
11 greater than ten-percent risk reduction just by adding
12 six minutes. Now, is that the actual number? That's
13 not necessarily true. We need to define potentially
14 that number because three minutes is still going to be
15 50 percent of that number.
16 And so we're not trying to say it has to
17 be 18 minutes, it has to be 24 minutes. The goal here
18 is to say, clearly, our fire PRAs are very dependent
19 upon that growth, so is the growth area an area that
20 we should do work on to better define? And I don't
21 say let's say 18 minutes because it's too easy.
22 Nothing is ever that easy. But it does give us the
23 insight to say if my fleet, if Rob's fleet, if all
24 these different fleets show that that is a key
25 contributor to risk, can we attack that part of the

fire growth curve, better define that, and better evaluate what we actually see in the plants?

MR. METZGER: I agree, I think, except for one point, which is that your fire analyses aren't necessarily sensitive to fire growth. They're sensitive to fire size, meaning the entire curve. So you would want to better develop, you know, how do you characterize the fires you're actually seeing, and I don't know that it's only the growth that matters. It's just the actual size of the fire that matters. By increasing the growth time, all you're doing is pushing down when that fire peaks or delaying when that fire peaks, right? Meaning you have a smaller-size fire at the time when it matters.

So maybe there's a little nuance here, but I agree that the analyses are sensitive to this. I mean, that's certainly valid. I think that makes sense and that makes sense of what you guys are seeing in the field. It doesn't match what's sometimes assumed.

But I do think this is, you know, I guess insightful to see just how sensitive the analyses might be to some of these numbers and what you could gain by refining them.

MS. LINDEMAN: I just wanted to add the

1 models are differing more, but, you know, fire size is
2 one of the attributes, but there's also plenty of
3 other things that are driving. So just the fire size
4 I think is an incorrect characterization.
5 MR. ZEE: This is Kiang. I'd just echo
6 that. I think it's a mistake to try to simplify this
7 whole treatment of fire PRA and isolate a single
8 parameter to say that's the controlling parameter. I
9 don't think that's actually true at all. There are a
10 large number of variables. They're all intertwined,
11 they're all interrelating, they all participate
12 differently in how they affect the various factors
13 that we can treat in these risk assessments.
14 Now, in all the things we're presenting,
15 in no instance are we trying to portray that this is
16 a developed method. We're simply saying there's an
17 attribute that affects the analysis, is this attribute
18 an important variable in what it's doing to our risk
19 assessment, knowing that we can't fully develop a
20 method. Is there a simplified way that we can bound
21 what we believe to be the numerical impacts in a
22 simplified fashion that we can readily incorporate
23 into the analyses as they exist today throughout the
24 fleet?
25 So in this particular issue with growth

1 rate, sure, we could have spent a ridiculous amount of
2 time to develop, hypothesize, and develop a framework
3 for what growth might look like, but we wouldn't be
4 here talking about it right now. The simplest way to
5 do it is we would say, look, if we think about what
6 that shape would be to pre-growth plot going into a
7 growth phase and then we overlay an artifact of an 18-
8 minute or 24-minute T-squared growth, in every
9 instance it would bound the curve of what we think
10 would realistically occur. Simply incorporating a
11 modified growth rate was the simplest way we can crank
12 this into our analyses and give you guys answers.
13 MR. METZGER: I mean, I appreciate the
14 simplicity of this and why, you know, you would look
15 there first. But, you know, a lot of these analyses
16 are built upon fire modeling calcs that use heat
17 release rate as the input, and that's partly why I
18 say, you know, the total curve is important, is an
19 important factor or parameter.
20 But, you know, we do have fire test data
21 that shows us what a fire curve would look like if you
22 got a fire. Now, admittedly, a lot of fire tests are
23 inherently conservative. I mean, for instance, they
24 are certainly piloted ignition, they are certainly
25 designed to get a fire. So we have, you know, data

1 that says what a real fire looks like if you get that
2 fire. I think part of what's going on here is you're
3 not getting those fires, and we need to somehow
4 connect those two things.
5 MS. ANDERSON: Right. So, Brian, I think
6 your point is that we have testing data and we should
7 be using that testing data. When we use the testing
8 data, as you discussed, that testing data doesn't
9 necessarily reflect the experience we're going to have
10 in the plant. In fact, we're pretty sure it doesn't.
11 MR. METZGER: Right.
12 MS. ANDERSON: And so that's why we're
13 looking at doing additional research, and we're doing
14 this sensitivity study to demonstrate why it has
15 impact on the CDF at the plant and so that we can
16 compare relatively which pieces of research are going
17 to help us improve realism and fire PRA at the plants.
18 So I think it's not the most productive discussion to
19 debate the specific values we chose for the
20 sensitivity studies.
21 MR. METZGER: Yes, I'm not debating the
22 values. I'm debating the approach and whether --
23 MR. ZEE: Well, I guess my other
24 perspective is there was a previous presentation where
25 the industry previously went off and did some work and

1 compared fire PRAs for plants that did and did not
2 incorporate the revised heat release rates from 2178.
3 And that study looked at the implications of what the
4 insights were from that analysis, and what it told us
5 was there was a behavior still being predicted from
6 the fire PRAs from those plants that incorporated the
7 lower heat release rates in 2178, and it was still
8 showing a large fraction of fire behaviors would have
9 propagated beyond the enclosure that did not match OE.
10 So that's a variable that's different than simply heat
11 release rates.
12 So we went and pursued why are our
13 analyses predicting those behaviors, and that's not a
14 heat release rate problem. We've already incorporated
15 2178.
16 So, you know, your point is taken. We
17 probably could do more work. Maybe 2178 numbers are
18 still way too high. But at this point in time, that's
19 not, to me that seems like already discussed
20 territory. It's not anything new. I think everyone
21 already knew this. So we're trying to pursue
22 different areas here.
23 MR. CASTO: So Greg Casto, NRR. So just
24 what Victoria alluded to, and maybe we'll talk about
25 this later and that's fine, just let me know, but has

1 the industry thought of the nexus for what research
2 needs to be done or what additional data-gathering
3 needs to be done that would support changes to this
4 area?
5 MS. LINDEMAN: Yes.
6 MR. CASTO: And we're going to talk about
7 that later?
8 MS. LINDEMAN: Yes.
9 MR. CASTO: All right.
10 MR. HYSLOP: I've got a question. I
11 notice you did one-at-a-time sensitivity analyses.
12 Did you ever throw all of this together and see what
13 type of decrease you would get?
14 MR. VINCENT: No, we did not. We didn't
15 have the time and the resources to do that right now.
16 Clearly, there are a lot of these that are synergistic
17 in and of themselves. The growth time and the non-
18 suppression curves would both be beneficial at the
19 same time.
20 If they're exponential functions, it's not
21 a linear, we can't just say, okay, ten plus ten, you
22 know, 20-percent reduction. So we didn't actually
23 look at all that. We just, you know, we recognize and
24 I think the industry recognizes as a whole that a lot
25 of these characteristics do play each other. You

1 can't look at one and not really look at the other.
2 But, you know, the HEAF fraction fires, that one
3 actually kind of really doesn't play. We could
4 probably add that in to the other ones, but we just
5 did not have the available resources to do it in the
6 time frame that we had.
7 MR. HYSLOP: Back to the first slide.
8 MR. VINCENT: I don't know how to do that.
9 I'm teasing, I'm teasing, I'm teasing. I know how to
10 do that.
11 MR. HYSLOP: I think we're --
12 MR. VINCENT: I did it. I know how to do
13 it.
14 MR. HYSLOP: No, the next slide. Yes.
15 That was an interesting slide. You know, the last
16 column stays in the cabinets, are you saying that the
17 difference between having a PRA that damages cables
18 outside the cabinet versus fires that stay in the
19 cabinet for those plants is really a small change,
20 which means that, you know, I'm surprised you got much
21 risk at all.
22 MR. HYSLOP: The stays in the cabinet is
23 the one-third, one-third, one-third. That's only for
24 those fires that were already staying in the cabinet.
25 MR. VINCENT: The cabinet is the other

one. Sorry. My headings are not the best. I tried to make it readable on a big screen, and then we kind of -- I didn't do a very good job, let's just put it that way. I apologize.

MR. HYSLOP: No, no, don't worry about it.

MR. METZGER: This is Brian again. I'm just curious, on some of these approaches, you know, we just talked about how, you know, what you guys have seen in the plants says one thing, and that's why you're doing this. Do you have or do you think you can locate something that would -- like, have you seen fires that have a long growth time? Have you seen fires that only damage a third of a cabinet? I mean, I know this is sort of like idealistic, but I'm curious if you guys have actually seen some of this stuff or if you're trying to sort of --

MS. LINDEMAN: Yes.

MR. METZGER: -- marry that up. So you have, like, photos of a cabinet that's only, I mean --

MS. LINDEMAN: Brian, just for comparison, the sensitivity studies that were run by the industry more closely align than some of the 90th and 75th percentile heat release rates. So, you know, I encourage you to think of this as maybe more of a prioritization process. If everyone came up here and

1 said growth didn't matter, I think, you know, there
2 wouldn't be a need to pursue much research. But, you
3 know, to me the insight is that the fire PRAs are
4 really sensitive to this growth time, and we don't
5 have the answer but we know it's significant. And,
6 you know, from my perspective, I think it's important
7 to get a handle on what the different types of growth
8 are, including how long to peak and if there's a pre-
9 growth phase.
10 MR. METZGER: So who would be prioritizing
11 what in that context?
12 MS. LINDEMAN: I mean, so, you know, I
13 don't speak for the research branch and vice versa.
14 But for me, you know, insight is that this growth time
15 is important to pretty much all of the models that
16 you'll see. So I think, for me, it's something that
17 has a global audience and the potential to be very
18 impactful on the risk results. So for me, this would
19 be something that would be high priority.
20 MS. ANDERSON: And if you're interested in
21 the prioritization discussions, we're going to be
22 having the preliminary prioritization discussions this
23 afternoon, so make sure you stick around.
24 MR. STONE: Can I ask you a quick question
25 for your or maybe the next presenter, just to let us

1 know what assumptions are you using and, like, what
2 did you change in cable to cable or non-suppression
3 factor to get these? Because I'm --
4 MR. VINCENT: The presentations from
5 yesterday?
6 MS. LINDEMAN: Yes. The presentations
7 from yesterday went one-by-one, so, for example,
8 cabinet to cabinet looked at some potential new
9 methodology and guidance for evaluating cabinet-to-
10 cabinet fire spread. And 18-minute growth is
11 extending the time until the fire peaks from 12
12 minutes to 18 minutes. So we had a presentation that
13 went through each. I understand that you weren't able
14 to meet yesterday.
15 MR. ZEE: I think the question I'd ask,
16 photographs of cabinets for extent of damage within
17 the cabinets. I think in the discussions yesterday,
18 we had some statements that basically say the
19 treatments as we currently do, when Rob did the
20 presentation of a third, a third, a third, what we're
21 required to do right now is 100 percent of the fires
22 damage 100 percent of the contents of an electrical
23 cabinet. That treatment applies even if you have the
24 highest technology in-cabinet smoke detectors
25 installed in the cabinet.

1 But yet when we look at the OE, the fire
2 events database -- in fact, when the NRC staff
3 participated on 2169, they got to look at all the
4 industry OE -- I think there's only a very small
5 fraction, if any, fire events in a low-voltage
6 electrical cabinet where the entire contents were
7 damaged in any real fire event that occurred.
8 MR. METZGER: I think the comment was
9 really just more about, you know, I've heard a lot
10 about what you're seeing in the field and if there is,
11 I guess, photographic evidence, you know, a picture is
12 always worth a thousand words, I understand that, you
13 know, we've all looked at the database entries and
14 sometimes it's very useful and sometimes it's hard to
15 deduce from what's written what may have actually
16 happened. But, you know, this idea that you guys are
17 seeing certain things, I think, if there is pictures
18 of some of these things, they would go a long way at
19 sort of corroborating part of the approach.
20 MS. ANDERSON: And that would be what we'd
21 be doing if we prioritized this as research to be
22 undertaken.
23 MR. CAVEDO: We do have lots of pictures
24 and lots of examples in cases where not everything in
25 a cabinet is damaged. And from our modeling, it's

1 even worse than saying everything is damaged. Not
2 only do we say everything is damaged, we say every
3 failure mode occurs. So we say the breaker both opens
4 and it both fails to open, so we have to model all the
5 failure modes to it. So it's a very severe treatment
6 now, which is very conservative and does not match
7 reality at all.
8 And I did want to make one other comment
9 on this, and I'm sure people will discuss this as
10 they're going forward, but in this particular
11 evaluation T equals zero was used as the time to
12 detection. That's why the growth and NSP showed such
13 a big gain. And it's become very clear to me that
14 that seems to be a very important thing that we need
15 to get alignment on because most people are not,
16 obviously, using T equals zero as the detection time,
17 but all the data, that's where it came from.
18 So when you said do we have any evidence
19 that there was a long period before the fire actually
20 started, no, because, once we detect it, that's when
21 the detection comes off and that's what we're counting
22 as events. So if they smell something funny and deal
23 with it, there might be a CR, but there's no way to
24 track those incipient type phases unless you happen to
25 be like Harold and have all this incipient detection

1 around to be able to do that. But for the rest of us,
2 once it's detected, that's T equals zero, but we're
3 not modeling it that way. And if we did, you're going
4 to see much bigger reductions in the growth gains and
5 the non-suppression gains.
6 MR. METZGER: I think I mentioned
7 yesterday, you know, T equals zero, I think most of us
8 can agree that's a tricky term because it can change.
9 The definition of when that is changes drastically,
10 depending on whether you're dealing with an analysis
11 that's maybe built upon a thermohydraulic calc versus
12 a fire time line or an event time line. You know,
13 that time changes and, in the context of fire, that
14 time of T equals zero can really be all over the map
15 as far as, you know, was that the beginning of
16 something or was it pretty far into an event?
17 I mean, for instance, if you're looking at
18 detection time, the time when detection occurred, for
19 sort of older detectors mounted high up in a ceiling,
20 that T equals zero could correlate to a pretty large
21 fire that it took to activate those detectors, whereas
22 if you have a VEWFDS system in a cabinet that might
23 not even be a fire at all, that might be just, you
24 know, very early pyrolysis occurring where there's no
25 flame and there's no visible smoke and that sort of

1 thing.

2 So I agree that T equals zero is sort of

3 a dubious term and you would want, we would all want,

4 you know, to have some alignment on what we are

5 referring to when we say T equals zero so that it's

6 consistent and understood, you know, across the board.

7 MR. MUSSATTI: Okay. Are there any other

8 questions? Any comments? All right.

9 MR. COYNE: Kevin Coyne, Research. Thank

10 you very much for the presentation and the sensitivity

11 studies are insightful, but I've got to admit I'm

12 getting a little confused where the industry is on

13 some of these topics.

14 So, yesterday, I heard a lot of words like

15 operating experience data. I didn't hear a lot of

16 words like sensitivity studies. This morning, I'm

17 hearing a lot of, well, these are just sensitivities,

18 you know, we're looking for areas for more research.

19 So it would be useful to me if the industry could go

20 through the topics you talked about yesterday and more

21 clearly define where you think you have a solid

22 technical basis for the approach that you described

23 yesterday and where you think more research is needed

24 and where you've just developed curves or mathematical

25 representations for the purposes of sensitivity

1 studies.

2 MS. ANDERSON: I can probably do an

3 extremely quick recap. So some of the sensitivities

4 we're running are based on FAQs that are not yet

5 approved, and so we did that to inform what

6 prioritization we should be getting, giving those and

7 moving forward on getting those FAQs done.

8 The ones that don't have FAQs associated

9 with them are based on insights from operating

10 experience, but I wouldn't say they're based on

11 rigorous research at this point and we'd still need to

12 undertake the rigorous research.

13 So they're not wild guesses. They're

14 beyond informed guesses. Yes, the sensitivity

15 evaluations, there's information behind them.

16 Probably the final answer won't be exactly what we're

17 evaluating today. We think the final answer will be

18 close to that. So it's an informed estimate, I guess

19 is what we'll call it, but the research still needs to

20 be done.

21 MR. MUSSATTI: Okay. Anybody else? All

22 right. Once again, a short reminder that it's helpful

23 for our court reporter for you to identify yourself

24 when you're speaking. Otherwise, it's a matter of

25 relying on Ken back there to recognize who it is

that's speaking, and I'm not sure he knows everybody in the room.

And you guys yesterday only had one presenter listed. Today, there are three or four for some of these, so I'm just going to have to say next.

MR. KVAMME: My name is Greg Kvamme, K-V-A-M-M-E. I'm presenting for Xcel Energy. We are a small fleet, but we have insights that are aligning with the industry and still very significant to us. The reason we're doing this is because we want our PRAs to reflect reality and give us good insights into not only how we use our, apply our risk-informed applications in the regulatory space but also in how we're doing our day-to-day operations in risk-informed maintenance, like hot work and transient control.

So I'm presenting on the two different plants that I evaluated. The first one for the cabinet-to-cabinet growth I did not evaluate, but the cabinet growth profiles, you'll see similar results where it's 10 or 15 percent increase or risk reduction if we can extend the cabinet growth profile time to peak.

The cabinet-to-cabinet, or the cabinet-only damage state had a pretty small impact with what I was able to evaluate. The main control room non-

suppression floor has a pretty minimal impact in the way that our models are set up.

The HEAF was modeled because, see, it's about a three-percent increase if we were to reduce the HEAF ignition frequencies. So it's not as big a influence for our plants. The transient PAU did not have a very significant impact because that just wasn't a big driver.

The HEAF non-suppression probability within itself had some impact, but the overall HEAF contribution is still low. So that one is not as big of a driver, even though, if the HEAF's ZOI was higher, then the HEAF NSP would give us more benefit.

The cable ignition I want to highlight is likely greater than the two or three percent that we're indicating because of some assumptions in how close our cables are located to our trays. So if we were to, if I had more time, I could go in and show a much greater benefit in pushing the cable ignition to 500 C.

The cable spread is a significant one. The transient time to peaks definitely had an impact on our models. For the obstructive radiation and the radiation ZOI, I was not able to show a big benefit without a lot of other work.

1 But the VEWFDS is still important, and
2 this is even after applying, you know, I did these
3 models with RACHELLE-FIRE applied and the Very Early
4 Warning Fire Detection System is still an area where
5 we could get a lot more benefit if we could improve
6 that treatment.
7 So just a number of bullet points that's
8 summarizing what I already talked about. Questions?
9 MR. METZGER: Brian, NRR, again. Just one
10 quick question this time. I know that in some of our
11 reviews, when we had a licensee that did apply NUREG-
12 2178 maybe did not apply it entirely. So I'm just
13 curious, when you're going through these sensitivities
14 -- and, specifically, some either did or did not apply
15 the obstructed plume piece of the NUREG. So I'm
16 curious if when licensees say that they applied that
17 NUREG, do they apply it, did they apply all of it or
18 only the release heat rates?
19 MR. KVAMME: For the RACHELLE-FIRE for
20 2178, we applied the new heat release rates for all
21 the different electrical cabinets. No, I didn't go
22 into the obstructed plume.
23 MR. MUSSATTI: Other questions? All
24 right. I'm going to take a moment aside here to,
25 first of all, shut this microphone off, to ask

1 Victoria what we should do now. According to the
2 schedule, we should be already after the break because
3 we've had two of these and we're still coming up on --
4 do the third one. Okay.
5 So I think there's more than one person on
6 this. This is Ashley speaking this time, isn't it?
7 Oh, I'm misreading this. Okay, next.
8 MR. RENNER: Good morning, everybody. Oh,
9 sorry, gee. I got to wake up. My name is Joe Renner.
10 I work with Jensen-Hughes, and I'm going to present
11 data from my colleagues over at Entergy. And let's
12 begin.
13 All right. So in the sensitivity study,
14 we simplified our analysis to have just two models,
15 two models that we're actively using, two models that
16 I know very well. And so model one, just finished
17 this model update. It's got 2169 in it. It's got
18 2178 implemented. We did not implement obstructed
19 plume, though, so you can keep that in the back of
20 your mind. Model number two is in the process of an
21 update, so we went back to the old revision which has
22 supplement one, ignition frequencies and 6850 heat
23 release rates.
24 So I'm going to present all my results.
25 They're all going to be in CDF, the LERF. I'm

1 expected to follow CDF proportionately.

2 One other bullet item I put up here is

3 that in Site E01, we have incipient detection that we

4 paid for, that we installed, that we put in, but at

5 the time of 2180 coming out and where it was heading,

6 they opted to just take it out. And so right now 2180

7 is not being credited for the incipient detectors that

8 they paid for, even though it's actively monitoring as

9 we speak right now.

10 So remember Site E01 is the one that has

11 2178 and 2179, and the Site E02 is back to 6850. And

12 so it's in order of the presentations yesterday, so if

13 you have your schedule or you agenda you can kind of

14 follow.

15 And so the very first one is cabinet-to-

16 cabinet propagation, which is what Francisco presented

17 on yesterday and which looked at where and how this

18 would impact some of our scenarios. And we kind of

19 just sort of estimated at that point similar to the

20 NextEra presentations. And so a lot of our --

21 actually, that's a good point is a lot of our data

22 here presented is going to be very, it was done

23 exactly as NextEra because I worked on it with Keith,

24 and we all kind of teamed together. So I know that

25 all of the -- if you remember those numbers, you can

1 put these two side by side for sure.

2 And so the cabinet-to-cabinet propagation

3 sort of looked at sort of the overall picture and

4 where and how we thought it would help. And I think,

5 at some point, we decided that it did have some

6 benefit, but we were thinking on a couple of percent.

7 And then the next two items, I don't think

8 anybody kind of fell out of their chair when they

9 realized that Bin 15 was driving the results, but

10 panel growth is driving the results. And as you can

11 see, you've got the, even with 2178 and at 6850,

12 you've got 18.5 percent to 23 percent for 24 minutes,

13 which was the factor three reduction if 24 minutes is

14 supported.

15 The next one, and it's updated, and it's

16 peak curves, and that had a huge impact, as well, and

17 partial cabinet damage, which is what Rob Cavedo

18 presented on. And then there's some variances in

19 sites, as you can see. One goes from 8 percent to 23

20 percent. Just the way the sites, you know, they're

21 just different at each of the sites and how you have

22 tables routed and cabinets configurations.

23 To kind of roll through this here, it's

24 the NSP floor, value for the main control room, 1

25 percent to 0.6 percent. I mean, you're changing small

1 numbers and making them smaller, and so I don't think
2 anybody is surprised by the variances there. And
3 HEAF, again, the HEAF zone of influence is what Keith
4 presented on yesterday. It definitely impacts our
5 analysis, given the locations of where HEAFs are at.
6 Transient controls. I think I'll talk
7 about that in a future slide. Cable tray ignition.
8 The bulk cable tray ignition that Rob Cavedo presented
9 on yesterday is in the analysis in our SE, and what
10 Brian was saying yesterday I think is important to the
11 guys at Entergy is there was some verbiage in the SEs
12 that you kind of wanted in the FAQ. And I just want
13 to make sure that, it's not Francisco was good with
14 that. So I think that that's important to us at
15 Entergy is that the SE and the FAQ is sort of
16 enhancing what we've done in the SEs. And so that's
17 important to the guys at Entergy, and it sounds like
18 that's where we're heading.
19 And then we have the horizontal zone of
20 influences, sort of the effect of radiation and the
21 horizontal ZOIs at the end. And I talked about
22 incipient detection. We're not crediting it at the
23 moment.
24 Let's see here. Okay. So significant
25 impacts. I kind of summarize here. I kind of grouped

1 them now into big impacts, medium impacts, and then
2 sort of lesser impacts. And I've talked a little bit
3 already about the panel growth for panel fires, and we
4 knew that that was a big impact. We've seen it
5 already in the first two presentations, so there's not
6 much additional insights there that I can present on,
7 other than we see the same things. So our analyses
8 are sensitive to that parameter, and we get that it's
9 only one parameter.
10 So sort of the medium impacts, which was
11 partial cabinet damage. Again, I think it depends on
12 your site and what you have for cabinets and what you
13 have in the cabinets and how you can apply it. And
14 then the next I think were pretty consistent.
15 Now, I think somebody asked earlier, you
16 know, how do these two get applied generically? Well,
17 the HEAF zone of influence or the HEAF NSP I think,
18 you know, separately, you get those results, but I
19 think if you were to implement them together, I don't
20 see that you have, you can't add those two together,
21 I would think, if you did both of them.
22 And the last one were the limited impact:
23 obstructive radiation or the horizontal zone of
24 influences. At our sites that we evaluated, our risk
25 results are just driven by the plume effects. And so

1 the things that are overhead, overhead and not
2 necessarily off to the side. If you had ignition
3 sources in a cable spreading room where you have, you
4 know, horizontal cross-trained components that are,
5 you know, off to the side or maybe cable tray risers
6 that are kind of going up and down through your
7 plants, I could see that being a big factor for some
8 sites. But for us, it didn't have much benefit, other
9 than a case-by-case evaluation.
10 The cable fire spread rate. Again, the
11 sites that I evaluated are very compartmentalized, and
12 to have these larger ZOIs, once you lose the cables up
13 above the panels, there's really not much differences
14 at that point at the sites that we evaluated. And so
15 to have something farther down the road, we weren't
16 going to notice much benefit.
17 The transient fire FAQ that Kiang
18 presented on yesterday, at our sites we implemented
19 transient-free zones. In fact, we implemented it
20 quite frequently over several zones. This FAQ, I
21 think, is a much more practical, pragmatic,
22 programmatic method that would sort of make the need
23 for transient-free zones less, I think less obvious.
24 And to implement in the fire protection programs
25 transient-free zones, that means it's not necessarily

1 a nightmare, but that's a lot of work. But to be able
2 to go into a specific zone and say the only part we
3 care about are these three conduits right here, to be
4 able to have broken those off and to paint them to
5 make that very specific and very important in a site,
6 I think that enhances safety, it enhances awareness,
7 rather than just saying this whole zone, stay out of
8 it, but really all we care about is that conduit or
9 those three conduits.
10 And so the FAQ, I think, enhances safety.
11 It enhances, you know, the ease and burden on running
12 the plants day to day and on the fire protection guys
13 that are, you know, having to review work orders and
14 what's coming in and what's going out and to really
15 focus on where the problem is, rather than just saying
16 this area is a problem. And so I think that that
17 would be still beneficial, even though our numbers
18 were low. I think our numbers were low because we had
19 area-wide transient-free zones where we would have
20 probably implemented that.
21 So my final conclusions are primary risk
22 reductions were observed in fire growth and fire
23 suppression time frames. I mean, I don't think that's
24 a surprise to anybody. And we still had risk benefits
25 on those, even after we implemented 2169 and 2178.

1 Realistic inputs should be pursued over
2 comprehensive fire modeling techniques. I think
3 that's sort of the philosophy is, yes, we have
4 techniques available and, as an employee of Jensen-
5 Hughes, selling FDS models is up our alley. But, you
6 know, that's not the right rock. You know, we don't
7 want to pursue these expensive fire model techniques
8 when we can fix the inputs, if possible and if the
9 data supports it.
10 And my last bullet is simply that I get
11 big picture numbers reduces risk, and that gets us
12 excited and we go, yes, we've got to fix this. But
13 really now the models are done, and so our, as
14 Victoria said, our tolerable CDFs are available. But
15 really we go to use it, we go to use these models,
16 we're going to care about, you know, maybe that target
17 that's off to the side, that obstructive radiation
18 techniques or some of the smaller examples. And so
19 it's not just what's the overall big picture, it's how
20 can we make our answers in the models that we're using
21 more realistic?
22 So with that, I'll open up to questions.
23 MR. METZGER: I'm getting a reputation
24 here. This is Brian in NRR. I do apologize for all
25 the questions, but this happens to be very interesting

1 to me. A couple of things. I didn't do the math on
2 the previous presentation, but it looks like, by
3 implementing -- correct me if I'm wrong here -- by
4 implementing, say, these ten or so methods, you're
5 seeing a 60 to 70-percent drop in CDF. Is that --
6 MR. RENNER: If you add them up, that's
7 correct, yes.
8 MR. METZGER: Thereabouts, right? And
9 that was -- did you use the radiation plume thing that
10 Francisco discussed yesterday in this sensitivity?
11 MR. RENNER: The one that Jason Floyd . .
12 .
13 MR. METZGER: Yes, yes, Jason's
14 presentation. Sorry, Jason.
15 MR. RENNER: That was one was just, in our
16 analysis, it was not necessarily an assumption, but it
17 was more of a qualitative evaluation to look at where
18 that would come in useful --
19 MR. METZGER: You said that was an
20 analysis, right?
21 MR. RENNER: Overall, over the whole
22 entire risk results, we think that one has benefit,
23 and I think it has much more benefit on a case-by-case
24 application.
25 MR. METZGER: You know, part of why I said

1 it is because you had said at the beginning that you
2 did not use the obstructed plume piece of 2178. So it
3 kind of makes sense in my mind that, you know, it
4 would, clearly that step in the analysis was not a big
5 priority for your site.
6 MR. RENNER: Okay.
7 MR. METZGER: And then one other
8 clarification. Like you mentioned yesterday, as far
9 as the editorial comment I made, it might be worth
10 pointing out that, you know, in any of these
11 submittals that we get, when a licensee chooses to
12 cite regulatory precedence, one of the challenges we
13 have, for instance in 805, is that if that's an
14 approach that someone wants to use, it would be good
15 to go back and see what was actually docketed. For
16 instance, in the case of 805 reviews, it's been, you
17 know, almost a decade where we did these reviews and
18 not everything that was reviewed was necessarily
19 docketed. So, you know, we used portals and audits
20 and looked at information. If ten years later, you
21 come in and you want to point to something from the
22 past, we can't go back into what might have been on
23 the portal at the time of the 805 transition. So just
24 something to keep in mind that check to see what's the
25 LAR, in the RAI responses, and in the SE if it's

1 something you want us to look at because, otherwise,
2 we have a harder time accessing it.
3 MR. SIU: Nathan Siu, Research. Joe, I
4 was struck by your point that you're seeing the
5 dominance of plume effects for your particular
6 situations you're looking at. And I know that in fire
7 modeling, there's often a user effect that, depending
8 on how does the analysis, the particular assumptions
9 they make, and employing a model, you can't see
10 variability.
11 So I'm wondering, in this case, are you
12 confident or has industry done benchmarking to show
13 that if that situation were in another plant with a
14 different analysis team you would still come up with
15 that same broad conclusion, plume effects, in this
16 case, are dominant.
17 MR. RENNER: Well, I think that, I think
18 all I was suggesting was that, at the site that we
19 were evaluating for the sensitivity analysis, our
20 results are dominated by plume effects, which is
21 cables that are running essentially overhead the
22 ignition sources, rather than off to the side. I
23 think that there are sites that probably do care more
24 about cable tray risers or have ignition sources in a
25 cable spreading room, but I can't speak to that.

1 MR. SIU: Yes, I guess I was just asking
2 you to project a little bit. I understand what you're
3 showing for your plant.
4 MR. ZEE: This is Kiang Zee. You bring up
5 an interesting point. I think, if we want to take
6 back a number of years, I think modeler variability in
7 terms of selecting certain bounding parameters or
8 characterizations of certain parameters, one of the
9 examples being fire surface areas to greatly affect
10 the plume effects. I think with the issuance of some
11 of the research work Mark and his guys have been doing
12 with, for example, the fire modeling user's guide, I
13 think there's a lot more convergence on treatments now
14 than we may have seen in the past.
15 MR. MUSSATTI: I think Ashley had a
16 comment.
17 MS. LINDEMAN: Nathan, I was just going to
18 add, you know, in fire things go up. So the plume, I
19 think, is a very common driver. And that's why, when
20 we were doing the work for 2178, we did the obstructed
21 plume because we knew, you know, that was a driver.
22 Now we're looking at radiation, and we held off
23 because we thought the impact would be less. But, you
24 know, hence, that's just another tool in the toolbox
25 and, you know, if you need to use it, you will.

1 MR. SALLEY: Yes, this is Mark Henry
2 Salley, Office of Research. Joe, nice presentation.
3 A couple of questions, if I could. You talk about
4 fixing the inputs. Could you expand on that a little
5 bit for the fire modeling?
6 MR. RENNER: Sure. Well, I mean, that's
7 what the presentations were about. All the
8 presentations were on the different variable inputs
9 that, you know, whether it was fire growth or NSPs or
10 HEAF frequencies or HEAF ZOIs or cable propagation.
11 I mean, every one of these presentations were on an
12 input. So I guess that's what, I think that's what I
13 was alluding to. And these were just some examples
14 that the industry came up with for this workshop, and
15 I'm sure there's more to be, you know, vetted and
16 looked at, as well.
17 MR. SALLEY: So looking at a fire modeling
18 with the V&V, are you happy with that, or is that
19 tolerable?
20 MR. RENNER: I don't know. I don't
21 understand the question, I guess.
22 MR. SALLEY: You know, when you do your
23 modeling, we have the V&V. Is it adequate for your
24 needs? Is there more work that needs to be done for
25 the modeling or any thoughts on that?

1 MR. CAVEDO: I think the modeling tools
2 are good. It's just we want to get the inputs to
3 those tools to make sure that those will reflect what
4 our operating experience is.
5 MR. ZEE: Yes, I think what we're finding
6 is the correlations, the fire modeling user's guide,
7 the boundary conditions for what the fire modelers do
8 once the source terms, if you will, being fed into the
9 correlations, once those have been fixed, I think
10 everything else proceeds through the characterization
11 of plume temperatures. I think all that is fine. We
12 haven't been seeing any particular problems with
13 those.
14 I think the only one outlier possibly is
15 the one area, you know, Jason found on the radiation.
16 You did that thing where some people's heads exploded
17 with the math.
18 MR. SALLEY: So you're happy with the V&V?
19 It's better than tolerable, right? Okay. I'll take
20 it at that. Final question: you talked a lot about
21 cable ignition and flames spread on cables.
22 MR. RENNER: Sure.
23 MR. SALLEY: Any work with cable coatings?
24 MR. RENNER: No. I mean, just the --
25 MR. SALLEY: Nobody taking credit for any

1 cable coatings or any of that on -- could I get any
2 insights on cable coatings and what you're saying, by
3 chance?
4 MR. SCHAIRER: Yes, this is Mark Schairer
5 with EPM. Yes, Appendix Q in 6850 has some guidance,
6 and I think recently there was a memo, an early memo
7 on, correct me if I'm wrong, is it HELEN-FIRE? Not
8 HELEN-FIRE. There's another acronym.
9 MR. SALLEY: REBECCA-FIRE, but go ahead.
10 MR. SCHAIRER: REBECCA-FIRE. That's it.
11 Thank you. There was some preliminary guidance there
12 that was issued that allowed some credit, I think, you
13 know, in the ten-minute range for cables with coating
14 for damage delay and ignition delay. So I do know of
15 some utilities that are taking advantage of that, yes.
16 MR. MUSSATTI: Rob, do you still have a
17 question or comment?
18 MR. CAVEDO: Just a comment for what
19 Nathan was asking. It's more a matter of geometry for
20 the plume versus the radiation. If you can just
21 envision cabinet rows in buildings. They want people
22 to be able to walk through them, so there's a certain
23 amount of separation. If that distance is about three
24 feet now, the severity factor to get that cabinet to
25 damage the cabinet across there is very high. And to

1 get that type of growth, you've already damaged not
2 only the cables above the panel that's there, but now
3 you've started to do room damage. So it's a very,
4 very rare in our models where you're going to find a
5 radiation damage that's not going to be governed by a
6 plume scenario. It's just a matter of how the plants
7 are put together.
8 MR. SIU: This is Nathan. Yes, I
9 understand. And I'm not surprised, but I just was
10 curious to see because it seemed to be a fairly strong
11 conclusion. And so I was wondering if that was a
12 universal viewpoint.
13 MR. MUSSATTI: Okay. Anybody else? How
14 about on the webinar? Do we have anybody available
15 there?
16 MR. HAMBURGER: Yes, we have a question
17 from Nick, I think. I'm going to unmute him and see
18 if he wants to ask him. Nick, you should be unmuted
19 now. Nick, you there? Oh, he says he has no mike.
20 I think his question about the HEAF ZOI, and he wants
21 to know whether you're changing the ignition frequency
22 or the zone of influence.
23 MR. RENNER: It's the, as Keith presented
24 yesterday, it's the split fractions that he came up
25 with for the Class 1 use and non-one use.

1 MR. VINCENT: Keith Vincent from NextEra.
2 Just to clarify, there was some confusion that's been
3 labeled inaccurately in a lot of these presentations.
4 It was not an attempt to reduce the ZOI, but I believe
5 Rob will allude to the fact that we might have
6 deviated slightly because of my inability to label it
7 and identify it correctly, so it's slightly wonky in
8 its naming. So we looked at the ignition frequency,
9 at least Nathan and Joe and I.
10 MR. MUSSATTI: Okay. Anything else in the
11 audience? Anything from the webinar? Well, since
12 Victoria has recalibrated my thinking in that there
13 was not five co-authors in one presentation but five
14 separate presentations, I'm guessing that either Rob
15 or Harold is next.
16 MR. STILES: Again, my name is Harold
17 Stiles. I'm with Duke Energy, and thank you again for
18 this opportunity to talk to you.
19 Before I get started, I wanted to address
20 a response. I owed an answer to a question from
21 yesterday about whether we get insurance premium
22 breaks, and I think maybe you, Nathan, for having
23 incipient detection. And I checked into that, and we
24 do not get any insurance breaks. And as it is
25 explained to me, the reason is because the risk is

1 different for, like, CDF versus financial loss of an
2 asset or extended outage time. But the answer is, no,
3 we don't get any financial break.
4 Okay. So for today's presentation, we're
5 talking about the insights and the benefit of the PRA
6 methods that we're looking at. Again, this is
7 sensitivities. And for insights, I'm hoping to
8 explain a little bit about what we're seeing about
9 what's driving this, in addition to just providing the
10 numbers.
11 So for the first one we have here, which
12 is the bulk cable tray ignition, this one here I think
13 has a very good technical basis, and I think Rob and
14 Mark and Greg and Francisco and the rest of the FAQ
15 team have done a good job. And I think it has a real
16 good regulatory position, too, for why this is
17 appropriate. And the benefits for us are pretty
18 significant in some areas.
19 And so the way I modeled this was to
20 eliminate the cable tray contributions for the
21 formation of a hot gas layer where the first cable
22 tray was beyond the distance corresponding to the
23 plume center-line temperature of 500 degrees. And for
24 us, we have a very, we have a screening method for hot
25 gas layer that often produces very conservative

1 results, and that's why we see, in some cases, a
2 significant impact.
3 So most of the benefit we got from this
4 was in areas like the cable spreading room, as might
5 be imagined, where the hot gas layer can affect cables
6 for different divisions, different trains. And we
7 have some panels in the cable spreading room where
8 this is a significant factor where the CDF might range
9 in the five-percent range or hot gas layer
10 contribution of CDF might be in the five to ten-
11 percent range. For LERF, it can be in the 30 to 40-
12 percent range. So it's very significant for us for
13 LERF in certain areas.
14 And there also was a, there tended to be
15 a greater impact for scenarios where we have thermal
16 plastic cables. I should also mention here that these
17 plants are in various stages of model development. In
18 some cases, we have the new ignition frequencies in
19 and the new heat release rates in. Some plants have
20 incipient detection. So it's really, it's a broad
21 spectrum of things, so that's why they sometimes have
22 dissimilar results.
23 The second sensitivity I looked at was for
24 updating the electrical cabinet non-suppression
25 curves. In this case, how I modeled it was to

1 increase the mean fire suppression rate, the lambda,
2 for Bin 15 from 0.098 to 0.119, which was effectively
3 restoring the 6850 value. And this, as somebody else
4 has already mentioned, this relatively modest change,
5 it yields a significant change in risk cumulatively
6 because we have between 500 and 1500 ignition sources
7 in the plant that this applies to. And, again, the
8 ranges there are a bit more modest, in the seven
9 percent down to about, you know, two percent range.
10 I also looked at increasing the electrical
11 cabinet growth phase. In this case, I increased the
12 growth period from 12 minutes to 24 minutes. I did
13 not include any sort of a pre-growth, a 12-minute
14 delay, but that would have been another option to have
15 done that. And this was a fairly modest change for
16 us, you know, three percent to one percent over, and
17 it almost always was, it was always in CDF. And what
18 we found was that doubling the length of the growth
19 phase increased the time to damage by only about 40
20 percent, so it gives us about 40 percent more time to
21 suppress the fire before it caused damage.
22 And although considered secondary effect
23 in a lot of cases, again, because of our fairly
24 conservative screening hot gas layer approach, we did
25 see a risk benefit in that area also.

1 And then I also looked at updating the
2 HEAF non-suppression curve, according to this FAQ. In
3 that case, I increased Bin 16 mean fire suppression
4 rate, the lambda, for cable tray fires caused after
5 the HEAF from 0.013 to 0.029. And I did include the
6 bus ducts in this count, too, and these HEAF
7 contributions between two and six percent. And the
8 reason that we thought it had, that's how much it
9 contributes to CDF normally, or in LERF in one case,
10 but the reason that it had such a minor impact for us
11 is that really our damage is being done in that
12 initial ZOI of the HEAF and that cable tray fires
13 after that kind of are small and tend to grow, but
14 they're not really as damaging as that initial damage.
15 So that's the only ones I did because the
16 differences in the way we model things. That was the
17 only sensitivities that I can provide for you. Are
18 there any questions?
19 MR. HYSLOP: Yes, I have one question,
20 Harold. I noticed the decay didn't have that rate,
21 didn't have much effect on your plants, but in other
22 cases it did. The growth rate, yes, the 12 versus 24
23 minutes. Does that mean the HEAF, I mean hot gas
24 layer scenarios are driving your risk, and, as a
25 result, it's not how quickly it gets there, it's just

1 the fact that you have these overall massive damage
2 conditions?
3 MR. STILES: Well, I think for LERF it
4 tends to have a greater effect, and I'm not quite sure
5 why, but it does seem to be the cables outside the
6 cabinet itself that drives it. So I would tend to
7 agree with that statement.
8 MR. CAVEDO: Just to reinforce what Harold
9 has already stated, for his sensitivity study, he did
10 not assume a T equals zero detection, which was done
11 in all the paths. So the growth benefit, if we were
12 to use the same set of assumptions, would be much,
13 much greater than the numbers that are there, and
14 you'll see that's the same for our presentation.
15 MR. HYSLOP: Can you elaborate on that?
16 So the T equal to zero, so if you immediately detect
17 the fire then you now get the full benefit of that
18 going from 12 minutes to 24 minutes, so it's
19 basically, as presented by Usama, a factor of three
20 improvement. But if you have an electrical cabinet
21 and then you have the tray, which is here, and then
22 you have a heat detector, which is probably over here,
23 it might take normally five minutes to detect it.
24 Well, now when you reduce the growth curve, for that
25 heat detector to actuate now takes ten minutes. So

1 you don't gain the proportional distance, whereas if
2 we change it to match the data and we make it T equals
3 zero, which is the previous presentations, then you
4 get a huge benefit. So we're not seeing as big a
5 benefit because of the delay that you get in
6 detection.
7 MR. METZGER: This is Brian in NRR again.
8 I think, you know, to be honest, part of what I was
9 hoping to see in some of these was, you know, some
10 trend emerge where most of these sites are having
11 problems with hot gas layer scenarios and that would
12 point us in the direction of what we should focus on,
13 the methods and approaches that are going into those
14 scenarios. It sounds like, though, it's kind of all
15 over the place, and that makes sense. Each plant is
16 unique, and they're going to be, the risk is going to
17 be driven by different scenarios.
18 So it's just an observation that I was
19 personally hoping to have some epiphany that, okay,
20 this is where the real heartache is, but it sounds
21 like it truly is just all over the board.
22 MS. ANDERSON: As we said yesterday,
23 there's definitely no silver bullets left.
24 MR. CAVEDO: We were hoping the same thing
25 you were.

1 MR. STILES: Okay, thank you.

2 MR. MUSSATTI: All right. Anybody else?

3 Nobody on the -- okay. I'm guessing that Rob is the

4 next one.

5 MR. CAVEDO: Okay. Rob Cavedo, Exelon.

6 And I'm going to talk about the benefits across the

7 Exelon fleet. So it's a rather diverse and large

8 fleet, and we have a summary of insights.

9 The benefit of these future fire modeling

10 approaches is dependent on the site and, in some

11 cases, unit configurations. That was something that

12 was surprising during the evaluation because a lot of

13 people, especially management at our various sites,

14 doesn't seem to recognize this, but a lot of our risk

15 is driven specifically by cable routing. So on one

16 unit, if you have cable routed differently than on

17 another unit, you can have a significant change in the

18 risk approach. So you'll notice when we get to the

19 various charts about the differences that there are

20 differences within a unit at the same site. Actually,

21 maybe from the numbers you won't be able to tell that,

22 but we did observe that.

23 And then the amount of benefit is highly

24 dependent on the methods that are credited. So as we

25 discussed in the earlier evaluations, for RACHELLE-

1 FIRE, we have such a lower heat release on the early
2 bins and, on the sites where we did credit obstructed
3 plume, of course that provides further benefit. So
4 those go hand-in-glove with these new NSPs and growth
5 rates. As you improve those, then you get a magnified
6 benefit.
7 So there are some cases, like with the
8 transient control and the transient growth, you don't
9 get the magnified benefit. It's actually a collapse,
10 right? Because if you have good controls, then it
11 doesn't matter as much about the transient growth. So
12 if you look at those benefits, they're not added
13 together. There's some overlap between them, so you
14 get less benefit than the two. But for a lot of the
15 methods, like the NSP and the growth and the RACHELLE-
16 FIRE, those combine to give you much greater
17 percentages than what you would glean from looking at
18 the numbers added together on the charts.
19 And the most beneficial thing that we
20 found was the bulk cable ignition. So if going from
21 we have a lot of thermal plastic able, and going from
22 205 to 500 is a huge deal as far as how much growth
23 you have and how much burning along the trays you
24 have. So that's a very big, important thing.
25 Next, most beneficial is lowering the NSP

1 floor, and the sites that use the RACHELLE-FIRE saw a
2 much greater benefit for this for electrical cabinets
3 that could end up causing abandonment in the control
4 room. Those lower heat release rates essentially get
5 nulled out when you eliminate the floor, and they
6 don't contribute to the abandonment at all.
7 And it was interesting that, whether it's
8 a PWR, a BWR, core damage, or LERF, you're getting
9 benefit all across the sites. And as we've discussed
10 before, there's a huge day-to-day benefit in having
11 these improvements in methods from assessing
12 modifications, doing the 4B type evaluations, you get
13 benefits where you're actually saving money on a day-
14 to-day basis. So it's very important to improve the
15 methods. And, of course, we're focusing safety, so
16 we're getting safety benefits, as well.
17 And here's the actual results for the bulk
18 cable ignition for the various sites. And it goes
19 from a high of 17 percent to a low of essentially no
20 gain because there are some cases where it's just not
21 driven by hot gas layer development, and that's the
22 biggest gains for these methods is that you
23 significantly reduce the chance of a hot gas layer.
24 You don't eliminate it. When you looked at the
25 presentation that I had given before, since it's just

1 a matter of changing the severity factors for what
2 ends up getting hit and the big plume damage, then you
3 see that it's just basically a factor of three
4 reduction in the hot gas layer development for those
5 scenarios that would have hit the trays and caused the
6 big heat release rates.
7 Transient combustible controls within a
8 PAU, as mentioned, this has a great degree of
9 variability. It's 13 percent down to a little bit
10 less than a half a percent. And some of the insights
11 which I think have already been discussed is, if you
12 did have a site that had a large area and, you know,
13 some sites have these large areas but there's a very
14 small risk-significant location within them, then by
15 applying these controls you get, it can be up to a
16 factor of ten reduction in that particular area. But
17 if you have a site where basically it's a room like a
18 cable spreading room and that has a big contribution
19 for risk and they just declare the whole thing a
20 transient-free zone, then you don't get as much
21 benefit as for those sites that had focused important
22 areas.
23 Now, that being said, because there are so
24 many important areas in a cable spreading room, it
25 would be possible, although I'm sure the plant doesn't

1 want to repaint any floors, but it would be possible
2 to gain benefits by focusing with the new approach and
3 saying these are the areas that are the most important
4 within those zones. So there is potential improvement
5 beyond this, but this is based on the existing
6 configuration, the existing zones that are
7 established. And if it was an area that was large
8 where there was a focused area, then that site shows
9 a big benefit. And if it's more the whole room is
10 declared a transient-free, then, of course, it's not
11 going to show as much benefit.
12 Reduction of the NSP floor. Yes, as I
13 mentioned, this most benefits the ones that use the
14 lower heat release rates, the RACHELLE-FIRE. And this
15 has a fair degree of variability, 12 percent down to
16 almost nothing, and it goes across different metrics.
17 And then this is combined. The NSP and
18 the growth of electrical cabinets are both there, and
19 this also gets the great benefit from the fires. And
20 just to reinforce, this goes exactly, what I said,
21 most of the scenarios, most of the sites that had
22 smoke detectors which would benefit from the early
23 detection, they had automatic suppression systems. And
24 the sites that didn't have the smoke detectors or the
25 locations or rooms that didn't have the smoke

1 detectors and had the heat detectors, and that ended
2 up pushing out the benefit of these. So it wasn't as
3 magnified as it was at some of the other sites where
4 they assumed a T equals zero for detection. But if
5 there were a T equals zero for detection, then the
6 benefits of what was shown here would be much, much
7 larger.
8 So I do think that one of the things that
9 I've come away from from this is that we really need
10 to try to move towards that since that's what the data
11 is based on and that provides us a huge benefit if we
12 don't have to assume the fire is ignited before people
13 have detected it because the only thing we have a
14 frequency for is what has been detected. So moving
15 towards that would, you can think of it as incipient
16 growth or you can think of it as just matching what
17 the data is delivering. But that's a big insight for
18 me at this conference.
19 Partial damage within an electrical
20 cabinet. Now, you notice that there are some sites,
21 just as the other people presented, that you're
22 getting essentially nothing for it. But there are
23 sites where they have common controls in the one
24 cabinet, and that happens to be a big risk driver.
25 And as I mentioned during the example period, the ones

1 that do have those very large benefits are places with
2 shutdown panels that don't have isolated controls or
3 they have common safety systems coming together that
4 feed the different sensors and are affecting multiple
5 trains to various actuations.
6 Okay. Improved characterization of the
7 transient growth. This really didn't provide as much
8 benefit as the controls, but it does provide some
9 benefit because the transients are still a significant
10 contributor at some sites. But the larger benefit was
11 the approved transient controls for those sites that
12 had the big areas.
13 Cabinet to cabinet time to damage
14 evaluation, as mentioned by Nathan's question, this
15 really didn't provide that much benefit to that many
16 sites. There were a couple of sites where they did
17 have some radiant damage that was driving things, but
18 almost everything is plume-driven, so that wasn't very
19 significant across the fleet on average.
20 So we've talked about things, and this is
21 the exact same conclusion that Harold had. The NSP
22 for the higher high-energy arcing faults, unless we're
23 going to reduce the blast radius where it just affects
24 everything and ignites so much all at once, then the
25 NSP after that is really a minor impact. But this is

1 another case where, hand-in-glove, you could get some
2 improvement because if we did get variations in the
3 zone of influence and different impacts that can be
4 smaller or more realistic, then having the non-
5 suppression probability reduced would provide a
6 magnified benefit.
7 The next one is -- almost all the
8 scenarios are plume-driven, and there are very few
9 scenarios that we had that were radiation driven. And
10 cable fire spread rate, once the trays are initially
11 ignited, there's such a big stack with an angle of the
12 plume coming out and affecting such a large area that
13 the flame spread rate is relatively minor relative to
14 the initial ignition of the tray stacks.
15 And that's all the results, and Brian has
16 questions.
17 MR. METZGER: I do apologize, really. I'm
18 just very inquisitive. Just real quick, on your
19 application 2178, did you use an obstructed plume?
20 MR. CAVEDO: Well, there are some within
21 the fleet that have not used RACHELLE-FIRE at all, but
22 the ones that did use RACHELLE-FIRE used the
23 obstructed plume more often than not. I can't make a
24 definitive statement for all of the units.
25 MR. SALLEY: I'll ask a question. I

1 noticed a lot of people were dancing around with the
2 HEAF zone of influence, and that's coming up in
3 different presentations. General question: is anybody
4 looking at aluminum out there for the possible HEAFs
5 and just identifying the areas, or is that any part of
6 what you're looking at?
7 MR. CAVEDO: What we're looking at for
8 these presentations, no. But as you know, a notice
9 went out, and so all the plants got a question of, you
10 know, how much aluminum is there. So, yes, that is
11 something that the sites are focused on. So, yes, we
12 always try to use the latest information and we make
13 sure we understand the risks and what to do about
14 them.
15 MR. MUSSATTI: All right. We've got a
16 question from back here.
17 MR. FRUMKIN: This is Dan Frumkin. Did
18 you have a slide on the net fleet benefit of RACHELLE-
19 FIRE?
20 MR. CAVEDO: No, we did not do the benefit
21 of RACHELLE-FIRE, but I can tell you it more than
22 offset the risk increases associated with 2169. So we
23 had the 30-percent increase for that, and our
24 experience has been, on top of that, you get almost a
25 10-percent reduction. So if we didn't have to get the

1 penalty for 2169, then you'd probably get 50 or 60-
2 percent reduction.
3 MR. FRUMKIN: 2169 is the VEWFDS?
4 MR. CAVEDO: No.
5 MR. FRUMKIN: No, the frequencies? Okay.
6 So the net fleet benefit was --
7 MR. CAVEDO: If you implement both of
8 them, then I'm guessing it's around 10 percent or
9 something like that.
10 MR. FRUMKIN: Okay, 10 percent.
11 MR. CAVEDO: But, again, all of our sites
12 have not implemented that fully yet.
13 MR. FRUMKIN: Okay.
14 MR. HYSLOP: I don't know. Has anyone
15 rolled up these to look at the overall impact on the
16 plant, or is everybody doing --
17 MR. CAVEDO: I personally did not have
18 time to roll all these together.
19 MR. HYSLOP: Yes, I understand. I guess,
20 because, as I think about this, if you just add the
21 numbers and, you know, they're all ranked descending,
22 so you can't say the top one in one is the top one in
23 another. But, yes, I guess someone said just from
24 adding the numbers it's a 50 or 60 percent, and that
25 isn't taking into account synergies, of course. I

1 just didn't, I just didn't have any idea whether
2 anyone had a sense of how much decrease they're
3 getting as we move ahead and how much we can expect.
4 Fifty percent is a factor of two. I don't know if
5 industry wants to say all we're going to get out of
6 all these things together is a factor of two.
7 MR. CAVEDO: I mean, as you're probably
8 aware, we have spent in cases millions of dollars to
9 get 10-percent reduction, so a factor of two reduction
10 is a big deal. That's a huge deal. We fight for
11 reductions on a day-to-day basis. Just when we're
12 doing modifications, we try to get the designs to be
13 smarter and to reduce the risk. And so if you look at
14 that amount of effort that's being spent, these
15 reductions are very significant.
16 MS. LINDEMAN: The presentations that we
17 just heard are sort of the ground level. When we get
18 into the research plan, I have a more maybe 30,000-
19 foot level and some of the insights on, I guess, a
20 wider basis. So maybe you can revisit that.
21 MR. HYSLOP: Yes, because I noticed a lot
22 of these improvements, they affect certain scenarios.
23 And so, you know, a percentage change in the scenario
24 doesn't necessarily translate to that same percentage
25 change to the overall PRA. And so, you know, yes,

1 whatever you have from a higher level, it would be
2 interesting.
3 MS. LINDEMAN: Yes. So when we go over
4 the research task that EPRI is going to focus on for
5 the next two years, at the end there's a kind of
6 composite slide on if you did every item what the net
7 benefit would be. So I don't want to ruin all the
8 surprise for my presentation, but it sounds like we'll
9 get there pretty soon.
10 MR. HYSLOP: Thanks.
11 MS. LINDEMAN: I think Dan has another
12 question.
13 MR. FRUMKIN: So you commented that
14 there's, I'm not sure how exactly you said it, but
15 when you combine these methods sometimes they grow,
16 they're more than the product of the parts, and
17 sometimes they're less than the product of the parts.
18 And I also heard you say that there's perhaps a 30-
19 percent benefit of RACHELLE-FIRE, and then there's
20 some complimentary reduction based on the frequencies.
21 Have these values of 8 or 10 percent fleet benefit
22 been thought of in the context of how they would
23 combine with RACHELLE-FIRE? Because RACHELLE-FIRE is
24 a given accepted method, if that were to be
25 implemented, you might find some of these are zeros or

1 ones that you might have thought are tens, and then
2 some of these might still be tens or elevens.
3 MR. CAVEDO: No, the benefit of RACHELLE-
4 FIRE pretty consistently would be a positive
5 synergistic effect with these methods because it's
6 pulling things to the lower range and, as Brian
7 mentioned, it ultimately boils down to the heat
8 release rates that are being impacted. And by pulling
9 those down and these pull the times down, that further
10 pulls it down. So it's all a benefit that overlaps,
11 so it does provide a positive synergistic effect,
12 RACHELLE-FIRE.
13 MR. FRUMKIN: Well, I guess if RACHELLE-
14 FIRE is screening, you know, some portion of fires
15 that you don't have to assume that there's damage,
16 then you're not going to get any benefit from a slower
17 fire or a higher suppression rate because there was no
18 damage. So I just, on the surface, it would seem like
19 your maximums would probably, could go down and,
20 depending on the plant situations, it could be
21 significant.
22 MR. CAVEDO: I understand what you're
23 saying, but the thinking of the RACHELLE-FIRE for the
24 distribution of the 98th percentile, those didn't
25 change a huge amount from what was there before. But

1 what did change is the severity factor within that
2 region changed. So you're not talking about
3 eliminating a scenario, you're talking about changing
4 the likelihood of a scenario.
5 So you're right. If it pulled it in so
6 much that it was completely outside the zone of
7 influence, then that would be the case. You could
8 potentially see that. But what we're seeing is, you
9 know, if you have the cabinet that's here and the tray
10 that's here, it's not the 98th percentile that's
11 hitting it, it's, you know, the 20th percentile. So
12 you're just talking about changing from the 20th
13 percentile to the 30th percentile. Well, for
14 RACHELLE-FIRE, it would be an improvement going from
15 a severity factor of 0.3 to 0.2. So it's not
16 eliminating, it's just changing the likelihood.
17 MR. FRUMKIN: I guess it seems like you
18 must have done a lot of research to come up with those
19 numbers for these future proposed methods, and it's
20 kind of questioning why we didn't see similar numbers
21 for RACHELLE-FIRE.
22 MR. CAVEDO: Yes, RACHELLE-FIRE was a big
23 benefit. That's definitely the case.
24 MS. ANDERSON: So, Dan, the reason you
25 didn't see us do those sensitivities is, first, some

licensees have already completely folded them into our model, so it wouldn't make sense to have them back those out. And the other is that we're doing these sensitivity studies to inform future research, so there wouldn't really be any value in that exercise if you look at methods that are already out there.

MR. STILES: So this is Harold Stiles with Duke again. I just want to get back to something Mark mentioned about the ZOI for the HEAFs. You know, we have recently had, unfortunately, some HEAFs at our plant. And with regard to the assumption that all the targets within this ZOI for the HEAF is damaged and ignited instantaneously, that's not really what we saw for this. So I think even that would be a worthwhile area for investigation.

MR. CAVEDO: That's not really the model. The model only damages the first cable tray within the zone of influence vertically, and then the fire exists. So even if the zone of influence goes up five feet, all the five feet isn't ignited.

MR. MUSSATTI: Anything on the webinar? Okay. One more. Okay.

MR. SALLEY: Yes, Harold, thanks for that. And I think that's a big thrust behind the research we're doing with the HEAFs and the ZOIs. You know,

1 right now, you basically got one-size-fits-all with
2 the Appendix M, and I think you're seeing some of the
3 discussion yesterday that it looks like bus ducts are
4 going to be a different animal. So a HEAF and a bus
5 duct versus a HEAF and a cabinet are going to be
6 treated differently by their location, by the way they
7 fail. And that's a big part. We'll talk a little
8 later this afternoon about the research program. You
9 know, just like we took, was it five original heat
10 release rates in 6850 and then we come up with like 37
11 in RACHELLE-FIRE and we got a lot more refinement, you
12 know, I'm hoping for something similar like that in
13 the HEAFs so we can look at voltage, we can look at
14 equipment, we can look at location, type, and build
15 the model to that hazard and what we see, rather than
16 trying to, you know, hammer everything into the one
17 size.
18 MR. MUSSATTI: Okay. Are there any other
19 comments?
20 MR. SCHAIRER: Yes, I just had one. This
21 is Mark Schairer with EPM. Just on the sensitivities
22 that are being done here, we're talking about, you
23 know, synergistic effects and things like that. But
24 one clarification or question for the folks that have
25 done it so far, it seems like we're changing just a

simple, you know, data input, and we're seeing the outcome of that and it's in, you know, the 1 or 10-percent range.

But I think one important note, and Rob kind of touched upon it, is, you know, maybe when these new methods come out, it would change the approach to the fire scenarios so that there would be even a greater impact because, you know, if you simply just go change the non-suppression probability in the existing scenarios, they've probably already been set up in a certain way to take credit at a certain point in time that's based on the data as it is today. If you had better data, you might have introduced, you know, a damage state or an earlier point in time in the scenario that would allow you to get a different CCDP and a better probability.

So I think because of the limited amount of time, obviously that level of sensitivity wasn't done. But is that a fair characterization? There's definitely -- these are probably the, you know, not the best you're going to get out of these, these are the minimal benefits we're going to get out of these methods.

MR. CAVEDO: I agree with that, as long as the method, the benefit that is stated in the

1 presentations is what we actually achieved. If we
2 got, you know, an extra three minutes on growth, then
3 it would be less.
4 MR. FRUMKIN: With some of the new
5 methods, like it's easy to go in and, well, not easy.
6 I wouldn't even know where to start. But I presume
7 that it would be fairly straightforward to go in and
8 change some of these factors within the model. But if
9 you're re-characterizing the scenarios, wouldn't that
10 involve, like, more walkdowns and the costs from, you
11 know, maybe a few million dollars may go up to a few
12 more million dollars in order to realize those
13 benefits?
14 MR. STONE: Yes, I think one point you
15 have to think of here is the more complex, the more
16 expensive, the longer it's going to take for us in
17 industry to implement these. I know for, you know,
18 the larger fleet like mine, we'd have to look at
19 scheduling out and looking at the options. But a lot
20 of us will probably go there and do it because of
21 things like fire, STPs and fire impacts are driving
22 us. It's pretty crazy. And to be able to minimize a
23 vulnerability to STPs and get more realistic fires,
24 even though that is an extensive cost, I think a lot
25 of people in industry will implement it. It's going

1 to take time to schedule out and get resources to do
2 some of the complex stuff that Mark is talking about.
3 MR. FRUMKIN: Right. And that's, I guess,
4 my point is that complex stuff as much on the table as
5 some of this more straightforward refinement of
6 numbers? And then what, you know, you did say that
7 that could have much greater impact. How is that
8 quantified and weighed against the more
9 straightforward refinement of numbers?
10 MR. STONE: Well, we'd probably implement
11 the easy ones quickly. To do the more complex stuff
12 is going to take more resources and planning to get to
13 that point.
14 MR. FRUMKIN: And I guess how's that in
15 the research plan for these more complex ones?
16 Because it looks like we're seeing a lot of the, as
17 you called it, easy ones.
18 MR. STONE: The longer term it is, the
19 less likely it's going to have it anytime soon
20 implemented in the industry model, at least in the
21 Exelon models.
22 MR. MUSSATTI: That was right on the edge,
23 for your information, of changing from a question and
24 answer to a conversation, and I was about ready to
25 intervene. Are there any other comments or questions?

1 I'd like to, I'd like to thank you for coming back so
2 promptly from our break eight minutes ago. It is --
3 we're about 23 minutes behind schedule now. We're all
4 the way up to 11? Son of a gun. I'm still not
5 reading this thing right.
6 MR. HYSLOP: Actually, I got one question,
7 one comment if we're finished with those. With
8 respect to user variability that came up, in 805 we
9 noticed a pretty big difference in user variability,
10 depending on the decisions that licensees made with
11 their money whether to improve the PRA or whether to
12 put money in a new feed pump or something, all
13 legitimate choices of course.
14 I know that you've got a list of plants
15 and the percentages and all that. Was that at all
16 considered in the ranking that was done, or was that
17 beyond the scope?
18 MS. ANDERSON: Was what considered? I
19 don't understand what you're asking. Were
20 modifications considered or --
21 MR. HYSLOP: No. Was the fact that
22 different choices were made with respect to improving
23 the quality of the PRA, the resolution or refinement
24 --
25 MS. ANDERSON: No.

1 MR. HYSLOP: That was beyond the scope?
2 MS. ANDERSON: No.
3 MR. HYSLOP: Yes, okay.
4 MR. SALLEY: And, Mark and Rob, you
5 brought this up, Mark. I just have a question.
6 Looking at 6850 or the process, the way it's laid out,
7 you said the synergy of how it all comes together, do
8 we have that piece right in 6850 or, knowing what you
9 know now, would you do things different than 6850 lays
10 it out to go through the process?
11 MR. SCHAIRER: I don't know I'm qualified
12 to answer that question, but I'll give it a try. Yes,
13 I think 6850 has a good, you know, general approach in
14 the fire growth suppression, all the right elements
15 are there. I don't think that's really what we're
16 questioning. You know, I don't think the entire
17 methodology is in question here. We're looking at
18 that we've zeroed in on some of the specific, very
19 specific inputs.
20 You know, if anything, I think yesterday
21 we talked about how the biggest disconnect, I think,
22 was where the data is coming from. We've got certain
23 parts of 6850 rely on experimental data, and there's
24 a lot of 6850 that relies on fire history and things
25 like that. And that's where I think we're seeing the

1 biggest disconnect.

2 So maybe there were, if anything, maybe

3 that's where the focus needs to be a little bit more

4 on bringing those two pieces of information together

5 so there's some alignment.

6 MR. CAVEDO: Yes, I would agree completely

7 that the 6850 structure is reasonable, and it's just

8 a matter of data improvements and, as I stated, I

9 think the biggest thing that we can improve is the T

10 equals zero for detection. If we could move towards

11 that or a longer growth phase, then that would be most

12 helpful.

13 MR. JOGLAR: This is Francisco from

14 Jensen-Hughes. I agree. I think, since 2005 that we

15 have been doing research, no one has commented on the

16 flow shown in 6850. That's probably the only part of

17 it that has not been replaced because all the other

18 numbers and frequencies and values have pretty much

19 been replaced with some few exceptions. So only the

20 structure is the only one I never hear a comment on.

21 MR. ZEE: This is Kiang Zee. Along the

22 lines of structure of 6850, which I think, Mark, is

23 one of the items you're getting to, I think the

24 industry has played with 6850 enough that I think

25 everyone understands all the parts. I think they

1 understand the framework. I think pretty much
2 everyone understands that there are, you wouldn't
3 necessarily do everything in 6850 in the order in
4 which the tasks are numbered. I think everyone
5 already knows that you wouldn't do task 8 the way it's
6 described, you wouldn't do task 12 the way it's
7 described.
8 But none of this is a mystery to the
9 industry. If you're asking a question whether it's
10 worth spending resources to fiddle with the document,
11 my input is no. I think it's fine the way it is, and
12 I think we should spend our resources elsewhere.
13 MR. MUSSATTI: Further comments? Okay.
14 Maybe we should take that break now for a minute. It
15 is now 12 minutes after 10. We should probably, let's
16 come back at 10:30. That gives you a couple of extra
17 minutes here. And then we'll just soldier through the
18 rest of it until where it says lunch, and then,
19 whatever time that actually turns out to be, we'll
20 take lunch then.
21 (Whereupon, the above-entitled matter went
22 off the record at 10:13 a.m. and resumed at 10:31
23 a.m.)
24 MR. HYSLOP: This is Nick's presentation
25 for the most part. He had to -- had a conflict, so he

1 wasn't able to be here.

2 So my name is J.S. Hyslop. I'm in NOR and

3 I'm giving this presentation on the Improving Fire

4 Ignition Frequency. Next slide.

5 So fire ignition frequency, Task 6 of

6 NUREG/CR-6850, EPRI 1011989, divides plants, fire

7 sources and events for fire frequency. They're based

8 on location and equipment type in 6850 -- you know,

9 pumps, cabinets. Also includes causal factors like

10 cable fires from welding and cutting.

11 These fire frequency bins are represented

12 by probability distributions where we have generic

13 frequencies developed for -- from data up to 2000.

14 Terms of events for reactor year are set to frequency.

15 The current generic fire frequencies and

16 NUREG-2169, also an EPRI program with research, are

17 based on fire event experience through 2009.

18 The program that we're talking about is

19 further refining Bin 15, which is the electrical

20 cabinet bin, in particular, dividing that frequency up

21 into constituent electric cabinets.

22 Application of fire PRA identified

23 electrical enclosures as the dominant fire ignition

24 source. Have a slide on that that follows. With the

25 publication of RACHELLE-FIRE, NUREG-2178, the need for

electrical cabinet frequency sub-divided in a cabinet's height becomes more relevant and necessary.

It's more relevant because we've got research that can take advantage of that split. We have heat release rates that have divided the cabinets up into constituent part -- constituent cabinets, switchgear, MCCs, et cetera.

And it's necessary because the purpose of this workshop is to improve realism, and that will do it. For example, a subdivision of frequency in the cabinet type will enable the PRA to more accurately distinguish between the risk of low and medium-voltage cabinets. This more realistic heat release rate and frequency would be aligned for those cabinet types.

By pairing frequency and heat release rate for a specific cabinet type, the PRA can also be aligned better with methods. We have methods that address specific cabinets like 1409 MCCs, and so that's a better alignment.

I said there's a slide on the importance of electrical cabinets. I guess this is an EPRI slide presented in an EPRI meeting in August. And the back part of the histogram or electrical cabinets, Bin 15, and that dwarfs the contribution in most cases of many of the other ignition sources.

1 So, that's the reason why we need to look at this
2 further and further refine our estimates for
3 electrical cabinet fires.
4 As was said earlier, we've got a lot more
5 bins. 6850 had five bins based on cabinet, external
6 configuration and internal wiring, whether internal
7 -- whether it was a single bundle or a multiple
8 bundle of fires that were connected and therefore we
9 produce a fire scenario that involved all of them or
10 a single bundle.
11 So, those were the conditions for 6850,
12 but now for 2178, which was also our research EPRI
13 MOU project. We have a lot more bins, and these bins
14 are -- we divided cabinets in the switchgear and load
15 centers, MCC and battery chargers and power
16 inverters. And then it was also divided on the size
17 of the cabinet and the internal loading.
18 This proposed task -- well, I guess it's
19 not a proposed task, it's an actual task -- will
20 involve a collaborative effort with EPRI to evaluate
21 the appropriate level of bins based on operational
22 data availability.
23 So the old approach was Bin 15 for plant-
24 wide components. And the new approach divides those
25 electrical cabinets, plant-wide components, and into

a switchgear load center, et cetera, including low-voltage cabinets. The staff feels like that's an important distinction to make.

So we feel that refining Bin 15 frequency will bring more realism to the evaluation of risk and potentially have a significant impact on most dominating fire risk contributor for EPRI's fire PRA impact study.

I've been speaking to some of our plant people who are fire protection engineers, and one of the conclusions that we feel are important to this study is that lower-voltage cabinets, 250 or so, they have a lower frequency than many of the other cabinets.

And my understanding is these are necessarily separated as well as the higher-voltage cabinets, so you have more of a potential to damage both trains. And so by lowering the frequency for these lower-voltage cabinets, you would get a better risk estimate that represents risk better.

However, the eventual goal for both industry and NRC should be the development of component-based frequencies based on industry-wide data. Basically, a fire ignition source should have a frequency based on the population of components

1 throughout the industry. It should not vary
2 depending on the presence of other like ignition
3 sources in the location of interest.
4 And component-based frequencies will
5 allow for a different fire ignition source
6 frequencies for different nuclear power plants as
7 opposed to distributing the same frequency to
8 different plant.
9 We've heard of a fair array of projects
10 yesterday. We've heard about ones that were fairly
11 well along, the FAQs. Some of those are already
12 ready to approval or we've had a lot of discussion.
13 We've heard of tasks like Francisco's that hasn't
14 made a FAQ, but apparently it's fairly well along.
15 And then we heard about others where
16 industry feels like this could make a difference, but
17 yet a lot of work has to be done to determine how
18 much of a help -- how much progress can really be
19 made.
20 The component-based frequency, it is
21 achievable. It wasn't always achievable because we
22 didn't have the counts, but now with 805, we do. So
23 now it would seem like the real amount of work is
24 just getting the counts because -- and then folding
25 those into the frequencies. The -- that should be

1 the biggest part, and that's available now. So it
2 seems like we've got a -- that component-based
3 frequencies are achievable now.
4 That's it. Any questions? Yes, Kiang?
5 MR. ZEE: This is Kiang Zee. I have to
6 try to keep up on the peg board with my competition
7 on the other side of the room. Okay, so if we're
8 going to go off and do a bunch of stuff on component-
9 based frequency, a thought came to mind. If we start
10 connecting together all of these refinements and all
11 these other treatments -- I'm not sure exactly how
12 this would work, but the thought came to mind.
13 If I had an event that occurred at a
14 plant that was arguably a fire event that was
15 promptly suppressed or self-extinguished or whatever
16 the parameters might be, that plant in all likelihood
17 would have said, "Oh, so my MCC had an event and it
18 got de-energized," or "My pump had an event and it
19 was unavailable," you would have counted it as an
20 event that occurred for your plant-specific data
21 update for internal events.
22 So the question comes to mind, we're
23 double counting. Because conceptually, I have a
24 bunch of events that have occurred in industry that
25 arguably have already been included in a plant's

1 internal data updates for internal events, which
2 means when I take that data and move it into my fire
3 PRA, that fraction, by however I construct it, where
4 its consequence is limited to the ignition source
5 itself, it should be an event scenario, if you will,
6 that's excluded from the fire PRA because it's
7 inherently part of internal events.
8 And that interconnection between fire and
9 internal events is something that the methodologies
10 are completely silent about. And it was a bit of an
11 epiphany that didn't just happen now, it's sort of
12 lingering. This is probably a good time for me to
13 sort of add it to the pile.
14 MR. HYSLOP: I guess -- I don't think
15 your comment is related to component-based
16 frequencies because we're not going to try and change
17 the number of events. We're just going to collect
18 the denominator.
19 MR. CAVEDO: No, no, no. What I'm saying
20 is -- what's going to land up happening is you're
21 going to re-parse all the data, and what's going to
22 land up happening is you're going to accumulate a lot
23 of events that occurred that identified individual
24 piece parts like a battery charger, a switch gear, an
25 MCC. And they're going to manifest themselves in our

1 fire PRAs.

2 There's a lot of events where the only

3 thing that happened was the battery charger became

4 unavailable. And I'm going to land up -- in the

5 absence of us agreeing how that's to be treated, I'm

6 going to add that to my fire PRA as a loss of battery

7 charger event as an initiating -- a fire-initiated

8 event when it's already included as a random failure

9 probability in internal events. So I'm double

10 counting.

11 MR. HYSLOP: I guess it's something --

12 was that handled in 2169? Because that's really a

13 frequency -- that's not a component-based frequency

14 issue, it's an issue about how you treat events and

15 -- in terms of your quantification.

16 MS. LINDEMAN: It's not treated in 2169.

17 You know, the process that we went through for the

18 FEDB update, you know, there's -- you know, you

19 participated. There's a set of criteria to determine

20 the fire severity.

21 So yes, I think about that too,

22 especially, you know, not only on, you know, what you

23 said is the fire is contained to the cabinet. But,

24 you know, there's also been some fire events that

25 have contributed to loop data. So I think it's a

1 difficult problem, but --

2 MR. HYSLOP: I guess the question I have

3 is how important of a problem is it? Because these

4 types of fires really don't contribute much to risk

5 if they're limited to a single cabinet or things like

6 that, is my understanding. And so, you know, while

7 it might be an issue, is it an important issue?

8 MR. CAVEDO: Yes, let me just offer some

9 insight in this. It does depend on the degree to

10 which things are modeled, but almost all plants

11 assume that whenever there's a fire, there's a plant

12 trip. So that's the difference where if the

13 component is lost with a plant trip, then that's

14 going to be some significance.

15 And unfortunately there are some sights

16 out there that didn't have the money to route every

17 cable in the plant from a fire PRA perspective, and

18 so they have to assume those failures as well because

19 they don't know where the cables were routed.

20 So it can turn out to be significant for

21 the unrouted cables and the other things that can

22 contribute, you know, maybe 10 percent or something

23 like that to the overall number. So it does vary

24 from site to site. Some sites it may be a very, very

25 small contribution, but at other sites, it could be

1 a larger contribution.

2 MR. HYSLOP: Yes. So in a sense, it's

3 sort of based on a limitation of the -- a resource

4 limitation and a resulting limitation of the model,

5 I think you're saying, Rob.

6 Yes, Nathan, were you going to --

7 MR. SIU: Yes this is Nathan Siu,

8 Research. Regarding Rob's point, I think the assumed

9 impact of the fire leading to trip is a little bit

10 different than the double counting issue that Kiang

11 was raising. Maybe I'm missing something.

12 As far as the double counting goes, I

13 mean, it's clearly a valid point. You'd have to

14 worry about it in principle. In practice, I guess

15 I'd be surprised if it really had a major numerical

16 impact, but I suppose you could look at it and

17 decide.

18 MR. SIU: I think because of the counting

19 rules, we count up a thousand little piece parts.

20 And so a thousand small numbers is -- accumulates up

21 to a non-insignificant number, is really what the

22 problem is.

23 MR. MUSSATTI: Yes, Howard?

24 MR. STILES: Yes, this is Harold with --

25 MR. MUSSATTI: Harold, I'm sorry.

1 MR. STILES: I think that a component
2 frequency certainly makes a lot of sense, J.S. I
3 would just -- part of that though is deciding which
4 one of those events actually progressed to a --
5 potentially challenging a fire. And I was just
6 wondering with regard to trying to apply that at a
7 component basis, what your thoughts were about how to
8 address something like that.
9 MR. HYSLOP: Well I guess for me, I don't
10 think a lot of these questions are specific to
11 component-based. If you have an event and you count
12 it as a challenging fire, it's not going to change
13 when you do a component-based. It's going to be in
14 the numerator.
15 And the only -- one of the big
16 challenges, I guess -- I'm not sure how much of a
17 challenge it is -- it's just collecting the
18 information for the denominator and then being able
19 to have an ignition frequency for a component that's
20 distinct to the component that's -- that allows for
21 the variation across plants. And so whether
22 something's challenging or potentially challenging,
23 that categorization is not going to change if you go
24 to component-based frequencies.
25 MR. STILES: And along that same line, it

1 seems that there is not a great deal of variability
2 in making that decision for the question of could it
3 be potentially challenging under any conceivable
4 situation which may not be exactly the one where the
5 event occurred. Could you -- do you have any
6 thoughts on whether perhaps that probability could be
7 like .1 or .2 or .7, other than just say .5 or 1 or
8 something like that?
9 MR. HYSLOP: Well the -- I guess the
10 frequencies I think that are -- you know, they're --
11 it's a portion or a whole number. And the whole
12 point of calculating these frequencies are that
13 events under some circumstances, under some
14 conditions might not be challenging for a plant, but
15 they might be for another configuration. You might
16 have a fire that gets out of a cabinet and doesn't do
17 any damage and -- but it might in another
18 configuration.
19 But I guess really -- I haven't thought
20 about these rules for a long time. Like Ashley said,
21 I was involved in the beginning. But in both cases,
22 with the rules, those would be counted as challenging
23 fires, anything that's viewed and has a record of
24 exceeding.
25 Because I think one of the conditions was

a flame of a certain size being seen. And so -- but yes, plants that -- or fires that do damage in one plant might not in another, but yet you certainly can't ignore the potential for other configurations in other plants.

MR. SIU: J.S., this is Kiang again. The mental exercise of what you described is very straightforward. I agree with everything you're saying.

But what I'm basically suggesting is if you simply follow the framework that you previously had in place, what's going to land up happening is you're going to take the numerator, which we already know are predominately power distribution equipment, and you're going to now divide it by a much smaller denominator.

Because we know power distribution equipment is a much smaller fraction of the total electrical cabinet count in a plant, which means what'll land up happening, what we propagated into our fire PRAs, we're going to find out that power distribution fire frequencies are going to go through the roof.

And the skyline chart is now going to have a new peak that's going to say risk is being

1 dominated by electrical cabinets that cause
2 significant accident precursor-type consequences at
3 a significantly higher likelihood than what we even
4 are predicting now, which makes it even more
5 inconsistent with OE.
6 So what I'm suggesting is I think -- this
7 is all good stuff and I think we should go do that.
8 What I'm suggesting is I think we should step back
9 and get some stakeholders together that have their
10 fingers into some of these models and just kind of do
11 a mental exercise to wind the tape in terms of where
12 it's going to head to and is it really going to give
13 us something that we think is actually improving
14 realism or is it another mathematical artifact
15 because of an imposed methodology of how we went
16 about doing the work.
17 MR. HYSLOP: Yes, I would expect this
18 will be a joint project, and we encourage EPRI to
19 bring in all the -- well, not research. But, you
20 know, from an agency perspective, we want all the
21 important parties involved. And, you know, certainly
22 we should move in this direction, and if we encounter
23 a challenge, then we'll address it at the time and
24 make the decision on what to do with it.
25 MR. MUSSATTI: Ken, how's the webinar

1 doing? Does anybody want to weigh in on this? Not
2 yet. I invite anyone on the webinar that wants to
3 speak to contact Ken so that we can hear your voice.
4 Anybody else in the room?
5 MR. STONE: I just wanted to emphasize
6 what Kiang says, is -- as we started, as part of our
7 objectives here this week, is to make -- is to try to
8 align our fire PRAs with operating experience, and
9 it's difficult sometimes with the limited data we
10 have.
11 But if we again unintentionally inflate
12 these frequencies for different components without
13 matching or even looking at what real operating
14 experience has shown across the fleet, we're going to
15 -- we're again going to be showing a lot of severe
16 fires that doesn't match what we've seen in the
17 industry in the past years.
18 MR. HYSLOP: I don't think we're -- the
19 intent is to change the number of potentially
20 challenging fires, but I think the concern -- I'm not
21 sure if I understood Kiang's comment correctly -- is
22 that when you divide components into finer parts, you
23 know, you may have a few of these and a lot of these.
24 And the ones where you have a smaller
25 denominator, it would be inflated relative to the

1 others, and is that a concern, is that going to be a
2 problem or are we going to have challenges for that.
3 MR. MUSSATTI: All right, thank you.
4 MR. MISKIEWICZ: This is Dave Miskiewicz,
5 EPM. I think everyone in this room is in agreement.
6 I hope that, you know, overall component-based
7 frequencies are going to be a benefit to doing the
8 analysis across the board, not just Bin 15.
9 But, you know, there's aspects of it in
10 cost savings, complexity, even the ability to
11 compares apples and apples to some extent. You know,
12 you can have a plant with -- two plants, one with
13 2,000 cabinets, one 1,000 cabinets. And the one with
14 1,000 cabinets has twice the frequency for every
15 cabinet, which doesn't make a lot of sense.
16 And even as you're doing mods, not having
17 to worry about, you know, changing your PRA every
18 time you add or take away pieces of equipment. Very
19 little -- lot of work be done for very little impact
20 and numbers.
21 Just like we're doing now with
22 sensitivity studies, I think we would need to do a
23 lot of that type -- same type of work if we're
24 starting to split up in finer and finer pieces, which
25 I think has been the objection to going to component-

1 based all along, was the statistics don't support
2 some of the rationale in doing that.
3 So I think it would take a lot of joint
4 effort. I think you'd have to get the stakeholders
5 involved. And if we got results that made no sense,
6 we have to stop and take a look at it instead of
7 going through. So I think there's a lot of benefit
8 into going down this approach.
9 The point Kiang brought up, I think
10 there's ways to deal with that, you know, in a side
11 -- you know, in conjunction with this stuff and it is
12 more involved than just counting numbers. It's --
13 you know, it plays all the way through quantification
14 and how your modeling your scenarios and what's a
15 real scenario and what's not in terms of fire. So
16 anyway, I just wanted to add that.
17 MR. HYSLOP: Thanks, Dave.
18 MR. MUSSATTI: Harold, you looked like
19 you were about ready to raise your hand for a
20 comment. You're good?
21 MR. STILES: No. I'm good, thank you.
22 MR. MUSSATTI: Anybody else? All right,
23 maybe we should move on to the next presentation,
24 then.
25 MS. LINDEMAN: Okay, like to -- this is

1 Ashley Lindeman from EPRI. I'd like to thank J.S.
2 for going first, that way he can answer all the
3 difficult questions.
4 So I think we all agree fire frequencies
5 is an important aspect not only in our fire PRAs now,
6 but as we move forward. When I was working on fire
7 PRAs as a contractor, you know, five years ago, we
8 used to joke that, you know, you could tweak the NSP
9 some of the fire modeling parameters, but you can't
10 really tweak the fire ignition frequency. So that's
11 why having a robust set of data for the ignition
12 frequency is really important.
13 Okay, so since 6850 and EPRI 1011989,
14 there's been a lot of work that has gone into making
15 sure that the frequencies are robust and, you know --
16 so, you know, we recognize that some of the
17 supporting data was pretty weak. So EPRI underwent
18 a significant project to collect operating experience
19 for the 2000s and strengthen the data from the 1990s.
20 So that was published in 2013 and then
21 there was a follow-on effort to revise the fire
22 ignition frequencies and non-suppression
23 probabilities, and that also published as a joint
24 report in the end of 2014, early 2015.
25 So although it provided an additional

1 decade of data, it didn't do much to revolutionize
2 the task. We did not change any of the binning. The
3 binning was the same or aligned with the binning in
4 Supplement 1.
5 Some of the insights that we noted from
6 the fire events database was there was a significant
7 variability in the magnitude and the consequence of
8 fires, including many low-severity fires. These
9 fires didn't grow very vigorously but, by the rule
10 set in the fire events database, was a potentially
11 challenging fire. And some of those attributes for
12 fire severity are evidence of a flame of two inches
13 or greater, so a pretty small threshold.
14 And then kind of ongoing is, you know, we
15 recognize that EPRI going every decade and collecting
16 the operating experience was very resource-intensive.
17 In addition to EPRI and the contractors that were
18 hired, the owners groups were involved in sorting
19 some of the data.
20 So INPO collects fire events now in their
21 ICES database, and that's ongoing. And this is a
22 good collaboration because it provides a uniform
23 mechanism for collecting the industry data. INPO's
24 also able to have a quicker conversation and follow
25 up with a plant if there's attributes that don't make

1 sense.

2 So where shall we go from here? I think

3 there's three main ways. You know, it's not

4 necessary to pick one, you can pick all. J.S.

5 mentioned our prior frequencies on a generic basis

6 are plant-based. Should we go and move towards

7 component-based?

8 And, you know, some of the major efforts

9 are verifying the equipment counts and making sure

10 the statistics make sense, dividing more -- some of

11 the more populated bins. I know Bin 15, the

12 electrical cabinet bin, is the one that first comes

13 to mind. Then the last potential direction is we've

14 had a lot of discussion about fire severity and

15 suppression, so really explicitly addressing those.

16 So when we review the insights from the

17 fire events database, one thing that we did is we

18 made a distinction between potentially challenging

19 and challenging fires. Now they're kind of the same

20 in terms of ignition frequency, but inherently they

21 have different characteristics.

22 Challenging fires had an observable

23 amount of smoke or heat. They may have resulted in

24 automatic suppression. On the other hand, we have

25 potentially challenging fires, and these are

1 typically small and suppressed by simple manual
2 actions.
3 So when we look at some of the more
4 populated bins such as Bin 15, there was a lot of
5 experience and the majority is potentially
6 challenging fires. And now remember, we all treat
7 the same as the 12-minute growth to peak.
8 So some questions that we have are do
9 challenging and potentially challenging fires have
10 different progression and growth rates? Do they
11 follow the same suppression rates? So as I
12 mentioned, the potentially challenging fires, they're
13 frequently suppressed by plant personnel. When we
14 look at the challenging fires, they're frequently
15 suppressed by the fire brigade and fixed-suppression
16 systems.
17 So structure, the next session on fire
18 growth, so as we see, trying to ask the question are
19 potentially challenging fires different from
20 challenging. And in general, we see that the events
21 that we classified as potentially challenging have
22 limited fire growth, they have limited heat release
23 rate and the damage is localized and contained within
24 the ignition source, right, so not external to the
25 cabinet.

1 So kind of the conclusion that we reached
2 is these potentially challenging fires grow slower
3 than what we see in the current methods to assess
4 growth rate.
5 So here's some possible ways to move
6 forward. When we look at the fire events, I think we
7 can characterize them into one of three fire
8 progressions. We have slow or delayed growth. So
9 this may be a sub-component that overheats. You're
10 still able to detect it and hence there's a delay
11 before the fire goes into the t squared growth phase.
12 Then we may have normal growth, which is,
13 you know, growth according to 6850, t squared in 12
14 minutes.
15 Then we may have some that experience
16 rapid growth, so maybe fires initiated by some type
17 of arc fault where there maybe is no time and the
18 fire -- or the event occurs and there's an
19 instantaneous peak.
20 So next we'll move on to suppression.
21 And as I mentioned, we see that there's a difference
22 in both the duration and the suppression method
23 between potentially challenging and challenging
24 fires.
25 Typically these potentially challenging,

which are the more frequently occurring fires, are suppressed -- more than half are suppressed in five minutes or less and the average time to suppress is 8 minutes.

Plant personnel commonly suppress these fires and 90 percent of these fires are extinguished simple actions which will be self-extinguished, removal of the power supply, a single portable extinguisher or a combination of both.

When we look at the challenging fires, we find that the duration is greater and also the average time to suppress is greater. One thing that is surprising is even these challenging fires are routinely detected by plant personnel. And the common suppression methods are the fire brigade and fixed suppression.

So how can we summarize our insights from the operational data? So for electrical cabinet fires, we see that the primary mechanism for detection is really plant personnel in the vicinity.

Less than 15 percent of fires are detected by the fixed detection systems in the room. Right, and that may be because these fires grow so slowly that it takes time for the fire signatures to reach the fixed detection systems.

1 What we did find, and this was a big
2 delta, is that early plant suppression does make a
3 difference. We found they have a big influence in,
4 you know, containing the fire. So as part of the
5 EPRI plan, we're looking to create a new branch that
6 credits plant personnel suppression, you know,
7 earlier than as currently reflected.
8 And we believe that there's enough data
9 that we can credit this early plant suppression for
10 fires exhibiting slow and normal growth. But we also
11 recognize that there may be scenarios where this
12 personnel suppression is not credible.
13 So some ideas that we've been playing
14 around is looking at the occupancy factors for
15 transient fires and seeing how that might influence
16 where this early suppression can be credited.
17 So to summarize the technical work,
18 definitely believe that there is merits in moving to
19 component-based approach. That might still be a few
20 years away. Dividing Bin 15 into smaller segments
21 might be a second order effect of this work, but not
22 the primary focus at this point.
23 So, you know, what we're working on is
24 really getting into the data and trying to see what
25 are the insights and then develop a technical basis

1 for a fire progression event true and also
2 incorporating a method to credit plant personnel
3 suppression.
4 So, you know, simply we're looking for --
5 to develop a procedure that would walk through the
6 insights that we get from an event and help
7 characterize the event in terms of growth,
8 suppression and damage, develop a revised approach
9 that can better account for personnel suppression,
10 you know, classify the events as necessary, you know,
11 and then bring it together in an event tree
12 structure.
13 So that is the EPRI perspective on moving
14 forward with the fire ignition frequencies.
15 MR. METZGER: Sorry.
16 MS. LINDEMAN: No, go -- sorry.
17 MR. METZGER: I think these are probably
18 straightforward. When you mentioned the -- you're
19 trying to characterize fires and how fast they grow
20 --
21 MS. LINDEMAN: Yes, this one?
22 MR. METZGER: -- you mentioned the term
23 "fast." And, you know, 6850 or at least that profile
24 that we currently assume in -- from 6850 already
25 characterizes these fires as slow, slow-growing in

terms of the -- I don't know, the traditional sense, the formula that -- sort of that t squared comes from is an alpha t squared where the alpha -- and this is not the alpha to be -- that we use in other analyses.

But there's a term there for how fast the fire. There's ultra-fast, fast, medium, slow. The one we typically use from -- in 6850 is actually corresponds to what was originally a slow fire. So I'm curious when you're referring to those terms, are we -- we're kind of redefining that I think probably, right, in terms of our own --

MS. LINDEMAN: You're talking about in comparison to maybe, you know, SFP or --

MR. METZGER: Right.

MS. LINDEMAN: -- how they characterize.

MR. METZGER: Yes.

MS. LINDEMAN: Yes. You know, I think for this group, you know, we tried to just put some general. So they may not particularly align with what's in SFPE. But, you know, I think we're at this point just trying to characterize the different growths and how they may affect the progression in the fire PRA.

MR. METZGER: But, I mean, put differently, maybe what we're discussing is creating

1 an ultra-slow fire growth that we use in this
2 industry?
3 MS. LINDEMAN: Yes. So maybe a good
4 example is there may be a fire event that lasted 20
5 minutes. So at 20 minutes, you would assume that the
6 fire has, you know, reached its peak. It's likely
7 involving multiple cable trays. But when you look at
8 the fire event report, we find that, you know, it's
9 contained within 6 inches. So, you know, that's
10 clearly -- you know, not all fires grow, and that is
11 what we'd like to address.
12 MR. METZGER: And one other question.
13 You mentioned that maybe developing a way to credit
14 personnel suppression, but if 85 percent or so are
15 detected by personnel, are we also talking about a
16 personnel detection -- I think -- I know we've talked
17 about this a little bit in the past. But --
18 MS. LINDEMAN: Yes. Yes, I didn't really
19 mention personnel detection. That's a good point.
20 That's also primarily the mechanism to detect. You
21 know, that's kind of where we start. Yes.
22 MR. HYSLOP: Could you put that slide up
23 again where you had the difference between
24 potentially challenging and challenging?
25 MS. LINDEMAN: So I had some -- this one?

1 I mean, at a --

2 MR. HYSLOP: Yes, that's good.

3 MS. LINDEMAN: Yes, at a higher level,

4 you know, there's specific rules in the fire events

5 database. And this is more of -- when we look at the

6 different events that were classified, these are some

7 of the attributes that we can take away.

8 MR. HYSLOP: Yes, I think this is

9 important. I really haven't seen this. It was a

10 long time ago when I was in Research working on this.

11 And I think part of the motivation in

12 assigning the characteristics -- the distinguishing

13 characteristics wasn't always how bad the fire was,

14 but sometimes it was the concreteness of a signature,

15 whether or not you had a signature of a fire, whether

16 or not, for example, it was smoldering or something

17 like that.

18 You know, the fixed suppression system,

19 you had a detection going off. And so that was part

20 of it, and so I guess it's interesting to see that

21 there is some alignment between the significance of

22 the fire and the distinction. But I don't -- I'm not

23 sure that was intended necessarily from my part. Now

24 maybe Pat Baranowsky was thinking about that.

25 MS. LINDEMAN: Yes.

1 MR. HYSLOP: I can't remember. But --

2 MS. LINDEMAN: Well, I think the idea was

3 at least it's a first cut -- and I'm not saying that

4 this is the final way of what we're going. But, you

5 know, after we published the fire ignition frequency

6 report, you know, the next logical step was let's dig

7 in the data.

8 And the first way to analyze it was,

9 well, we have these potentially challenging fires and

10 we have these challenging fires, and let's look into,

11 you know, what each event are telling us, you know,

12 looking at potentially challenging and challenging.

13 MR. HYSLOP: Yes. For example, I know a

14 little bit about -- very little, but some fires, the

15 -- I think the plant strategy is to attack them with

16 the brigade maybe as opposed to an extinguisher.

17 Maybe someone can correct me if I'm

18 wrong, but when they have these insulation fires on

19 piping and things and they peel them away, you know,

20 they do it in stages. And I think the brigade is

21 awful involved in --

22 MS. LINDEMAN: Yes, I know what you're

23 talking about. Yes, so the insights that I presented

24 here are specifically for cabinets and I don't

25 believe that the fire brigade is the automatic

criteria for challenging. I believe it's the suppression method. So if they used a hose stream, I think it -- I believe it ends up being challenging or -- so.

MR. MUSSATTI: We have a mic down on this side of the room here. Do you have a comment?

MR. STONE: Yes, I had a quick question. Do you -- do we proceed going to two separate initiators for like a cabinet 1 as challenging and one potentially challenging or trying to combine it to --

MS. LINDEMAN: Oh, that's a good question. I think we're struggling with how to characterize it at this point. We're still in the early stages of analyzing the data and then, you know, how to make it practical for -- and make sense, is the next logical step.

MR. MUSSATTI: Okay.

MR. STILES: Again, this is Harold Stiles with Duke Energy. Actually when you looked at the difference between potentially challenging fires and challenging fires, did you also look at the frequency at which a plant trip was involved?

MS. LINDEMAN: Not specifically, although that's a good point and that's part of the research

1 plan, is trying to make a little bit more room for
2 that to be involved in the fire PRA methodology.
3 You know, certainly the only data point
4 that I can concretely say is that from the roadmap in
5 2010, you know, one in eight fires caused a plant
6 trip. But I think we'd have to recognize that just
7 applying a 1 in 8 number is inappropriate. Right?
8 There might be HEAFs, right, that likely
9 trip the plant. And then on the other end, you might
10 have a transient, you know, which is relatively
11 unlikely. So -- but if you, you know, send me an
12 email, I could certainly let you know for specific to
13 cabinets.
14 MR. MUSSATTI: We have anybody on the
15 webinar that wants to chime in?
16 MR. HAMBURGER: I don't see anybody, but
17 --
18 MR. HYSLOP: I have one question.
19 MR. HAMBURGER: -- we can take this
20 opportunity just to invite them. If they would like
21 to say something, use the Raise Hand feature and I
22 can unmute them.
23 MS. LINDEMAN: J.S., did you want to say
24 something or -- okay.
25 MR. HYSLOP: There's been a lot of talk

about the plant trip and I guess, you know, there's a mismatch between the PRAs and operating experience.

But I think the reason the PRAs do it is because all the cables aren't traced. It's not -- isn't that what really drives the plant trip assumption, that you don't trace all the cables so you can't conclude that there aren't any and you can't say that, "Gee, I traced half my cables, so there's 50 percent probability that there's a trip." Isn't that what drives you?

MS. LINDEMAN: I think it's a little bit of both, but, you know, there should be room to -- at least to account for the variability in different ignition sources and different rooms.

It just seems that if we have experience to the contrary, it seems that we're maybe penalizing or non-penalizing sources inappropriately. Right? So, you know, you showed the graph of the skyline chart.

And, you know, one of the second highest ones was transience, so -- right? I think I know off the top of my head that one transient event caused the plant trip. And I think that's because a light bulb exploded on a cable tray and caused the plant trip. But the other transients didn't, so by

assuming ever transient caused the plant trip, are we inappropriately putting that risk into transience? So --

MR. HYSLOP: I'm acknowledging the mismatch. I'm just saying there's a -- that there are some -- it's not just a methodological issue.

MS. LINDEMAN: Yes. Agree, but I think at some point, it's not practical or -- in all cases, it's not practical to trace every single cable in the plant.

MR. MUSSATTI: Okay, I think Ken's got ourselves somebody from the webinar here.

MR. HAMBURGER: We have a question from Young Jo.

MR. JO: Actually I should have made a comment on a previous presentation. For Vogtle 3 and 4, and we have to develop PRAs and new plants which has fewer components in general as compared to an existing plant.

It is very important actually ignition frequency based on the -- four components of basis. This is an example of Vogtle typical Westinghouse 300 electrical cabinets. For Vogtle 3 and 4, we have only 1,000 electrical cabinets.

If I use frequency and 6850 methodology,

1 the four components of the electrical cabinet
2 frequency doubled for no reason. And I think that
3 this problem will get worse if it goes to an SMR like
4 NuScale if there are like only 50 cabinets.
5 So for the existing plants because of
6 number of components of similar plant, this may not
7 be significant. But for Southern Nuclear, this issue
8 is a real issue and it's currently -- fire risk
9 because of using as component of basis of frequency.
10 Thank you.
11 MS. LINDEMAN: Okay.
12 MR. HYSLOP: I think he was supporting
13 the component-based frequencies. At least at his
14 plant, it's pretty significant.
15 MS. LINDEMAN: Yes, that's what I got
16 also out of the comment.
17 MR. KRUEGER: Ashley, Greg Krueger, NEI.
18 Your discussion about data got me thinking with
19 regard to being identified by individuals. I wonder
20 or I ask were those individuals part of a fire watch
21 or is there a subset of the data that would indicate
22 that, you know, there was hot work or something else
23 going on that -- such that the individual did
24 identify and extinguish a fire.
25 And the reason I ask it that way is that

1 might be a piece of data that's in a -- in the fire
2 event's database. But the condition in the plant is
3 very specific in that case. It's not random.
4 In other words, likely operations
5 protected the other train, right? They've done other
6 things that might not be in that data that you're
7 looking at and you're -- so you're applying this data
8 as a data point to an average condition which in
9 fact, you know, might be overemphasizing or
10 overstating the frequency.
11 MS. LINDEMAN: Yes, I have two comments.
12 MR. KRUEGER: Okay.
13 MS. LINDEMAN: One, the fire events
14 database has a check box for fire watch. So, you
15 know, we do know the fire events that were detected
16 via fire watch.
17 And number two, I don't think I made this
18 quite clear, is that often these fires are suppressed
19 by, you know, non-fire watch, non-fire brigade.
20 They're kind of a passerby that might be qualified to
21 fight a fire. So just wanted to add that as well.
22 MR. MUSSATTI: Okay, any other comments?
23 MS. LINDEMAN: Okay, thanks.
24 MR. STONE: I did have one quick
25 question. Sort of along what Dave was bringing up

1 earlier, is there any way to pilot -- before we
2 finalize all this, to pilot and put some of these
3 into some of the PRAs and see if it -- like anything
4 we expect to see as far as operating experience?
5 MS. LINDEMAN: Yes, that's a great
6 question. And as part of, you know, EPRI's
7 invigoration to speed up and acceleration our work on
8 fire PRA, we're now having, you know, conference
9 calls every other week to keep apprised of the
10 technical progress.
11 And it's funny you say that because last
12 week one of my comments was, you know, we need to
13 pilot this or tabletop this. So I think it's
14 acknowledged that we would have to make sure anything
15 that we produced, you know, is practical and made
16 sense.
17 MR. MUSSATTI: Okay. I think we're done
18 here and we can move on to the next presenter.
19 MR. SIU: Morning. I should first thank
20 Nick Melly for putting together a set of slides that
21 I subsequently ignored and stuck in a bunch of stuff
22 that he won't recognize. But -- so I'll take the
23 blame that goes badly here.
24 I guess I feel a little bit like Snidely
25 Whiplash coming up here and talking about non-

1 conservatisms and PRA. For those of you who are
2 laughing, you're revealing your age or your
3 television viewing habits.
4 But then I started thinking about this
5 and said, "Well, this is natural." We're talking
6 about looking at realism, looking at uncertainty. So
7 obviously it can go both ways. There's some things
8 that we have in our models. There's some things that
9 we don't have in our models.
10 So we understand that. We move forward
11 and we do decision making in a risk-informed fashion.
12 So just to -- oops, the animation didn't work.
13 Sorry. To belabor the obvious, and so I'll earn my
14 dinosaur merit badge points here.
15 Look, monitoring is part of risk-informed
16 decision making. We go forth, we make a decision,
17 but then we constantly check to see if our decision's
18 right. And we check out technical tools. We do the
19 R&D in cases where we think we need to make changes.
20 And again, that cuts both ways. In
21 places where we see there's conservatism, try and
22 knock it down. In places where they may be non-
23 conservatisms, let's look at it and see if there's
24 something that we need to work on. Are there
25 uncertainties in fire PRA? Of course there are.

1 Fire is an incredibly complex phenomenon.
2 And I'm sorry to lecture to you guys who have degrees
3 in this area. But you go phenomena that work on a
4 multitude of length scales down from molecular all
5 the way up to the size of a turbine building, and in
6 our case, beyond, if you worry about off-site
7 consequences.
8 You got different time scales, you got
9 things that are happening more or less
10 instantaneously and then you got things happening
11 over hours and everything in between. And it does
12 matter. It's an incredibly non-linear phenomenon.
13 And any of you who've built a fire in
14 your fireplace, you know that. You shift something
15 just a little bit, your fire's going to burn or not.
16 It's just the way it is.
17 And of course you don't expect your
18 models to represent that level of detail and you
19 don't try, because it's not worth it. So you shove
20 everything into these engineering models until you
21 have these heat release rate curves that you say,
22 "I'm going to use this as being representative of a
23 fire."
24 But we know that it's just a one
25 particular representation of the possible fire and

there are many other ways that that fire could evolve. It's good enough for engineering purposes. We had a conversations in the elevator the other day.

Kevin mentioned, "Well gee, you've got the Boelter equations for heat transfer." Those are based on solutions of the Navier-Stokes equations, but at some point in time, you look at the engineering data, you fit it to some non-dimensional numbers and you say, "That's it." And it's good enough plus or 10 percent, plus or minus 20 percent. Good enough to go? I work with that.

So our PRA models are sufficiently realistic. They're good enough for the purpose. I'm a cheapskate. I stay in cheap hotels lots of times. It's good enough. I just need to stay the evening, I don't need the infinity pool. It's tolerable.

Other cases, I might need to rest much better. I might need to upgrade my hotel this day so I'm ready for the next day's meeting. It depends on -- obviously on the purpose.

And I -- in the case of the PRA, obviously I work on the PRA enough so it gets me through that particular hurtle. If I want to use it for something else, maybe I have to refine that tool. Maybe I have to pay more to get there. Unfortunately

1 sometimes the payment is big, understand that.
2 So we know there are uncertainties in
3 fire PRA, and we know that fire PRA has all the
4 classic uncertainties. It has uncertainties in the
5 parameters. We were just talking about the fire
6 frequencies -- uncertainties in the models that we
7 use.
8 Again, we've decided to use these
9 consensus heat release rate curves as being the
10 model, saying that's going to be useful in our
11 process even if it isn't necessarily truth in the
12 broader sense.
13 We have completeness and certainties,
14 there are some things that we've decided we're just
15 not going to model because we don't know how to do it
16 at this point. It's going to be too expensive to do
17 it, we don't think that it's worthwhile or maybe we
18 just don't know and we haven't pushed hard enough on
19 that. And I'll give you some examples in a second.
20 So we have guidance, NUREG/CR-6850, EPRI
21 1011989. Says this is how we say to do it, and of
22 course, there have been developments since there.
23 And of course, as people have already said, nobody
24 expected this thing to be the final word, that we are
25 constantly evolving.

1 So again, I'm just saying this so I don't
2 feel bad about talking about non-conservatisms. And
3 -- oh, I forgot to mention. By the way, for those of
4 you who don't know the figure up on the upper right
5 there, NUREG-2201, that's a PRA FAQ report, came out
6 in 2017. Talks about PRA in general, not just about
7 fire PRA, and it certainly talks about things like
8 realism.
9 Of course we want the PRAs to be
10 realistic. The decision making might be
11 conservative, but you want the information to be as
12 realistic as appropriate for the situation.
13 And regarding the treatment of
14 uncertainties, of course many of you may be aware of
15 NUREG-1855, Rev. 1 came out also in 2017 which also
16 talks about how you -- we deal with uncertainties in
17 a regulatory decision making process. And those of
18 you who have been involved with risk-informed
19 decision making here, you're very familiar with that
20 document.
21 Okay. So this is eye chart, don't read
22 it. This is the infamous 42 issues. Some of you may
23 have heard about that story. Those of you who don't
24 know it, I can tell you on the break.
25 But basically these are the issues or

1 problems that we identified back in 1997 to say,
2 "What should we be looking at in a fire risk research
3 program?" And we tried to develop this from a fairly
4 comprehensive viewpoint.
5 And I get -- what I'd like to say is I
6 think we've probably checked the box on a lot of
7 these things. I don't know for sure and it'd
8 probably take a little bit of effort to go down item
9 by item, say, "This is where we are on each item
10 here," but I think in general it's a demonstration
11 that yes, we identify issues, we make progress and we
12 move forward.
13 Okay. So the topic of -- oh, I -- one
14 thing I should say. Item number 39 on that list,
15 learning from experience -- absolutely. We really
16 need to pay attention to operating experience and to
17 make sure that our models aren't wildly -- aren't
18 inconsistent without experience.
19 It's true that you can have an event that
20 you have not yet seen in operating experience, and
21 the Fukushima accident was clear example of that.
22 And so when somebody asks you, "Did your PRA predict
23 Fukushima," you say, "Well, it was one of a million
24 sequences. It could have happened. It might not
25 have," the next event that occurs isn't necessarily

1 the most likely event to occur.

2 The PRAs identify possibilities. They

3 identify the relative likelihood, what we believe at

4 this point, but we don't see that it's predicting

5 what's going to happen next.

6 So of the events I'm going to talk about

7 are things that you might say, "Well, wow, gee that's

8 something that I have in my PRA -- or I don't." Not

9 to say that you need to, but it's maybe something to

10 think about.

11 Okay. So potential fire PRA non-

12 conservatisms. One of the products of the past

13 research was a report I'm particularly proud of, and

14 that was NUREG/CR-6738. And if you haven't seen that

15 report, I suggest taking a look. It looked through

16 some 30 events back in 2001 and tried to look at them

17 from a fire PRA perspective. What are these events

18 telling us about fire PRA?

19 I know Ashley's crew has looked at it,

20 and the work that they're doing trying to squeeze

21 more out of the OPE is great. That's a sort of thing

22 I think we need to continue doing because there are

23 some really funny things -- I shouldn't say funny --

24 odd things sometimes that you see with these

25 operational events, things that you might not have

1 expected if you're just taking a very linear view of
2 an event.
3 So first item, multiple fires. We've
4 seen them. The PRAs typically -- and I don't how
5 many people here model actual multiple fires
6 occurring in their plant, but we have seen events
7 where that has occurred, and I'll give you a list of
8 them in a little bit. And it's not a complete list,
9 it's just a list of events up to a certain point in
10 time.
11 Multiple hazards from the same root cause
12 -- we have seen fires that of course have triggered
13 suppression systems, which have then led to flooding
14 of other rooms because maybe the drain system wasn't
15 working properly. There was a really extreme event
16 in the Vandellos plant where it was a turbine missile
17 led to a flood from the circ water system, also a
18 fire.
19 And so that instead of -- you might say,
20 "Well, ha-ha, the flood's going to put the fire out."
21 No, the flood carried the burning oil down into other
22 parts of the building. You know, these things have
23 happened. Will it happen now? I don't know. It's
24 something to think about.
25 Smoke effects, you guys are well aware of

1 those. You're aware of -- the Fort Calhoun event I
2 guess right now is something people are talking about
3 whether there was conductive effect from the smoke to
4 trigger other effects, and I'm sure Mark will talk
5 about later.
6 The Narora fire, 1993, India, forced
7 control room abandonment. Also caused the loss of
8 the auxiliary shutdown panel, 17-hour station
9 blackout. Plant recovered. Operators did a great
10 job in recovering from that event. So there are
11 pluses and minuses that you can get from this. That
12 was a non-proceduralized, non-trained kind of
13 recovery action.
14 More -- a little bit more recently, the
15 Maanshan. Station blackout caused by a high-energy
16 arc fall, 2001. It was a two-hour station blackout.
17 The smoke was so intense, the operators couldn't
18 reach the panel they needed to hook up the diesel
19 generator from the other unit.
20 Again, operating experience is just a
21 wonderful source of information of things you'd at
22 least like to consider in your PRA. And multi-unit
23 scenarios, I have some examples of those.
24 I'm not going to go through this blow by
25 blow because frankly I don't remember all the

1 details. You'll find a lot of this -- all of these
2 events, by the way, are listed in the NUREG/CR-6738.
3 There are appendices that provide some descriptions
4 of each of these events. And again from a fire PRA
5 perspective, so it provides you information of some
6 things that might be worth considering.
7 Armenia was one of the most salient ones
8 because that was one of the most severe fires. It
9 was self-ignited cable fire. It was a short circuit
10 and it led to ignition of this power cable in seven
11 different locations, and not all were in the same
12 room. There was another unit that was also affected
13 by that fire. There were secondary explosions, by
14 the way, in that fire.
15 Turned out that the first unit was
16 affected much more than the second unit and they
17 actually I think used some equipment from the second
18 unit to help out the first. Again, positive
19 interactions between the units, but it was a big
20 event that we don't necessarily have modeled and
21 maybe don't need to, given the current state of
22 protection against self-ignited cable fires. I don't
23 know.
24 Some of the U.S. events listed here are
25 much less severe. In fact, they're all less -- much

1 less severe than the Armenia event. But they're just
2 -- are demonstrations that yes, we have had multiple
3 fire events in our database that right now I don't
4 think are in the PRAs.
5 And it's a matter of analysis to
6 determine if they really need to be included at this
7 stage and what we can do about it, because you can
8 imagine the combinatorial problem will be huge.
9 That's one reason we didn't try to address it.
10 Multi-unit scenarios, I think you can
11 barely read the chart here. But you all know Browns
12 Ferry. There was an event at Greifswald in East
13 Germany, 1975; the Armenia fire I already mentioned;
14 Narora, 1993, I already mentioned.
15 There are two here that I mentioned that
16 are -- were not actually multi-unit fires. These
17 were the Beloyarsk and Chernobyl. That was not of
18 course the Chernobyl accident. Then these were
19 turbine-building fires where the roof collapsed.
20 So it's a potential multi-unit kind of
21 event, although it -- they have huge turbine
22 buildings in -- for those particular plants, so it
23 didn't affect them. But it's a mechanism to think
24 about.
25 Again, I know we protect our structural

1 steel, so -- but again, what kind of severe -- if
2 we're talking about beyond-design basis accidents and
3 what's contributing to risk, what's really going to
4 get you in trouble?
5 Is it a bunch of little things together
6 or is it something beyond your expectations in one
7 area, the tail of the distribution, if you will, that
8 then drives the rest of it?
9 Okay, I don't need to go into these
10 observations too much in detail because these are
11 just on the multi-unit fires. Again, you'll find
12 them in NUREG/CR-6738. I did mention the
13 asymmetrical impacts. One unit was affected more
14 than the other.
15 There were non-proceduralized recovery
16 actions in all of these that saved the day. It was
17 a good job by the operators -- fire, smoke effect.
18 There are modeling challenges, clearly.
19 Large-scale cable fires, if you had fires that were
20 ignited by these big turbine oil fires that
21 propagated through bad penetrations into other
22 buildings.
23 Turbine building fires and explosions,
24 secondary fires and explosions, collapse in
25 structures, in some cases difficulties in gaining

1 access to an area, and then as I mentioned, the non-
2 proceduralized recovery actions which clearly is a
3 conservatism on our part, not a non-conservatism.
4 And I will mention again, just so you
5 don't read too much into this, these are events that
6 occurred before 1993. We have not taken a real
7 systematic look at events since then other than
8 through I guess the work that Ashley and her team are
9 doing. And I will mention also the Maanshan station
10 blackout event in 2001 was not captured by 6738
11 because that occurred after the report was published.
12 Okay. How do we deal with non-
13 conservatisms? So we deal with them the same way we
14 deal with any source of uncertainty, including
15 completeness uncertainties. NUREG-1855 says, in a
16 risk-informed decision making context, this is how we
17 deal with uncertainties. And it's also -- it's
18 consistent of course with Reg Guide 1.174.
19 On the NRC side, we do have a generic
20 issue process that looks at issues and asks do these
21 issues affect multiple plants, is it something that
22 can affect public health and safety of course, and
23 importantly, can it be resolved by what we know now.
24 It's not supposed to be something where,
25 "Gee, here's an issue. We don't know how to handle

it, and so let's go off and do something." It is something that we think we have the technology to deal with. And right now, the high-energy arc fall issue is in the generic issue process.

So I'm not going to talk about high-energy arc falls. I'm sure Mark will -- are you going to show the video? No? Okay, well that's too bad.

You should have it with Dolby sound, you know? Just it's very impressive. No, he'll talk to it. So you -- but I think most of the people in the room know about this issue. Both the material impact of the aluminum on the zone of influence and the -- also the conductive effects of the aluminum particles spreading throughout and potentially shorting out stuff.

Okay, so getting back to kind of the original theme of things, look, we understand there are non-conservatisms and dealing with them is just part of the process.

Ashley and Jay have talked about fire frequency. It was recognized that the fire database didn't have all the events that we care about. Update that, numbers are higher, that's the way it is, move on.

1 Hot short probability, same thing. We
2 had, way back in the dark ages, a universal hot short
3 probability for fire-induced hot shorts and people
4 questioned that. And then of course there were some
5 situations where that was low and some situations
6 where it was too high. You deal with that, you do an
7 analysis and you move on.
8 Fire-induced errors of commission, I was
9 pleased to hear that we actually are doing something
10 with the errors commission even if it's on a fairly
11 limited sense. They're apparently folks that's
12 supposed to look to see if the operators can take an
13 action based on a signal.
14 Let's say a lube oil pump is out and that
15 they have one indication, and they get a wrong
16 signal. They do something. So that -- at least
17 that's a step forward in the treatment of this
18 consistent gap in our PRAs. And right now, of
19 course, the high-energy arc fall issue is ongoing.
20 So this is me, not NRC necessarily.
21 Maybe NRC is in agreement. Many of you have heard
22 post-Fukushima, one of the criticism that was folks
23 lacked imagination. That's a really hard thing to
24 deal with as a recommendation -- be more imaginative,
25 be smarter, do something.

1 Well, on the other hand, you've got to
2 recognize of course that PRA is not just a check-the-
3 box activity. You don't just run through the series
4 of steps in a process and automatically at the end
5 you have the answer.
6 Searching for ways that the system can
7 fail is part of the PRA process and it's basic to the
8 risk triplet, what can go wrong. You have to think
9 about how -- what can go wrong. And then you have to
10 find ways to dig into the information and ask that
11 question, "How can I get this huge source of energy
12 to impact this set of equipment?"
13 And there's stuff in the way, understand
14 that. How can I fail that equipment and fail it in
15 a way that's dependent so that the likelihood is not
16 ridiculously low? So it -- and if you can't think of
17 something, then maybe it isn't there, but at least
18 going through the exercise.
19 Again, just great -- sounds great in
20 principle. To actually execute it, you'd really need
21 help, if you're me, at least. So you look to
22 information sources that you available and operating
23 experience, OPE, is of course a great source because
24 it does tell you how things can fail.
25 After every big event, you typically can

1 dig and find that there was a precursor to that
2 event. So in the case of Fukushima, there was the
3 1999 Blayais flooding event which had many of the
4 same characteristics of Fukushima. But for some
5 reason, it was known in the flooding communities, but
6 it didn't get propagated out to the broader safety
7 community.
8 And I remember hearing a presentation on
9 this at the 2010 RIC Conference talking about --
10 2010. Nineteen ninety-nine was the flood, the
11 conference was 2010, Fukushima was 2011. Now could
12 we have done anything about -- anything more than we
13 did before then? Maybe not.
14 But again, it's trying to pay attention
15 to the lessons that are there and seeing what we can
16 learn from it. It's not going through this to see
17 how can I dismiss this event, it's what can I learn
18 from that event to help me do my analysis.
19 So operational experience can help spur
20 this imagination, obviously temper it as well. If
21 you can imagine something, but I've never seen it in
22 practice, that's a flag. Maybe you should think
23 about whether or not you want to put that in the
24 model.
25 And at the end of the day, you have to

support this imagination to somebody else. I can always throw in a basic event in my model that says, "Operators turn off high-pressure injection when they need it." Why in the world would they do that? It would never happen.

Then, of course, you have the operating experience that tells you, "Well, it did happen under some circumstances that maybe there's actually an explanation for that." And you can build out into your model, but at least you have the support to say, "This is why I put it in the model," and don't immediately just screen it out.

It's critical for demonstrating realism to the folks who don't do the PRA for a living to say, "Yes, I do match up with operating experience." Obviously that's something that we really need to do.

But the last thing I'd say is that we shouldn't consider it in isolation. Operating experience is great, but it's just one source of information. Experiments are another source, modeling is another source, and it's all important because they all have their strengths and they all have their weaknesses.

And a Bayesian analysis, those of you who follow the Bayesian approach, it -- you have evidence

1 from all these sources, and the question is how to
2 integrate that evidence in a way that can help you do
3 the risk assessment.
4 So I'll close with a 2:00 in the morning
5 test. So Kevin knows about this. There was a very
6 famous risk expert who asked people, "If somebody
7 woke you up at 2:00 in the morning and said, 'The
8 plant actually melted,' would your first question be,
9 'How big was the earthquake?'"
10 You know, prior to Fukushima, a lot of
11 people might have said, "You've got to be kidding me.
12 That's -- I wouldn't ask that question. That just
13 doesn't match my idea of what's going to drive risk."
14 If somebody had asked me that question,
15 had woken me up at 2:00 in the morning, I might have
16 asked where was the fire. I think fire is very
17 serious. I'm glad you guys are paying attention to
18 it because I think operating experience demonstrates
19 it's serious.
20 Our risk assessments, they have flaws,
21 sure. All models have flaws. All models are
22 imperfect. Still they provide an indication that
23 this is important, and so I'm glad we are paying
24 attention to it. And with that, I will answer
25 questions.

1 MS. LINDEMAN: Nathan, this is Ashley. I
2 have a few comments. I think you laid out eight
3 potential non-conservative -- so the first one was
4 multiple fire.
5 So, you know, just want to provide some
6 perspective from the methodology. And if we observed
7 multiple fires, you know, they would be counted, you
8 know, each as individual fires if they met the
9 criteria.
10 Right, Vandellos is -- that was noted in
11 68.50. And as part of our fire peer raised, you know,
12 we postulate turbine building collapse due to
13 catastrophic lube oil.
14 You mentioned smoke effects and, you know,
15 I know that's something that we don't understand.
16 But, I know the French are working on investigating
17 that further.
18 I know Narora that was the only data point
19 we have for main control room abandonment. And as you
20 know, we postulate that in our models.
21 And then the last note I wanted to make
22 from a fire event data perspective is, yes, all the
23 fires are unusual. And we do note if we have a --
24 maybe events that don't fall into a bin, we keep them
25 in a separate, I guess, place.

1 So, if we see a pattern, you know, that
2 might be something that we need to consider in the
3 future, so.
4 MR. SIU: And I appreciate that. And I do
5 understand that things have changed since I was last
6 deeply involved.
7 But, I would also say that as people
8 progressively slice away conservatisms, there are some
9 things that may not be in the models. For example, if
10 somebody's decided to do a more detailed analysis of
11 the turbine building and doesn't have that scenario
12 where you blow off the turbine building, then some of
13 these multiple hazard things start popping up again.
14 MS. ANDERSON: On the issue of multi-unit
15 risk, if I understand correctly that's a subject of
16 separate research that's going on. And in order --
17 that's sort of a policy issue, right?
18 By policy we don't model multi-unit risk?
19 MR. SIU: Well, we are actually modeling
20 it in our Level Three PRA. So there's --
21 MS. ANDERSON: Right.
22 MR. SIU: There's the tech --
23 MS. ANDERSON: But that's research.
24 That's not --
25 MR. SIU: Yes. Right. Right.

1 MS. ANDERSON: Regulatory or anything.
2 MR. SIU: Right. I'm not talk -- yes.
3 What we do with that, we don't know at this point.
4 MS. ANDERSON: Right.
5 MR. SIU: There's clearly activity around
6 the world modeling it. And questions how to model it.
7 And of course there are always questions, if we should
8 model at all for fire for example.
9 This is just, pardon the pun, fuel for
10 that --
11 MS. ANDERSON: Right.
12 MR. SIU: Kind of activity.
13 MS. ANDERSON: Okay. But, so I think for
14 the purposes of today's meeting where we're trying to
15 identify our research in the very near term, I don't
16 think multi-unit risk would necessarily be the --
17 something we would want to start chasing, given that
18 it's the topic of other research and that by policy we
19 don't consider it in regulatory decisions right now.
20 MR. SIU: So, yes. These are all great
21 points.
22 What I would say also is at the last PSA
23 conference, Karl Fleming had a presentation that I
24 didn't follow entirely, where he was talking about the
25 contribution to the single unit risk from the other

unit. Which was not always positive.

MR. MUSSATTI: Okay. We have a mic down on the starboard side of the room here. Is -- are you -- do you have a question? Nope.

Okay. Then we have a question right here.

MR. ZEE: My name is Kiang Zee. Well, actually I think this is a great presentation.

My perspective is, as we're here today thinking about how to peal more layers off the onion if you will, and get more realistic, we're whittling away at all the easily identifiable things that are conservatism.

And I think you're absolutely right. At some point in time, we're going to have to start asking ourselves, are we really doing the PRAs correctly, and picking up these rare events that we haven't seen before? And how are we addressing them?

To your point about multiple fires, I think we actually have a couple of them actually embedded in the fire PRAs. I think the most common one we lovingly refer to as the proverbial toaster wire event.

And I think as it exists right now, I think there's two mechanisms for that to occur that are already in the fire PRAs. One of them is the case

where you have a fire that interrupts the control circuit on a medium voltage switch gear.

And as a consequence, you've lost tripping capability to the circuit breaker. And that same event impacts the power cable.

So now the power cable becomes the proverbial toaster wire. In which case every co-located cable and every incremental length along its entire route is picked up in the fire PRA.

And I think the other one, I think it's actually an IE Notice now, is the discovery of the unfused lead wire off the ammeter shunt on DC systems. And given the occurrence of multiple shorts on a DC system, you could actually deliver the possible 20 thousand amps that can come out of a battery system down a number ten wire going off to your control room, which is frightening.

MR. SIU: Great.

MR. MUSSATTI: Okay. A question back over here.

MR. FERRANTE: Hi. This is Fernando Ferrante with EPRI. So, I -- Nathan, let me ask you this question in terms of how you make decisions when you're looking at non-conservatisms.

We know there are things that maybe are

1 not fully quantified or not looked at. In some cases
2 they are looked at in some qualitative way.
3 But when you're making a decision, how do
4 you bring this around so that you're not in a
5 situation where you say well, I have this number, and
6 it doesn't include a bunch of stuff from this other
7 part. And therefore I'm going to make a decision in
8 some way.
9 Do you see what I'm trying to say? Like
10 I think non-conservatisms ought to be looked at
11 directly, rather than just say okay, we have a bunch
12 of things that we don't know. And therefore this
13 number here maybe conservative.
14 But I'm okay because it might be covering
15 for something else I don't know. Do you see what I'm
16 trying to say?
17 MR. SIU: So, first of all as you well
18 know, I'm the wrong guy to ask that question. You
19 don't ever want me making decisions for you.
20 But, look, there are some folks, I've
21 spoken with various levels of managers, and within
22 NRC. I obviously haven't spoken within -- with the
23 industry about this.
24 Some want more guidance. Exactly what
25 you're saying. How do I, given that I've got all

1 these different sources of information, what do I do
2 with it? Help me out.
3 And there are other folks who say, I am
4 just fine. That's my job. I have to weigh all these
5 pieces of information and bring it together and make
6 a decision.
7 So, I don't know that we have a mandate
8 right now to come up with such guidance. It's
9 possible. Of course it's much broader then fire.
10 We clearly have come to an agency
11 position, for example, and there is a commission. And
12 we have statements, this is as far as we're going to
13 go knowing that it's not in the model. But do some
14 things anyway just to make yourself comfortable that
15 you've got that covered.
16 So, yes. But right now it's, to me, a
17 technically conceivable proposition. You could go
18 after and come up with guidance that would help some
19 subset of users.
20 But I don't think we're aiming there yet.
21 It's a wishy-washy answer. I'm sorry. I'm not the
22 decision maker.
23 MR. MUSSATTI: Okay. How's the webinar?
24 Every -- okay. Harold?
25 MR. STILES: So, this is Harold with Duke

1 Energy again. So, I like the presentation. I think
2 it's very good to use the PRA to explore these other
3 rare events, and look for non-conservatism.
4 I would just mention that with regard to
5 using OE to improve realism that -- you know, it's
6 never going to be the thing that you anticipated and
7 planned and designed for that's going to cause the
8 problem.
9 It's always going to be some long series
10 of things that you didn't really think have a high
11 likelihood of happening. But, for the PRA, what I
12 find to be most useful in it, is to inform your
13 decision making on a day to day basis.
14 And so including these very rare events,
15 it's difficult to see how that's going to influence
16 day to day decision making.
17 MR. SIU: So that gets back to my point
18 about obviously different uses for the PRA. There was
19 a really great paper by Don Dube actually at the last
20 conference, talking about enterprise risk management.
21 And it's talking about the costs that are
22 associated with the success branches on a PRA. So you
23 can just plan to a state that you really don't want to
24 be in from an economic standpoint with obviously a
25 higher likelihood then if you had caused core damage.

1 And now how does that affect your day to
2 day decision making? I don't know. But you might
3 think about it a little bit more.
4 Let's just say that you take an extreme
5 hypothesis where you said, nothing ever will bother
6 you except the huge turbine building fire that somehow
7 gets past this wall into the control building. Let's
8 just say that.
9 You might want to focus your resources a
10 little bit on the assumptions that say this wall is a
11 good barrier between the turbine building and the
12 control building. Because maybe under some situations
13 that barrier is degraded, in which case I would assume
14 your day to day decision making would think about
15 that.
16 But it's right now. I mean, obviously
17 again, you're using the PRA for some purposes and not
18 for others.
19 Brian?
20 MR. METZGER: Brian at NRI. I just, you
21 know, part of what we've been talking a lot about here
22 in the workshop in general, is about OP E and marrying
23 that up with, and this is more fire modeling focused
24 obviously, but with the fire information.
25 And there are areas, you know, that could

1 represent non-conservatism. For instance, one of the
2 things that you get out of OP E that's valuable is,
3 it's timing information and circumstantial
4 information.
5 And then when you compare that or pair
6 that up with some of the assumptions, you know, things
7 can change a bit. And one example is if we don't use
8 good fire size information, we can inadvertently
9 introduce non-conservatism.
10 And a lot of times, you know, in the past
11 even with the original version 68.50, there were these
12 one megawatt fires, and if you pull that into your
13 analysis, assume that that's a real thing. And then
14 you are modeling that size fire.
15 And on top of that, you're pulling --
16 you're using that fire size to determine timing
17 information, you know, analytically speaking. For
18 instance, sprinkler activation times, or smoke
19 detection times.
20 And using an unrealistically large fire,
21 you're then being non-conservative by assuming that
22 those sprinkles activate at a particular time.
23 Because in reality, if the fire's not that big, those
24 sprinklers are not going to go off as soon as they do.
25 So, you know, that's just sort of one

1 example in my mind about inadvertent non-conservative
2 under the guise of being conservative. You know, on
3 its face, it sounds conservative to use those really
4 big fires.
5 But in practice and further in your
6 analysis, I've often wondered whether that's actually
7 a true statement? It's conservative, you know,
8 depending on what you're doing, depending on what
9 you're trying to extract from the analysis.
10 So, as far as research goes, and things
11 like that, you know, I think keeping that in mind and
12 how that fits in with like we are talking about
13 getting better timing information for analysis and
14 things like that.
15 That's just one example in my head of
16 potential non-conservative -- non-conservatism, if we
17 don't get that interplay correct.
18 MS. ANDERSON: Right. And just to make
19 sure I understand what you're talking about. I think
20 you're talking about masking effects is more of what
21 you're referring to.
22 And that's something that we're very
23 concerned about. Which is why we're trying to make
24 sure we get our PRAs as realistic as practical.
25 MR. METZGER: Yes. I've used that term

1 masking. Because you know, if you do that and you
2 keep it in your analysis, you effectively mask where
3 the real risk may or may not be.
4 And as a result, you might focus resources
5 in an area that once corrected is no longer the
6 highest risk area. Or maybe it's, you know,
7 relatively lower or something.
8 But, yes. I think masking is part of what
9 comes from that.
10 MS. ANDERSON: That's part of it. But
11 it's not the whole thing.
12 MR. MUSSATTI: All right. I'm going to
13 let this be the last comment. Because we've got a lot
14 to do this afternoon.
15 And we've got to move on on the record --
16 onto lunch here in a minute.
17 MR. FERRANTE: Fernando Ferrante with EPRI
18 again. So, Brian, your comment is directly relevant
19 to an EPRI report that was done in 2015.
20 That essentially goes back and it's the
21 aggregation report as it's called. It goes back and
22 says, what is the impact if I made this assumption for
23 this particular type of risk-informed application?
24 If it's a delta, I might be changing
25 something between the baseline and the greater case.

1 If it's a baseline alone, am I making the wrong
2 decisions by focusing on the wrong thing?
3 So, it's something that I think we're all
4 painfully aware on a general basis. And going back to
5 aggregation, it goes back into, if you're going to
6 make a decision with a single number, what is truly
7 driving that?
8 And what can you do about it? And where
9 do you ask the direct questions? So, I think we're
10 aware of it. But it's hard to resolve.
11 And I think within fire, we're trying to
12 address it within those individual parts and bring the
13 risk profile back to something that means something to
14 the decision makers across the board, so.
15 MR. MUSSATTI: Okay. Thank you. Just a
16 little bit of heads up and to get us rolling for this
17 afternoon.
18 Victoria and I talked earlier, and we feel
19 that there's going to be a stimulating discussion
20 later on this afternoon that's going to take up
21 probably more time than what we planned for.
22 According to the schedule we should be
23 done around 4:00. At which point I get a half an hour
24 of dog and pony show. Which isn't really necessary.
25 So, I'm going to forego most of that so

1 that I can -- I can allow for additional discussion
2 later on. But, I would like to stay fairly close to
3 schedule when we get back.
4 We thought that if this morning's session
5 had ended a little bit earlier, we were going to move
6 up some of the first presentations from the afternoon.
7 But, we're right up against 11:58 now.
8 So we may as well take lunch. Is anybody
9 thinking about leaving the building? Or are you
10 planning on staying here?
11 Staying here? Everybody's staying here.
12 That's the smart thing to do with the traffic out
13 there and everything like that.
14 Can I ask you to take a 45 minute lunch
15 break instead of an hour? And we come back -- you
16 need a longer nap then that?
17 (Laughter.)
18 MR. STONE: Well, the elevator hasn't been
19 working. Do we have a way to get up there?
20 MR. MUSSATTI: The elevator is working
21 now, isn't it?
22 UNKNOWN: It is.
23 MR. MUSSATTI: It is working. Okay. The
24 key here is that it takes -- an NRC person can only
25 bring up five people according to the group.

1 We have a handful of NRC people here that
2 can bring you up to the next floor and bring you back
3 down. But we're only supposed to be able to herd five
4 cats at a time.
5 So, we're more competent then that. But
6 I don't think security thinks we are. But we'll get
7 you all up there and we'll get you back.
8 But I'd like to see if we can come down
9 here and get started a little bit early. How about if
10 I say 12:50 instead of 12:45?
11 UNKNOWN: We can do that.
12 MR. MUSSATTI: Okay. One or two last
13 things here and then you can go.
14 First of all, out there on the table
15 you'll see that there are evaluation sheets. Those
16 are very important because that's the way we get to
17 keep our job as a -- as a facilitator.
18 And as you can see from the picture there,
19 I've got mouths to feed. So I need really good input
20 from you guys on these evaluations.
21 It also trains us by giving us feedback as
22 to what we're doing wrong. And it's an invaluable
23 thing that you can do for us. I'd appreciate it.
24 If you don't do it that way this
25 afternoon, I'll tell you how you can do it remotely

1 from your desk when you get back to work. But, we
2 really would like those filled out.
3 I think that's all the stuff I need to say
4 now. Let's go have lunch. Be back here at ten
5 minutes until 1:00. And we'll get promptly started.
6 Thank you.
7 (Whereupon, the above-entitled matter went
8 off the record at 12:00 p.m. and resumed at 12:54
9 p.m.)
10 MR. MUSSATTI: Okay. I got to talking.
11 It's my fault that we're three minutes late. I admit
12 that.
13 This afternoon we're going to finish up
14 with our presentations as quickly as possible so we
15 can get onto the fun stuff. If you'll look at the
16 bottom of your agenda, the last item of the day is
17 trying to figure out what to do next.
18 And what we're going to try and do is
19 we're going to -- between Ken and I, we're going to
20 let everybody sort of spitball and come up with ideas.
21 And talk about the types of things that we can do as
22 next steps.
23 And then we're going to take a little vote
24 just so we can see if there's any commonality between
25 the NRC and industry as far as what they see as next

1 steps. And that will give you some starting points
2 for your next meeting on this.
3 But, for right now we have Ashley getting
4 ready to start up on this next session.
5 MS. LINDEMAN: Thank you. Ashley
6 Lindeman, EPRI. So, I guess I get the pleasure of
7 being before lunch and after lunch, so.
8 All right. I'm going to speak about the
9 EPRI fire research plan. I hope you'll get from the
10 presentation that we went through a systematic process
11 to identify what's driving the current results,
12 identify the delta, and then propose research to close
13 those gaps.
14 So, the research plan is really focused on
15 the near term from now until 2019. And it's the top,
16 you know, six tasks that we think would be the most
17 impactful on the fire models.
18 And the plan I'm going to speak about, it
19 excludes some of the in-progress research. You know,
20 what we talked about for obstructed radiation,
21 cabinet, to cabinet, and you know, the motor and pump
22 heat release rate.
23 And the basis was, you know, that is
24 already work that's pretty far along. There's no need
25 to rehash the effort. We just need to seek that to

1 completion.

2 And then the last bullet, this is not

3 really intended to be an exhaustive list of low

4 hanging fruit. I think we can all agree there's, you

5 know, maybe less significant areas.

6 Right, like clarifying what the barrier

7 failure probabilities mean, and multi-compartment.

8 But that's not the focus here. It's where are the

9 deltas and how can we close them?

10 So why are we interested in refining our

11 fire PRAs? Well, this is a snapshot from some of the

12 805 submittals.

13 And it shows the contribution of fire

14 versus other hazards for the total risk profile. So

15 as you can see, fire is anywhere between 40 and

16 roughly 95 percent of the total site risk.

17 You know, which includes internal events,

18 internal flooding, and seismic margins. So as you can

19 see, fire is really something that if you believe the

20 risk results would get a lot of attention.

21 So what we did is we gathered data and

22 seek to reconstruct the skyline. So the skyline was

23 originally constructed in 2010 to identify the risk

24 drivers.

25 It included a small number of plants. And

it found that electrical cabinets were important for all the plants that were sampled. And then the other driving ignition sources were more a plant specific basis.

So what we did is we sought results. So ignition frequency, non-suppression probability, severity factor, CCDP. Right, all the nitty-gritty details from 30 plants. A sampling of Bs and Ps, 805 and non-805 plants.

Identified the results by ignition source type. And then, you know, reviewed some of the operating experience. And then determine where the gaps were.

So the ultimate question we want to ask is, are our methods giving us a good picture based on operating experience? And are we applying these methods and getting reasonable results?

So we went through a multi-step process to get to the research plan. We wanted to collect the models.

Understand, you know, I think you heard from the past presentations that the fire PRA models are maybe in different stages of development from incorporating some of the new methods, like 2169 and 2178, to just finishing the 805 process.

1 And then we, you know, there's also plants
2 that are actually just beginning to start fire PRAs.
3 So, you know, there's a wide variety.
4 So we collected the models and then
5 summarized the results via the ignition source bin.
6 So, very similar to the past effort.
7 And then we went that one step further to
8 look at the operating experience in the U.S. and see
9 if it was aligned with the skyline. And our results
10 identify the factors and then, you know, identify the
11 gaps and how the -- how research can close it.
12 So J.S. showed the slide already. So, it
13 you know, this isn't the first time you've seen it.
14 But we presented this at our EPRI advisory meetings in
15 August.
16 So this is the skyline chart. I know a
17 lot of discussion came up about, you know, our plants
18 using the latest methodology.
19 So, on the left-hand side, the first maybe
20 nine plants have used 2178 and 2169. So as you can
21 see, the contributions of cabinets is lower. But, as
22 you can also see, the main control board has had a
23 noticeable up tick.
24 But once again, the cabinets are the
25 dominant risk contributor. Transients, HEAFs and the

1 main control board are also important.

2 So I know we had a lot of discussion. And

3 one thing that I thought was important to present was

4 the rate of severe versus non-severe fires, or I like

5 to think of it as non-severe is within the cabinet and

6 severe is when the fire leaves the cabinet and damages

7 external targets.

8 So one of the insights from reviewing the

9 data was that almost 70 percent of fires that we

10 postulate using the current methods result in severe

11 fires. So fires that damage external targets. And

12 this is contrary to the events, or the insights from

13 the fire events database that show most fires are

14 small and they're quickly suppressed.

15 So we expanded this chart into how many

16 severe fires would we see. It would be over, you

17 know, two and a half per year for the industry.

18 So over a ten-year period we'd expect to

19 see 25 fires that would cause damage to external

20 targets. And that is just clearly a delta. We don't

21 see that -- we see that as a maybe one or two.

22 Here's a better snapshot of some of the

23 recent research, the 2179 and 2169. So this shows a

24 little bit more distinctly that yes, the net benefit,

25 there is a little bit.

1 There's a 30 percent increase in ignition
2 frequency for bin 15, but there is also the heat
3 release rates. And as Rob pointed out, some movement
4 in the 90th percentile. But also a lot of movement
5 more frequency towards the smaller fire sizes.
6 But as you can see, you know, the cabinets
7 are anywhere between 20 and 70 percent of the fire PRA
8 risk.
9 So once again, we come to the realization
10 that the risk from cabinets is important. And all
11 plants sampled, 30 plants, a variety of Bs and Ps, 805
12 and non-805.
13 So why do we have this delta? Well, we
14 have aggressive growth. And that results in a lot of
15 fire growth outside the cabinet.
16 And as we pointed out, we don't see that
17 in experience. The credit for personnel detection in
18 our methods is not where it needs to be.
19 You know, I think we have a lot of
20 evidence on how, you know, plant personnel can detect
21 and suppress fires before they reach rapid growth.
22 And you know, I think this is compounded by some
23 conservatisms in the cable tray ignition and
24 propagation.
25 So, I just want to reiterate there's no

1 silver bullet. You can't just do one thing and fix
2 it. It's a very intricate problem that needs
3 attention now at a higher level.
4 We also saw that transients and HEAFs are
5 important. But to a lesser degree. And for
6 transients there's two areas where we think there's a
7 delta.
8 I think we often assume transient fires
9 are when you go to an area and you leave a mass of
10 combustibles and they may catch fire. In practice we
11 see they're just generally miscellaneous ignition
12 sources. A vacuum cleaner, a light bulb exploding, a
13 welding machine overheating.
14 And it doesn't have a good correlation to
15 what's actually left in a room. It's more like a
16 miscellaneous ignition source bin.
17 And generally with some exceptions, we
18 treat all transients equal. In some instances we can
19 use a lower heat release rate.
20 But there's been no really generic
21 industry guidance on when that should be applied. So
22 often, you know, you default to the 317 kilowatt
23 transient fire.
24 Now HEAF, I think we can all agree that
25 they're one of the ignition sources that, you know, we

1 don't see really potentially challenging. HEAFs are
2 roughly two percent of the fires in the fire events
3 database.
4 But they are challenging. And they have
5 caused damage. So, we agree that they should be a
6 visible contributor to risk. But we do think that
7 there's areas where the modeling could be improved.
8 So, we believe that there's a significant
9 difference between the 1E and non-1E equipment. You
10 know, predominantly most of the failures have been in
11 non-Class 1E equipment, you know, in the medium
12 voltage range.
13 So we believe that that distinguishment
14 should be made. Also we need to consider protection
15 and how effective that is.
16 We did a review of the U.S. data and we
17 found that the long duration HEAFs are fed by the
18 generator -- so protection may work, but it may take
19 several seconds for the generator to wind down. So
20 the fault is still fed.
21 Then -- and roughly half of the events,
22 the results, the main control board is important. You
23 know, more so for the plants that implemented the new
24 fire frequencies.
25 There is a noticeable difference in the

1 fire ignition frequency. But our operating experience
2 suggests that fires are limited to the subcomponent on
3 the main control board. And fire spread beyond that
4 is rare.
5 We also have some very conservative target
6 mapping when we go through our fire spread models.
7 And identify target sets and the main control board.
8 And then you know other ignition sources
9 are important. But obviously plant specific.
10 All right. So, how do we compare this
11 with operating experience? So the NRC puts out a SECY
12 each year that reviews significant events that have
13 happened in the fleet.
14 So we looked at the one published in 14
15 that looked between 2004 and 2013. So in that time
16 period there were seven events with the CCDP greater
17 then 1E minus four.
18 And two involved fire. And that was the
19 Robinson cable HEAF and the Fort Calhoun fire.
20 You know, we also -- so that's our
21 starting point for comparison. We also want to point
22 out that, you know, we didn't cherry-pick the SECY.
23 We also looked back from 1990 and then forward
24 looking.
25 And, you know, there are some significant

1 events that have occurred in the '70s. But, you know,
2 hopefully our fire protection programs, you know, are
3 more robust after Browns Ferry and Appendix R.
4 So, those, you know, maybe aren't
5 relevant. But, you know, post 1990, there was no
6 events that reached the 1E minus 4 threshold. And
7 post 2013 there is a few events that were in the E
8 minus six, but nothing for E minus 4.
9 So over, you know, almost three decades,
10 these are the events that are significant for fire.
11 And if we looked at the PRA results, we found that in
12 a decade we would have found 15 fire events that would
13 have had a CCDP of greater then 1E minus 4.
14 And of those events, five would have been,
15 you know, significant at the 1E minus 3 range. So
16 clearly there's a delta we're predicting severe fires.
17 So how do we move forward? So the way to
18 move forward is move from a screening level approach
19 to detailed assessment of some of the key drivers.
20 Cabinets -- transients, HEAFs and the main
21 control board. And also, I had a presentation
22 basically on fire ignition frequencies and how to
23 model that scenario progression and break away from
24 some of our assumptions such as the 12 minute growth.
25 So, in summary, you know, there's six main

1 items that we believe would bring the most impact in
2 the next few years.
3 So first is the areas that I talked about,
4 developing better relationships between frequency,
5 severity, and suppression. So that's really task 1A
6 and 1B.
7 And the delta that we see is there's a
8 large majority of fires, and they don't damage outside
9 the ignition source. So, I think the main focus now
10 is on cabinets given the styling chart.
11 And the gaps that we already talked about,
12 you know, there is differences, an in fire growth
13 progression. There might be slow fires, there might
14 be fast fires, and everywhere in between.
15 And as we saw from the earlier
16 presentations, it does matter in some areas. You
17 know, upwards of 10 to 20 percent.
18 The other area I spoke about in the
19 morning was enhanced credit for personnel suppression
20 and detection. So, currently in our fire PRAs, we
21 only credit personnel suppression in continuously
22 occupied areas such as the main control room, and
23 where there's a continuous fire watch, such as hot
24 work.
25 But operating experience suggests that

1 this suppression and detection is also present in a
2 variety of ignition sources. So we're proposing to
3 develop methods and data to enhance the credit for
4 plant personnel suppression.
5 And kind of like all the stuff that we
6 talked about, we can't just do number two and number
7 one. We must address the fire growth to also make the
8 plant personnel suppression reflective of operating
9 experience.
10 The next area is providing additional
11 methods and guidance on fires that lead to a plant
12 trip. So, it's a very common assumption that every
13 fire leads to a plant trip regardless of severity,
14 location, and ignition source.
15 We know that -- we have a data point in
16 2010 that one in every eight fires resulted in a
17 reactor trip or significant power reduction. And I
18 don't think it's appropriate to apply that, you know,
19 just as a multiplier.
20 You know, I think we need to do the work.
21 And that would depend on the ignition source. So,
22 that's an area.
23 HEAF is the next area where we think work
24 is warranted. Currently all -- you know, we treat --
25 we have a method for assessing the damage for bus

ducts. And we have a method for electrical cabinet HEAFs.

But other than that, we treat them, all HEAFs the same. But, you know, is the frequency the same for 1E and non-1E? Is the scenario progression the same? Is the damage profile the same?

So, and I think there is some immediate work that we can do on the frequency end. And I know Mark is going to speak about some of the experimental tests.

But, you know, I think we have to be careful. You know, some of the tests that were done, or all the tests that were done really didn't consider electrical protection, so.

But anyways, you know, we agree that the methods to determine the zone of influence could be improved.

Transient fires is the next area. So, as we talked about, most of the transient ignition sources are small.

And they usually don't have enough combustibles to be a significant fire hazard. They're typically small and usually not capable of growth or propagation.

So, we're proposing to do a more detailed

1 characterization of transient fires on a plant area
2 basis. As part of this, we'd like to test some of the
3 more common nuclear power plant transients.
4 So, we've gone through the data and
5 identified the more common elements that catch fire.
6 And we'd like to do some limited scale testing to get
7 the heat release rates, with the basis that 68.50 has
8 some data on transient fires.
9 But again, they seem to represent kind of
10 the upper limit, the 90th percentile. But we think
11 that we need to do the more likely scenarios.
12 So that's why we're proposing to do, you
13 know, a reasonable burning of transients so we can get
14 a better idea for what the more likely transient fires
15 would be.
16 The last thing we're going to talk about
17 is the main control board. We've had some experience,
18 and it's typically limited to the switch or the
19 subcomponent.
20 The main control room is continuously
21 occupied, so these are, you know, have rapid detection
22 and intervention. Now I'll also mention the problems
23 identifying some of the target sets in the main
24 control board due to the cable routing that maybe
25 uncertain.

1 So in concert with some of the other
2 areas, perhaps maybe we need a heat release rate
3 profile specific to the main control board that
4 accounts for some of the difference in fire spread,
5 and not propagation.
6 Perhaps some enhancement of Appendix L.
7 And make sure that we're properly accounting and
8 apportioning the generic frequencies through the
9 board.
10 So over the -- on Monday we talked a lot
11 about the different sensitivity studies. So I thought
12 it was helpful to review each one and saw how they fit
13 in.
14 So as I mentioned, the plan that I spoke
15 about, you know, didn't really want to account for the
16 research that was in progress. So, cabinets, cabinet
17 propagation, and all the radiation work.
18 All right, that's ongoing and we have a
19 plan to finish that out. And then there's also the
20 FAQs. And they have their process.
21 The research plan really touches, you
22 know, on some of the area. But, in other areas it's
23 in addition.
24 So, I'd like to think of, you know, in the
25 nuclear industry we always like diverse ways of doing

1 things. So, this is a diverse, you know, method of
2 accounting for things.
3 So, I thought that the revised growth
4 curves, the 18 and 24 minutes, you know, they address
5 some of the areas that we talked about. The fire
6 growth, fire suppression.
7 The NSP curve obviously aligns with our
8 research item number two. There was a lot of work and
9 discussion on HEAF events. And that aligns with our
10 research objective number four. And transients is
11 five.
12 So, I hate to bring this up, because it's,
13 you know, it is, I guess, looking into the future.
14 So, if we were able to realize all the different
15 deltas and do the research and close the gaps, we made
16 some judgments on the -- how effective the method
17 would be, basically from a frequency side.
18 So as you can see, it cuts the risk down
19 now. It's, you know, 30 percent to 50 percent of what
20 it would have been.
21 And I want to reiterate in some cases the
22 areas of research overlap. But in not all. For
23 example, this doesn't consider cable ignition at five
24 hundred degrees.
25 So, now as you can see, there is

1 significant improvement. In some ways, you know, I
2 think there was thrown out.
3 If you did all the sensitivities maybe a
4 50 percent benefit. And we seek a similar range,
5 likely half, if we're able to implement all the
6 research.
7 All right. So some of the key takeaways.
8 We really used the skyline as a way to reset and
9 recalibrate our path forward for fire PRA research.
10 We came to the conclusion that the results
11 that we see in our fire PRAs are not reflective of
12 operating experience. I think that's been pretty
13 clear in the amount of severe fires and the amount of
14 fires that reach the significance of the ASP Program.
15 So that alludes that there's more work to
16 do. We need to go from the screening level analysis
17 to a more detailed analysis.
18 So, I think many people have touted the
19 success of, you know, 2178. And that was an area
20 where we went from Table G1, which was pretty vague,
21 to having a variety of heat release rates in addition
22 to additional ways to get realism by opening the
23 cabinet and assessing the contents, and also
24 introducing the obstructive plume.
25 So I think this clear -- this exercise

1 clearly demonstrates that we need to do more work to
2 refine the methodology. And you know, we're going to
3 work forward as a two-year plan, seeking to finish by
4 the end of 2019.
5 We just believe that's when the methods
6 are -- well, methods are needed now. But most
7 beneficial in the next two years.
8 So, that is what I have.
9 MR. HYSLOP: Ashley, J.S. Hyslop. Can you
10 go back to that slide where you had the reduction
11 frequency for ignition source?
12 So the vertical access is percent of core
13 damage frequency but from the set of ignition sources?
14 MS. LINDEMAN: So this is the total risk
15 if -- well, you know, all improvements were made. So,
16 the axis is like percent of initial CDF.
17 And this is CDF if everything was
18 incorporated.
19 MR. HYSLOP: But it says 60. That means
20 if these improvements were made, then the core damage
21 frequency would be reduced by 40 percent?
22 MS. LINDEMAN: Yeah, or half.
23 MR. HYSLOP: It says 60 that means 40
24 percent. Or if it says -- if it's 30, -- if it's 30
25 on the Y axis that means it would be reduced by 70

1 percent.

2 Is that what that means?

3 MR. LINDEMAN: Well, I think you just need

4 to multiple the -- so if it was the first one is, I

5 guess that's not a good one.

6 I mean, it's more than half in some. For

7 example, plant 17. But, it's --

8 MR. HYSLOP: The reason I'm asking,

9 because it appears, if I'm reading the chart right,

10 that most of the plants would see an improvement of --

11 okay, if this is 60 percent, they'd see an improvement

12 of a little over a half.

13 Some of them would be a little less than

14 a half. But on the average --

15 MR. LINDEMAN: I think you're reading the

16 opposite. I think you're reading the opposite.

17 MR. HYSLOP: Okay. That's what I wanted

18 to know.

19 MS. LINDEMAN: Yes. Yes, so one thing I

20 didn't point out is the colors are important. Right,

21 as you can see, the cabinets are still visible. But

22 the yellow is HEAF.

23 So, right, some become more important and

24 some become less important. Transients is one that

25 shrinks from the skyline to the new profile pretty

1 significantly, so.

2 MR. HYSLOP: Oh, so then just so I can be

3 -- so then the figure primarily indicates that in most

4 plants, your reductions would be a little less than a

5 half.

6 And in a few cases it might be more than

7 a half.

8 MS. LINDEMAN: Yes. That's correct.

9 MR. MUSSATTI: Any other comments? Do you

10 have one?

11 MR. SALLEY: Yes, Ashley. A couple of

12 times today I heard two years. What's magic about two

13 years?

14 MS. LINDEMAN: I'll let Victoria comment

15 on that.

16 MS. ANDERSON: It's to 505 and 5069.

17 MR. MUSSATTI: Okay. Anybody else?

18 Anybody on here? Did you check the bridge line? Go

19 ahead.

20 MR. HAMBURGER: If anybody on the webinar

21 has comments, you can go ahead and raise your hand and

22 I will unmute you. You can ask your question.

23 MR. MUSSATTI: Okay. Now, I'm sorry. Go

24 ahead.

25 MR. COYNE: Yes. Kevin Coyne, Research.

Nice presentation Ashley. I just have a question that kind of ties to the theme of this workshop of realism.

What is your view of what a realistic fire PRA is? And how objectively would you know when you obtain it?

MS. LINDEMAN: I mean, that's a really good question. I'm not sure I can provide you an answer on the spot.

I'd like to think about it. And since we're sitting, you know, really close, maybe we can have a side conversation.

But, you know, before I came to EPRI, you know, I lived and breathed and, you know, was a spreadsheet engineer walking down plants. And I definitely believe that some of the growth that we're postulating is overly aggressive.

You know, I pretty much know all the fire events by heart. Particularly the electrical cabinet ones.

And I can say that that to me is the biggest delta. You know, I agree with Brian, you know, a picture is worth a thousand words.

And when we can see some of those pictures and you see the cabinet, and it's just a small sphere, it's pretty obvious that that's a delta.

1 So, those are my initial thoughts. But
2 I'd be happy to carry on the conversation later.
3 MR. HYSLOP: Well, it seemed like part of
4 the answer would be, when you're done you feel like
5 the issue of whatever is characterized more properly
6 with respect to operating experience. That would seem
7 to be part of the answer.
8 Now, how far you have to get there, you
9 know, this is sort of a graduated approach. It's step
10 wise, and no one is saying that you're going to have
11 perfect agreement when you're finished here.
12 MS. LINDEMAN: Of course. Yes. And you
13 know, Fernando and I have discussed, you know, there's
14 a balance between the operating experience and then
15 making sure you can account for, you know, the
16 potential possibility of a severe fire.
17 So I think there's always that balance to
18 keep in mind.
19 MR. HYSLOP: Yes. The only other thing I
20 wanted to say is, a part of that, the justification
21 for the new number needs to be there.
22 So, it's about -- it's getting where you
23 want to go with a suitable justification and basis, I
24 guess.
25 MS. LINDEMAN: Yes. We understand the

1 need to provide a basis. But, you know, -- you know
2 what I'm saying.
3 MR. HYSLOP: Yes. I do. You don't have
4 to say anymore.
5 MS. LINDEMAN: We agree that we need to
6 provide sufficient justification for what we're
7 proposing.
8 MR. MUSSATTI: Okay. Let's check the
9 bridge -- the webinar before we take our next. Okay.
10 Then on the port side of the room over
11 here we have a dropped mic? And that would be you?
12 Do you have a comment?
13 MR. CASTO: No. I was thinking about a
14 comment. But now I'm good.
15 MR. MUSSATTI: Okay.
16 (Laughter.)
17 MR. MUSSATTI: Yes. That's what thinking
18 looks like. Okay. All right. Anybody else have a
19 comment? Or should we move onto Mark?
20 I think Mark, you're up.
21 MR. SALLEY: Okay, I am Mark Henry Salley.
22 I am the branch chief for Fire and External Hazards in
23 the Office of Research. And -- let me set this up.
24 I am going to walk you through our fire research plan.
25 Again, this is -- I am going to give you

1 a high-level view of what we are looking at here and
2 what we are doing in research. But the key here is to
3 -- to facilitate -- as our facilitator says, some
4 discussion and get some ideas off you as to what we're
5 doing and where we're going. And, you know, the two
6 key things are we doing the right research? And what
7 is the priority for that work? So that's kind of
8 where we want to go to.
9 Before I start off into this, though, it's
10 important with partnerships and where we can build
11 alliances and such. Working with EPRI, we have an MOU
12 with EPRI on a number of tasks. There's a separate
13 addendum on fire risk. It's the oldest one that we
14 have done with EPRI.
15 And all points considered, I've got to say
16 it's a very valuable partnership to be working with
17 EPRI -- not just saying that because they're here.
18 But actually it's good in the fact that sometimes you
19 see things from only your point of view. And us being
20 regulators, we tend to look at it from the regulator's
21 point of view, not seeing it from the end users' of
22 the licensees' side. And that's something that EPRI
23 brings to it is, is they're looking at it from that
24 view.
25 So if you go back and look at a lot of the

1 joint projects we've done over the last, oh, almost 20
2 years, you will see that some of the strongest and the
3 best products -- the highest quality had come out as
4 joint reports. So I think that's a valuable thing
5 that will -- that will last the test of time. You
6 know, 6850, 1001, 1909 EPRI number is -- was the first
7 report that the NRC published jointly. So that was
8 kind of the pioneer for us to actually do an EPRI, NRC
9 joint logo type report. So that is a little history
10 here, and again it is valuable.
11 Other federal partners, especially NIST,
12 you know, we are in the -- the nuclear regulatory
13 business. We are not in the fire model business. So
14 the fact that nuclear safety is our issue, we have
15 reached out to folks like NIST who have been doing
16 fire modeling for 30-plus years and have got access to
17 all their tools. And you heard some talks this
18 morning, but I think the fire modeling program is
19 pretty good. And we continue to work with EPRI and
20 this to use things on their fire models.
21 Other federal agencies too, that's
22 something I am starting to reach out a little bit to
23 to see what else is out there. Case in point, if you
24 go look at the latest V&V that Dave Stroup did with
25 Kevin and EPRI -- we had -- the ATF had a lot of good

1 experiments that we could bring in to -- to increase
2 the robustness of our fire model. So -- things that
3 they had done in their work. So again, looking for
4 partners like that.
5 And finally, international. International
6 can be challenging sometimes -- just language and
7 travel and trying to do webinars. We have to do them
8 sometimes two and three different times a day just to
9 work with the agent versus the Europeans. But we see
10 in the HEAF program working with the OECD and the NEA
11 has been very, very valuable. And I think that not
12 only increases the safety in this country, but also
13 for the -- the plants around the world. So that's --
14 that's one that I am -- I am very happy with.
15 And I also want to just notice Japan here.
16 We have a NUREG IA-0470 that we published in August of
17 '16. And it's interesting, everyone knows Fukushima.
18 And everyone knows about the great earthquake in March
19 of 2011. But the nuclear plant that was closest to
20 the epicenter was a plant called Onagawa. And Onagawa
21 didn't get the notoriety of Fukushima, but what they
22 did have was a seismic-induced HEAF. And the event
23 lasted over seven hours and they took out like eight
24 pieces of switch gear. So it definitely got their
25 attention.

1 So SNRAR is the Japanese version of the
2 NRC. That's their regulator -- Nuclear Regulatory
3 Authority. And they've been great to work with.
4 We've gotten a lot of good information from them. And
5 as we get that, we will publish that as NUREG IAs. IA
6 is International Agreement. And again, that's
7 information that you can get access to and use. So
8 that's just a couple of the things we're working with.
9 Background, NRC's three months old, Browns
10 Ferry fire occurs. It was a wake-up call for an
11 agency that, like I said -- three months old. It was
12 January of '75 when this agency was created. Near-
13 miss accident, wake-up call. I'd like to think we're
14 still all awake and we're still paying attention to
15 the things we've learned from Browns Ferry.
16 And beginning with that, we've had a very
17 active fire research program. As a matter of fact, we
18 put a NUREG together, BR -- which is BR for brochure
19 -- 0364 and that's a short history that talks about
20 the different programs that we've done at the NRC and
21 Fire Research. Now I was even looking at this. 2008
22 was when we -- we stopped it. That's when we
23 published it. That's almost ten years now, and
24 there's also another decade of work here. So I will
25 need to go in there and update that.

1 And again, this is -- I think at the end
2 of the day this is about safety. The PRA is good.
3 Susan Cooper always put in my head that, you know, PRA
4 is the total finder of vulnerabilities and rank your
5 -- your risk. But at the end of the day we have to be
6 focused on safety and that's the important thing. But
7 even saying just safety -- so what in there is going
8 to be the biggest bang for our buck? Where do we
9 really need to focus? And that's where I think we
10 need everybody's help getting that together.
11 So what we've done -- again, Dave Stroup
12 and Tammie Rivera who are here kind of took the lead
13 with the branch and we sat down and brain stormed a
14 little bit what we are working on, where we saw work
15 in the near future. And we've put together a draft
16 plan for Fiscal Years 2018 to 2022. And the idea with
17 this Fire Research Plan -- we haven't had one for a
18 while. You know how the NRC does research --
19 classically, we're user-need driven. And that would
20 be a user office -- my biggest one would be Greg here
21 and he would have a need for something, or do an NRR.
22 Send it over to us, we would agree on what the task
23 is, and then we would go and perform the work. And
24 that's our biggest way to do work.
25 Other ways -- obviously, the Commission

1 can direct work. Some of the human factors work with
2 the Ideas Program is one that's Commission directed.
3 So again, we continue to work that way, but what we
4 wanted to do with the Fire Research Plan was in
5 essence to put together a catalogue. That we could
6 look at all of the NRC, especially NRR who is our
7 biggest customer, and say hey, here's the things we're
8 thinking about and here's the things that we can do
9 for you. And this is what it's going to take. Are
10 you interested in any of this?
11 And again, the user office -- Greg in this
12 case -- can pick and choose as they see fit. So it's
13 kind of our best -- our best estimate, our best guess
14 as to what we need to do. Again, we -- we I am going
15 to talk about programs that we have that are winding
16 down over the next year or two. I am not tied to that
17 two years, Victoria, like you guys are. I am trying
18 to look out five years.
19 But again, we want this to be forward
20 looking and understand that not everything in there is
21 going to be funded. Some ideas may be good ideas,
22 they're just -- just not needed at this time. Again,
23 it can be revised and updated as needed. So I would
24 like to just walk through the tasks and again, this is
25 where we're going to be looking for -- for some of

1 your input on this.

2 The first task is one that is winding down

3 -- it is part of a clean-up task. And as I was

4 putting this together I realized that this task is

5 almost 20 years old. If you think back to '97 when

6 the information notice came out about the multiple hot

7 shorts and -- and all the inspections kind of ground

8 to a halt. And we were looking at that. The first

9 tests were done by NEI and EPRI back then in the '99

10 time frame.

11 Since then we've picked up and we've done

12 a lot of work. And again, we've worked

13 collaboratively, very much with EPRI, through the

14 CAROLFIRE Program, DESIREE, AC Circuits, DC circuits.

15 We had numerous expert elicitations. And I think the

16 -- the important thing is that I think now with this

17 we have a nice, solid technical basis for our circuit

18 analysis work. You know, we understand the difference

19 between thermal plastic and thermal short. And again,

20 this is on the control circuits, which tend to be the

21 big driver for us -- and how to do that on a risk

22 informed manner.

23 So the JACQUE-FIRE, which is 7150, the

24 first evolution was a PERT, the second one was SHAC

25 process. And now the third one is kind of a cleanup

1 where we bring this all together. And where this is
2 important to you in industry is, I hope, as we saw on
3 the RIC presentation that Steve Hutchins presented
4 last year -- that this will form a lot of the
5 underpinning -- the technical argument for the next
6 revision of NEI-00-01, Revision 4. So it should have
7 a good, solid technical basis for what' being done,
8 and we should have good agreement there.
9 So again, that's winding down and there's
10 just a little cleanup. Volume 3 is in publishing, but
11 we have to go back to Volume 1 and things we learned
12 doing Volume 2 and 3 and clean it up.
13 Also, an off shoot to that is there's no
14 discussion on CTs. I heard nothing about current
15 transformers. And that's interesting, and I really
16 thank EPRI for standing with us in doing that. But we
17 -- in the expert elicitations we had a lot of debate.
18 You know, how many windings? How many turns? And the
19 different electrical experts had different opinions,
20 as you would expect. And we said hey, this is
21 something reasonable. We have some research time,
22 some money at Brookhaven. EPRI come up with a number
23 of CTs. We were able to go up do the experiments.
24 And we determined that the CTs do not start a
25 secondary fire.

1 So again, it's a whole lot of savings that
2 you don't need to look at that for something that was
3 postulated without the data. So that's -- that's one
4 where clearly the experimental work I think benefitted
5 the industry quite a bit there. Another follow-on
6 area is we'd done some small-scale testing with
7 Sandia. You know, when Steve Nowlen retired he took
8 a lot of knowledge out of Sandia in there. But we've
9 got a couple of other young ones that are coming
10 along. Christ LaFleur and Alice -- we've done some
11 good work with them. And this report has been
12 publishing -- there's been very little work done
13 instrument circuits and how they respond to -- to fire
14 conditions. So we have some insights here and this
15 report will be coming out shortly this summer.
16 With the hiatus that the NRC took from
17 inspecting -- and as the personnel change, guys retire
18 and new people come in, a lot of the experience and
19 talent of how to do these circuit inspections and how
20 to do the Appendix R, post-fire safe shut down
21 inspections was lost. We worked with Brookhaven and
22 Sandia. And Region III, Darius Swarcz and Mark
23 Jeffers, you guys may know them. We did a number of
24 training classes for the -- internally for our NRC
25 inspectors. Because I believe at the end of the day

1 the region -- or, excuse me, the licensees -- you
2 expect a good rigid -- good, rigorous inspection from
3 the NRC when they come out and do your tri-annual.
4 So we -- we did a number of series of
5 training for our -- for our inspectors. We put it
6 into some in-house learning so they can go and
7 continue their qualifications and keep their quals up.
8 And that information that we used -- we've created a
9 handbook -- an old NUREG that got -- it goes back to
10 when I was an NRR, 1778 was supposed to be the
11 footprint for the circuit analysis and how we do it.
12 Obviously, over the 20 years it has changed with all
13 the testing and things we have learned. But we have
14 gone back and we are going to revise that and issue
15 that, if you will, as a post-fire safe shut-down
16 handbook that will contain all the information and the
17 regulatory footprint, as we call it, for that.
18 Cable coding -- I asked a couple
19 questions. That's an area that we're still winding
20 down. The guidance in 6850 is -- is somewhat vague as
21 to what credit you can take for cable coatings. We've
22 done some research at NIST in Sandia. Getting ready
23 to publish that, but it's interesting that the issue
24 that kicked off the cable coding problem came out of
25 a tri-annual two years ago at a plant.

1 And it was a question where the inspector
2 saw off-colored cable coding. You know, most of the
3 stuff you find is a white or a cream color -- your
4 flamastics, your flamascos. But we've noticed a
5 couple plants where it was a brown or a black. And
6 again we -- we are still trying to work on getting a
7 couple samples to see what the qualities are of this
8 material. So that's kind of the last thing that is
9 holding that up.
10 Task 5 through 8 -- this is one Dave's
11 working real close with Ashley. And these were a lot
12 of the ones -- I think we heard the first day
13 yesterday that we're looking at -- the obstructive
14 plumes zone of influence, pumps and motors, the
15 cabinet to cabinet propagation and the transient heat
16 release rates. So we have talked enough about that
17 yesterday. And again, we are always partnering with
18 EPRI and NIST on these tasks and working in a
19 collaborative manner.
20 Task number 9 -- okay. This is the 600-
21 pound gorilla in the room as far as I put this
22 presentation together. And I didn't -- I am not going
23 to turn this into a HEAF presentation. But it is an
24 area that's definitely got our interest. And there's
25 a lot of work to do here. We are partnered with OECD,

1 NEA, Japan and NIST. We have eight member countries
2 we are working with.
3 We completed the first phase of testing.
4 It -- because it was an international program we did
5 not put -- we did not publish a NUREG, we published an
6 international report. But again, with the
7 international body -- most of their stuff is held for
8 five years. It is not publically available. We made
9 some special arrangements with the group that the way
10 we are transparent here in the United States, that if
11 we do the work we are going to publish it immediately
12 and you guys can use it. That's all freely
13 downloadable on their website. And it's our first
14 phase of testing.
15 From that -- and it's all referenced in
16 the Information Notice 2017-04. And the links are
17 there for you. And again, the big eye opener that
18 came out from that was -- was the aluminum HEAF. When
19 we started that we knew that we had the Appendix M
20 model built off one data point. We also saw that
21 there was FAQ questions coming in on bus ducts. So we
22 knew there was additional work that needed to be done
23 here.
24 When I talk with the international
25 partners -- when I brought up the subject of high

1 energy arc faults, it was like every country had one.
2 You know, they're telling about one in France.
3 Obviously, Onagawa in Japan -- Germany has had them.
4 And so it was clearly a topic that people were seeing
5 this operating experience, but there wasn't a lot we
6 knew about it. So it was an area that was really ripe
7 for research.
8 As a matter of fact, you notice Nick Melly
9 isn't here. I would love to have Nick here today, but
10 Cooper had a bus duct failure, I guess, earlier in the
11 year that they're going through the REG conference and
12 looking at it. And they're actually running
13 experiments yesterday, today and I believe the rest of
14 this week up at KEMA. So that's -- that's where
15 Nick's at, and that's why he's calling in is he's up
16 there with -- with the NRC folks witnessing the
17 testing that Cooper's doing on some bus duct.
18 We've got a Phase 2 to the program. Now
19 it's much more focused. I put the -- the test plan
20 out for public comment. And I know NEI and a number
21 of folks did give me comments on it. I thank you for
22 that. We will go through the comments. Kenny's
23 working on it. And we will address those as well as
24 we've got a lot of comments from our international
25 partners as we go on through this next phase of

1 testing.

2 The U.S. industry is invited to join us.
3 Every fire forum for the last five fire forums I have
4 asked, you know, we are looking for partnership. May
5 11th, Mr. Greenlee said that, you know, the industry
6 really wants to work with the NRC during the
7 Commission meetings. So again, we are open to work
8 with you on this. And it wouldn't be anything unique.
9 For example, Japan. Japan is one of the partners
10 that's in there by the nation. They have NRA, who is
11 the regulating body, but they also have a -- a version
12 of EPRI. A Japanese version that's called CREPI. And
13 -- EPRI in Japanese is CREPI.

14 But they're together working as a team for
15 Japan. The same with France. France IRSN is the
16 research body, and of course EDF is the utility.
17 Again, they're teamed up and working together. So it
18 would be -- we would welcome you to work on this
19 international program with us.

20 And it's interesting, there's a lot to
21 learn. I noticed Ashley said we didn't take into
22 account breakers and circuit protection, which is
23 interesting. And no, we didn't. And we did it based
24 on operating experiences while we are picking our
25 times. And as you would guess, duration is going to be

1 a big driver. But there's so much to HEAF.
2 I mean, take a look at the event that
3 happened in March down at Turkey Point. There you had
4 the -- the reactor coil that got shorted out by the
5 fire barrier falling through the carbon fiber.
6 Everything worked as designed. The -- the breakers,
7 the relay protection clicked in. The fault cleared in
8 under half a second. Yet you still over pressurized
9 the room and blew the fire door open.
10 So again, there's so much we need to learn
11 about the HEAF. And again, like I said, this is the
12 600-pound gorilla in the room in my opinion. And
13 that's one that we're actively working. Some other
14 tasks -- Susan Cooper was here yesterday. Another big
15 one we're working with EPRI is the Main Control Room
16 Abandonment. NUREG-1921 gave a treatment to HRA.
17 Since then we've done Supplement 1. EPRI has
18 published already. It's going through our publishing
19 right now and it's a qualitative review of how to do
20 main control room abandonment.
21 The next phase of the project -- and the
22 really challenging phase -- is going to be putting
23 numbers to this and making the quantitative values for
24 main control room abandonment. That's -- that's going
25 to be an interesting task and again I believe we're

1 still looking for some pilots and some things when we
2 get a -- a method to try. If we learned one thing in
3 6850 it was the importance of a pilot. That you
4 really need to pilot these methods. And I -- some of
5 the things I think we're seeing still today, it would
6 have been nice if we had piloted -- if we would have
7 had that luxury JS back in 2004, 2005 to actually do
8 it when we couldn't.
9 Tasks 11 and 12 are continuing activity.
10 Again, as NRR sees it fit for us to work on these,
11 these are the Vetting Panels and the FAQ Support. We
12 will continue to support them.
13 Thirteen -- PRA Training. You know, we've
14 been doing that now 12 years -- since 2005 when 6850
15 was still rolled out. We used to do it twice a year.
16 We're down to once a year. We split that now with
17 EPRI. And I think it's a program that still -- still
18 bears dividends as new people come into the industry
19 -- that we can do this. We use this as part of the
20 qualification for NRC employees -- inspectors -- when
21 they come in.
22 But again, the program is still running
23 strong and -- and we're twelve years into it. It's a
24 -- for us it's not that expensive. I think it's --
25 it's pretty good dividends. Fire Growth -- you know,

1 I made a couple notes here as we were talking earlier
2 -- the importance of fire growth.
3 But it was just -- going back in time --
4 I guess I will date myself here going way back. But
5 1996 there's a report and some of you may want to look
6 it up -- NUREG-1547. Mark, you'll look it up. You'll
7 be the only one, probably. That's okay.
8 But the question was at the time -- if you
9 remember back in the early '90s -- was thermal lag.
10 And we were going through the whole thermal lag. And
11 as the -- as the discussions went -- as the debate
12 raged, if you will, one of the things that came up
13 that was very big was the standard time temperature
14 curve -- ASTME-119, NFPA-251 -- that that is not a
15 realistic fire. And you're making us test these
16 barriers to non-realistic fires. You know, we got to
17 do better and we need realistic fires.
18 So the NRC went and this NUREG -- they
19 contracted NIST, Cooper and Steckler. And I was still
20 at TVA at the time. So they came down to Watts Bar,
21 which was a construction site. We were just finishing
22 up getting ready to license Unit 1. And they walked
23 the plant. And low and behold, they said you're
24 right. We can give you a different fire curve for
25 every room in this plant. And if you want, you can

1 take that unique fire curve and qualify that unique
2 thermal lag barrier to that curve. So you would have
3 a one-to-one match.
4 Of course, financially that would be
5 crazy. But every fire barrier would have to have a
6 custom designed fire to make it pass and qualify. But
7 it's interesting, the work is there today. And still
8 we're debating that. You know, fire growth and the
9 curve and the 12-minute rule. And I love rules -- I
10 am one to always follow rules. So yes.
11 So again, I question some of that. And if
12 we need to question that, as we were talking at lunch,
13 let's question those things in 6850. You know, we're
14 -- you know, why is it this way? And can we justify
15 -- can we substantiate it? If that's really the root
16 of the cause to get to realism.
17 And again this -- go back to this NUREG
18 and take a look at it. And, you know, what was done
19 20 years ago -- it's quite interesting. Bin 15, I
20 don't need to say anything more about that. JH did a
21 great presentation. Thanks for picking that up for
22 Nick. We appreciate it.
23 And the final thing -- Kenny has just got
24 involved in a project, again, working with our
25 international partners. The PRISME Program. We've

1 been in and out of it a time or two, but right now it
2 looks to be focused on some things that we're
3 interested in. One of the things that they're looking
4 at internationally is this question of cabinet to
5 cabinet propagation. So it would be nice if we can
6 get some international data points and help us out
7 with that.
8 So that's one that we're just going to be
9 getting involved with and looking at. And I believe
10 -- couple things that didn't make the list, you know
11 -- but again, I think, that may be important. And
12 again, this is the point of discussion with you. I
13 thought we were done with incipient detection when we
14 published 2180, DELORES-VEWFIRE. But apparently
15 there's still some discussion and there could be more.
16 So we're open to that.
17 So I threw that up here. And again, I
18 don't know where we want to go -- what we want to do
19 with it. Is it -- do we need more testing? Operating
20 experience? Is there more HRA stuff we need to work
21 on that Susan was working on? Or where do we need to
22 go with that?
23 Instrument Circuits Spurious Operation --
24 I think when this report comes out -- this NUREG/CR we
25 did with Sandia, you're going to see -- and if Gabe

1 explains it to me and I understand it properly -- that
2 you're -- you're taking your instrument circuits in a
3 worst-case scenario -- which, obviously wouldn't be
4 realistic, it would be conservative. But there --
5 there may be a way to do circuit analysis for
6 instruments similar to how we do control circuits.
7 But again, that will take a little more research and
8 that. So we need to take a look at the small-scale
9 work we did and see if there's something worth going
10 on.
11 Same too with -- with In Cabinet Spurious
12 Operations. We saw with the SIS wire and the way the
13 cabinets are wired there could be different
14 probabilities. And right now you're going to use
15 probabilities that we developed for cable trays and
16 conduits that are -- that are out there that are
17 different configurations of what we see in cabinet
18 wiring.
19 A program the ACRS questioned us on is
20 what are we doing with Digital I&C? And, you know,
21 that's one that's kind of out there. But again, it's
22 a bigger issue with digital I&C fire is just a -- a
23 bit player in that. Knowledge Management -- is there
24 anything we need to do in knowledge management? And
25 then -- and then I throw it open to the floor. Is --

1 did I miss anything? Is there something important
2 that we should be focused on, working on, that I
3 missed here?
4 So with that, I believe that that's all
5 for me.
6 MS. ANDERSON: All right, I have a
7 question. So in -
8 MR. SALLEY: That was quick.
9 MS. ANDERSON: It's a question both for
10 Mr. Salley and for his NRR counterparts. So I saw
11 there -- there is a lot of work going on. You guys
12 are definitely very busy. And I understand you are
13 talking about the next five years.
14 So the first part of my question for both
15 you and your NRR counterparts is is there a direct
16 regulatory application for each of those tasks?
17 Because some of them I didn't -- I didn't really see
18 what the nexus to a regulatory need was. And maybe I
19 am just missing something, but I am pretty well
20 involved in a lot of the risk-informed applications.
21 MR. CASTO: I can start. For some there
22 aren't. And this was one of the things that I wanted
23 to bring up is -- is as Mark said, some of these are
24 nearing completion. And they're related to NUREGs and
25 such -- ongoing work that has been in place for a

1 while. Some of these others are new initiatives. And
2 with the research plan, this is the -- this is a
3 mechanism that NRR funds work to research.
4 So in recent past public meetings the
5 industry has brought up I guess the issue -- or the
6 observation that if the industry devotes time and
7 resources to more data collection or doing more work
8 to improve fire realism, where is the -- the counter
9 commitment on -- or, on NRC's resources? And this is
10 one of those mechanisms, right here.
11 So in the discussion we have this
12 afternoon where we figure out what's -- what's
13 commonly most important, and what should be expedited,
14 we will take that into account as well for -- for what
15 to prioritize our funding toward. So short summary
16 answer to your question, not all of these are current,
17 regulatory-driven issues.
18 MR. SALLEY: Yes, Victoria. And if you
19 wanted to -- if you wanted to walk through one-by-one,
20 I will be happy to do that with you. Another part of
21 it, and this is probably my fault for the record
22 keeping -- as I said, we work off user needs. And
23 we're working off user need 2008-003, which again, is
24 sorely outdated. The problem came in is when the
25 first 805 applications started rolling in and

1 questions were firing hot and heavy, we couldn't keep
2 up between research and NRR, the administrative burden
3 -- and okay, I am going revise the user need and
4 you're going to take it. You're going to review it.
5 You're going to get it signed out through your office
6 director, my officer director -- they're going to
7 debate it.
8 We circumvented a lot of that in the -- in
9 the essence of supporting and speed so that we could
10 be reactive and do that. So things kind of got messy,
11 if you will, from an accounting standpoint. And
12 again, that's the idea with the research plan is that
13 we will have a solid research plan that we will work
14 off of and do a better job of the accounting.
15 MS. ANDERSON: I mean I get -- so, you
16 know, from our perspective what we are looking to
17 support with improved fire PRA realism are some near-
18 term applications that we see coming -- and they're
19 really going to lean heavily on the fire PRAs -- risk-
20 informed completion times for tech specs and risk-
21 informed engineering programs, 50.69. And so I think
22 we identified a lot of areas that we saw as
23 potentially supportive of those applications. And so
24 we saw those as potential high priorities. And I see
25 a lot of things in here that don't necessarily overlap

with what we identified and I don't necessarily see how those are helping some of the near term regulatory issues.

Not that -- you know, I was hoping maybe I would see some things, like, oh yes, that would help us a lot with our realism. It would help us a lot. And I didn't really -- there were a lot of things that I was sitting here scratching my head going, well, how does this really help improve fire PRA realism or directly support a regulatory issue? I guess that's sort of what I was --

MR. CASTO: And this is still a work in progress. This is still in draft and -- remember, we had that meeting, I guess it was back in April, when we first started looking at -- at the research plan and how it would align with where the industry saw additional research needing. So we had that meeting.

This part is really a continuation of that -- or, really, this meeting is a continuation of that. So -- so we are still working to get just where you're talking about.

MS. ANDERSON: So I think -- I guess, I mean, so Mark one of the things you said at the beginning was you were looking at a five-year plan.

MR. SALLEY: Right.

1 MS. ANDERSON: And we're looking at needs
2 in the next two years. So maybe there would be a way
3 to schedule this research so that we can cooperate and
4 the research you do in the next two years is
5 prioritized such that it supports those applications
6 that are coming up imminently.
7 MR. SALLEY: Right, and when I opened up
8 with a -- you know, are we doing the right work and
9 the right priorities? That's what we're hoping to get
10 alignment on here today.
11 MS. ANDERSON: Right.
12 MR. SALLEY: So that's -- and again, a lot
13 of this -- I will just give you an example here, one
14 just jumped out at me -- is Task 2, for example. You
15 know, that was a task that was started a couple years
16 ago. And Sandia finally got around to doing it. The
17 work is done. We're publishing it. So it -- it's
18 just a matter of closing it up.
19 There was a huge follow-on task to this to
20 go and start doing full scale circuit work. And
21 discussing with Greg and his folks, they said, you
22 know, for instruments, we are not really sure we need
23 that right now. Why don't you kind of put that way,
24 way back on a back burner and we can resurrect it if
25 we have to. So that was one where, okay, we'll finish

1 the work we started, but we won't go into the bigger
2 parts of that now.
3 MS. ANDERSON: Yes, I think -- I think --
4 I don't think that I am suggesting that you would
5 abandon work that's almost done. But maybe before
6 starting the next phase of some of this -- or maybe
7 even before starting it at all, depending on where you
8 are -- we may want to take a time out and reconsider,
9 is this really the best place to put our efforts?
10 MR. SALLEY: And that's why we're here
11 today.
12 MS. ANDERSON: Yes, exactly.
13 MR. METZGER: To clarify, you know, more
14 than half of the tasks that are in this plan are, you
15 know, near term completion tasks that do fit into that
16 two-year time frame. Some of these are topics that
17 are considered sort of maintenance of existing
18 guidance, or clarification to existing guidance. Some
19 of these are internationally focused to where they
20 wouldn't really show up for us. And that's where this
21 user need mechanism comes into play.
22 So this is really just a list of what our
23 two offices have come up with that isn't already
24 covered by some other discussions. And trying to take
25 stock of what is currently in play, when that's going

1 to wind down or complete, and then looking forward a
2 bit. And then the -- the task -- the exercise that we
3 go through is whatever is on this list, whether it's
4 this same list or expanded list or cut down list --
5 NRR would then write user needs to research, to
6 essentially fund those from our -- from the Program
7 Office.
8 So, you know, this whole workshop is --
9 you know, all these topics are essentially fair game
10 to add to the list, or ideas of other things that we
11 haven't heard yet to put on to those lists. Or -- or
12 some other list. So --
13 MS. ANDERSON: But I would suggest that
14 maybe we could take -- you know, you reference that a
15 lot of these activities were ongoing activities or
16 maintenance activities or -- you know, one of the
17 expressions people like to make fun of us well, we
18 have to do it, it's a tradition. Why is it a
19 tradition? Because we've always done it.
20 Maybe we take a good hard look at some of
21 the things we do every year or every two years and
22 maybe -- maybe it is good enough for now. And we can
23 sort of pause that or revisit it again in five years.
24 MR. SALLEY: That's a fair comment and I
25 -- I think that's what we want to -- that's why we've

1 got our facilitator, paying him the big bucks.
2 (Laughter.)
3 MR. MUSSATTI: You put a lot of weight on
4 my shoulders right there.
5 MR. SALLEY: Yes, so, you know -- I guess
6 I will take any questions you've got. And -- I
7 thought Ashley and I would, but again, if you just
8 want to go into, you know, these were the things we're
9 throwing out here and go into discussion -- that would
10 be fine too. So however you want to go.
11 MR. STONE: I've got a quick question.
12 MR. SALLEY: Yes?
13 MR. STONE: You mentioned -- Scott
14 Greenlee is my boss.
15 MR. SALLEY: Sure.
16 MR. STONE: And, you know, we would be
17 willing to help. I guess, how would I determine how
18 we can help within this context? Exelon can help with
19 -- within this context with the EPRI and the NRC work
20 together? Can we support in another way? I'm just
21 asking, what's the -
22 MR. SALLEY: I think that's, you know, one
23 that -- that we're open to ideas. I mean, the classic
24 way, for example -- like I said, I talked about France
25 and Japan is that they -- you know, it would be EPRI

1 and the NRC would go in and join partners to fund the
2 testing and to do the work and that -- that's
3 classically how the other countries are doing it.
4 I guess there could be other things we
5 could work out on how to do this. Again, I've tried
6 to reach involvement on this with -- with things like
7 making the test plans public. And Kenny, we got a
8 fair amount of comments on it and we thank you for
9 that and we're going to, you know, work that in. So
10 we are -- we are reaching out for involvement there.
11 If you guys wanted to contribute in more, well that
12 would be great.
13 MR. MUSSATTI: Two comments out here on
14 the floor and I am going to go to her because she
15 hasn't spoken yet at all. And everybody deserves the
16 right to speak.
17 MS. DeJOSEPH: Joelle DeJoseph, Jensen-
18 Hughes. Mark, in your list -- is there a -- does --
19 1 through whatever it was, 15, is that indicative of
20 the closest to being done? Or a ranking that you, you
21 know, kind of put to it? So I guess the question is,
22 is -- I guess ultimately what I am getting at is the
23 level effort needed to close these out.
24 MR. SALLEY: Yes, we can take a minute and
25 walk through. I think that may be the easiest. And

1 Victoria, I think that would answer some of your
2 questions, too, if you wanted to take five minutes and
3 do that?
4 MR. MUSSATTI: Sure.
5 MR. SALLEY: Would that help you Joelle?
6 MS. DeJOSEPH: Facilitator says yes.
7 MR. SALLEY: Okay, yes. And there was no
8 -- no rhyme or reason to the numbering scheme. I
9 think it's who Dave talked to first and he started
10 with Gabe. Isn't that right, Dave? Wasn't that your
11 method?
12 MR. MUSSATTI: Can we clear up a couple
13 questions here first? And then you can move on into
14 what -- giving us a ranking on -- on these things?
15 First here on the floor and then on the webinar.
16 MR. FERRANTE: Yes, this is Fernando
17 Ferrante with EPRI and just -- to just question, I
18 mean, and I don't want to speak for Ashley -- but she
19 mentioned a couple of efforts where we are looking at
20 data and it will be good to see on an actual PRA
21 what's going on.
22 And so that's an area where, you know,
23 either Exelon or Entergy or Duke -- whoever could
24 reach out and quickly say where will we help best?
25 Under what framework? And then, you know, if it's to

1 be shared with the NRC, under what conditions and what
2 not? And so I -- you know, it's not like we're not
3 thinking about that. And I think if there's openness,
4 and Ashley's the right person to talk to -- and -- and
5 then see where do we coordinate and with that -- the
6 right approach?
7 MR. SALLEY: Yes, and if I could go on
8 that a little more, you know, one of the things is
9 intellectual knowledge. And that it's valuable
10 because you guys are at the plant every day and you're
11 running the plants every day. We're up here in
12 Rockville.
13 You know, one of the questions we had as
14 we're moving forward going into this next phase of
15 HEAF testing -- I am sure a lot of you have looked at
16 our test plan as we put it out -- okay, I can tell you
17 from cables and doing some work that if I am going to
18 pick a garden variety thermo-set cable, I am going to
19 choose Rockbestos Firewall III. Why? Because talking
20 through enough people that that's like in 70 or 80
21 percent of the plants out there. It's very common.
22 There was a lot of it made.
23 And when we test that cable, we're serving
24 the larger bodies of -- of licensees and getting the
25 most out there. On the same token, if I asked you for

480-volt switch gear, okay, there's a lot out there. There's Square D, there's Siemens, there's ITE, there's Westinghouse, there's GE. If I -- you know, if I had a vehicle to say, you know, hey what is the most common -- if I am going to go and test enclosures for HEAF and I want a 480-volt enclosure, what would serve us best for me to go do the testing on?

I'd hate to pick one that was used in one plant in New Jersey by Dennis. You know? And I -- and I missed the whole rest of the industry. So those kind of -- you know, that type of knowledge, if I had a vehicle to get it, would greatly help us out. And again, then I've got to take it to the international stage and make sure that we're lining up with what's in Japan and what's in Germany, what's in France. So again, it's getting the right stuff and doing it, you know, in a right, representative manner.

MR. MUSSATTI: Yes, let's -- let's take this question from off the webinar.

MR. HAMBURGER: Okay, this question is from John Biersdorf, Idaho National Laboratories, who first apologizes for not having a microphone. His comment is INL has been doing flooding research with our RISMC software to apply realism and dynamic PRA methods to reduce conservatism. RISMC incorporates

1 dynamic PRA, thermo-dynamic and physics models and
2 human actions into a single process to provide a more
3 realistic analysis of a single scenario. We are
4 looking for research possibilities to apply RISMC to
5 fire and can provide more information for anyone
6 interested.
7 MR. SALLEY: And the question is?
8 MR. HAMBURGER: No question. Just a
9 comment.
10 MR. VINCENT: I have a question.
11 MR. MUSSATTI: Go ahead.
12 MR. SALLEY: Brought to you by. No.
13 (Laughter.)
14 MR. SALLEY: INL. No, okay.
15 MR. VINCENT: Keith Vincent from NextEra.
16 You -- there's a lot of discussions about HEAFs and
17 it's been kind of a big issue for us at NextEra the
18 last year. And everything that I've heard, at least
19 from you -- at least in these kind of forums -- is
20 about how bad aluminum is. But we also reference that
21 we have a one-size-fits-all model. So are we going to
22 be just expanding the zone of influence for aluminum?
23 Or are we going to actually look at refinements to
24 maybe look at do all HEAFs actually propagate to the
25 extent of the San Onofre event?

1 MR. SALLEY: Our goal is to -- especially
2 working with our international partners -- is to -- to
3 go through all HEAFs. When we -- just to give you a
4 little bit by way of background, when we started the
5 HEAF program, again as I said, we were trying to go
6 and we knew that the Appendix M was made off of one
7 event. The -- what was that? The SONGS event of
8 2001, I believe.
9 We were trying to go out there and do, if
10 you will, the confirmatory research to say yes,
11 verily, that was a -- a good example. It's a
12 conservative model if everybody is happy with it. And
13 we were heading there until we stumbled into the --
14 the aluminum piece.
15 Now working with our international
16 partners, for example, when we talked to Japan they're
17 very concerned about aluminum. They've got a lot over
18 there. I think we're still figuring out how much
19 aluminum is in the U.S. plants. But when I talk to
20 plants like Germany, they think they find a little bit
21 in one plant. So them it's -- it's not that big of a
22 deal. So they're going to have definite other things
23 with copper and such.
24 So again, I am hoping that we can -- we
25 can do similar as we did with the RACHELLE-FIRE

program and do that with the HEAF. So we can look at things intelligently like voltage and the power and decide the -- you know, how did the physics play into it for the model. And again, I -- I have said this before, I will say it again that, you know, just because it's aluminum doesn't mean the sky is falling. There is still a lot we need to learn.

We've seen a couple bad things happen. But on the other side, if you go and look and look at the international report, I want to say Test 4, 5 and 6 were some Korean cabinets that were donated to the program. We tested those early on, obviously, in 4, 5 and 6. But they had aluminum buses in there and we couldn't -- we couldn't get plasma. We couldn't get it to arc.

And at that point, if you would have asked us hey, is aluminum matter? It's like yes, it doesn't work. But it wasn't until we got on to later things -- and again, these are the things you can only learn from testing. You know, I can't run a model -- I can't run -- I can run FDS. I can, you know, do it till I am blue in the face and it's not going to give me an answer here.

So certain things, you know, like the CTs and like this -- we need testing. But again, I want

1 to -- you know, with the test plan, if you looked at
2 it, we want to move in a very structured manner that
3 we're doing it in a scientific endeavor. And that's
4 what our goal is here.
5 MR. MUSSATTI: My sense is that everything
6 that we are talking about here is the stuff that we
7 really want to talk about after we come back from our
8 break because it all ties into kind of what -- what
9 Ken and I had envisioned here. We've got an empty
10 flip chart up here at the front of the room which we
11 brought in because we're kind of like boy scouts and
12 we're planning ahead a bit as to how it is that we're
13 going to be able to come to some sort of consensus
14 between industry and the NRC in -- in what the next
15 steps are.
16 And we sort of envisioned having some sort
17 of a round-robin-type of a voting process where we
18 would put down a list of the key items -- the ones
19 that are the biggest hitters -- and let -- let you
20 guys work out which ones are the ones where there
21 seems to be commonality and which ones seem to be the
22 -- the ones that are the most obvious to do and the
23 ones that seem to be, well, that would be nice, but it
24 would be a lower priority.
25 I don't know if this is the exact model

1 that we need to have for this kind of a -- a narrowing
2 of our focus down, but that was our starting point.
3 And what I would like to ask everyone to do is -- over
4 the break that we are going to take here in a minute,
5 collaborate. Think a little bit about this. And if
6 you've got a better mousetrap, we would be more than
7 happy to use it. But I -- we've got a starting point
8 as far as figuring out whether we've got the right
9 rock or not.
10 MR. SALLEY: Before you do that, can I
11 quickly go through these tasks and -- and give
12 everybody -- so there's a little more --
13 MR. MUSSATTI: I was saying all this as a
14 segue into you providing us with some of this
15 information.
16 MR. CAVEDO: Before you do your -- I just
17 had a quick non-technical question. You had mentioned
18 that you have developed a CBT program for how you're
19 training your inspectors. Do you -- is that available
20 to the public? Is it on the website?
21 MR. SALLEY: Greg, do you want to take
22 this one?
23 MR. CASTO: I will find out.
24 MR. SALLEY: I don't believe it is. It
25 was internal training for our inspectors for quals.

1 MR. CAVEDO: It would just be nice to know
2 what they're being taught since they're inspecting us.
3 MR. SALLEY: I knew you were going to ask
4 that. Yes, we can -- we can take a -- an item back to
5 look at that. Again, I want to put the handbook out,
6 so you definitely have the handbook they're working
7 from. But the -- the training we did was a week-long
8 training. Like I said, we had some folks -- you know,
9 Mark Jeffers who came from industry. Really sharp
10 dude in Region III. Darius Swarcz is in III. Harry,
11 were you part of that? No. Gabe, Taylor, Tammie --
12 we all went up to Brookhaven and we did some
13 professional training so they can do that -- what do
14 we call that? Computer, online, at-your-own-pace
15 training now that we do through our I-Learn? Yes. So
16 that's what it is. We can look into that and take an
17 action.
18 So can I quickly blow through these? And
19 I am keeping you guys from break. Task 1 is done,
20 like I said. Gabe and Ashley are just talking about
21 going back and looking at Volume 1 and cleaning up
22 some things we learned in 2 and 3 just to make it --
23 it all reads true and it reads good.
24 And again, this is an important one for
25 you because if you listen to Steve Hutchins at the

1 RIC, this should form a lot of the underpinning for
2 any IOO-O1 Rev 4. Small -- Task 2 is done, like I
3 said. There was a follow-on. We stopped it because
4 we didn't have a need for it at the time. But again,
5 the work is done so we are going to publish it.
6 Training -- we talked about that. Again,
7 Tammie is working on it. The 1778 -- we just need to
8 read through it and we're going to put that out. I've
9 asked a question for you, Rob, about that training --
10 if there's anything we can do with it. Cable coatings
11 -- again, that work is also done. We are holding out
12 here looking for, I believe it's Brunswick. Is
13 anybody here from Brunswick? Yes. Okay, we're
14 looking again. That question came up from two tri-
15 annuals ago that we were wanting to close it -- to put
16 it all to bed. So yes, we will talk offline.
17 Oh, and again, there's some confusing
18 information, Victoria, in 6850 that I think we are
19 going to do a lot better job with discussing the
20 credit you can take for cable coating. So that --
21 that's the regulatory piece that ties in. Five
22 through 8 are the ones that -- that we discussed
23 yesterday. I think they're all very clear -- that
24 we're working on.
25 Nine, high energy arc faults -- of course,

1 the Information Notice -- that -- that's one that
2 we're interested in. At 10, again, this came out of
3 industry -- the original for the main control room
4 abandonment. Ashley, is there anything you can
5 address on that? That was the driver for -- for the
6 MCRA.
7 MS. LINDEMAN: I mean, I saw your -- your
8 research plan. I think the only thing that concerns
9 me is the -- the timeline for publishing the
10 quantitative report.
11 MR. SALLEY: Yes, that's something, too --
12 MS. LINDEMAN: We need to get something
13 out quicker.
14 MR. SALLEY: Yes, Susan needs to have a
15 separate -- we had a meeting internally yesterday with
16 Mike Cheok, and Susan can talk with you on that.
17 Vetting panels to support activity -- FAQ support, you
18 know, we do it as Greg sees need for our support.
19 Training, we have kind of picked that one up
20 internally in Research. For me it's a low-effort
21 item. I know it -- it does take some resources from
22 EPRI to support it. But again, we are seeing good
23 things from that.
24 Fire growth revision -- that's one you
25 guys are interested in. Bin 15 -- we discussed that

1 earlier and again, the interest. PRISME III, again,
2 that's an international one. We will take that in.
3 The one that I do see directly to you, plus the other
4 work that he's doing is the cabinet to cabinet. So
5 that's the --
6 MS. DeJOSEPH: What's the - what's the
7 cabinet to cabinet that's different than what we're
8 doing with RACHELLE 2? Just international stuff?
9 MR. SALLEY: Do you want to talk about the
10 cabinet to cabinet they're proposing in PRISME III?
11 MR. HAMBURGER: They have several
12 scenarios proposed to study the possibility and
13 phenomenology of cabinet to cabinet fire spread. The
14 way they have it arranged now -- and they have not
15 done these tests yet, but I have looked at the draft
16 test plan. They have adjacent cabinets in a bank
17 configuration and they have cabinets facing each other
18 across -- across an aisle. I am not sure what they're
19 going to be measuring. What -- what was -- what was
20 your question?
21 MS. ANDERSON: Well, I -- so based on that
22 -- I mean, we can discuss this later, but based on
23 that it sounds like maybe this is work that hasn't
24 started and maybe we could do faster on our own. But
25 -- it -- maybe -- that would be a candidate to take a

1 new track on, possibly.

2 MS. DeJOSEPH: The question was what's

3 different than what we're doing with RACHELLE-FIRE 2?

4 Because we -- it sounds like just the two

5 configurations you've mentioned we have addressed at

6 some capacity. Do -- okay. No, I understand that.

7 But this -- I am not loud enough?

8 MR. MUSSATTI: She's keeping up with you,

9 but I don't know if everyone else is.

10 MS. DeJOSEPH: So I guess do -- the

11 logical question is do we not have enough confidence

12 in what we're doing with the RACHELLE-FIRE 2 Working

13 Group that we need testing to back up what we're

14 doing? Like, is it unnecessary?

15 MR. SALLEY: It's -- it's a part of an

16 international program. It's a very low cost for us to

17 join on this one. And the fact it gives us some

18 confirmatory data to what we've done. So more data is

19 good. They're also doing some other interesting

20 things, too. For example, they're doing elevated fire

21 source. So they're -- there's some things that we

22 haven't done here before that, again, it -- it helps

23 us do some confirmatory work. And again, we're part

24 of a large, 12-country conglomerate.

25 MS. DeJOSEPH: Can you go back one slide?

1 What was Task 14?

2 MR. SALLEY: Sure. You don't care about

3 fire growth?

4 MS. DeJOSEPH: No, I didn't write it down.

5 I forgot.

6 MR. SCHAIRER: I have a question on that

7 one. I'm Mark Schairer.

8 MR. SALLEY: Yes, okay.

9 MR. SCHAIRER: Yes, you kind of skipped

10 over that one a little briefly. Are you guys doing

11 any -- are you planning to do testing for Task 14?

12 What's the status of that one and the plan for that

13 one -- a little more?

14 MR. SALLEY: Dave, that's you. I am going

15 to turn it over to you.

16 MR. STROUP: What was the question again?

17 MR. SCHAIRER: Just if you don't mind

18 going into a little more detail about what that task

19 is, what the plan is. Your plan -- is it a research

20 of previous tests? Or are you planning to do new

21 testing?

22 MR. STROUP: For the -- this is Dave

23 Stroup, Office of Research. For the Task 14, for

24 example, that was intended to align with the kinds of

25 things that we have been talking about with revising

1 the fire growth rates across the board for electrical
2 cabinets and transient fires and all of those.
3 Whether it involves testing or not remains to be seen.
4 I mean, I am in agreement with what Ashley has
5 proposed. I am not sure about how we get to the
6 answers that she wants -- whether we have to do some
7 amount of small-scale testing, large-scale testing to
8 support that or not, I -- I haven't quite figured that
9 out yet.
10 That -- but that task was intended to
11 align with that. Now the -- the Bin 15 stuff came out
12 of discussions that we had during one of the public
13 meetings some time ago where that was discussed as
14 being an important -- an important supplement to what
15 we've done with RACHELLE-FIRE 1 and the re-binning of
16 the electrical cabinets there.
17 Now one other word on the PRISME III,
18 PRISME III was something that we were directed to get
19 involved in and the cabinet to cabinet propagation
20 piece was something that they were interested in and
21 we were trying to tailor that so that we could
22 hopefully get some useful information out of those
23 tests to support some of the other work that we've
24 been doing that we've already talked about with the
25 RACHELLE-FIRE 2 stuff.

1 MR. METZGER: This is Brian in NRR and I
2 will try to expand on that a little bit, too. You
3 know, I think the reality is that the answer for Task
4 14 is this is essentially just a topic that we agree
5 could use some more attention as far as actual plan or
6 what we had in mind for that. It's kind of wide open
7 at this point.
8 And then also, as far as regulatory need,
9 you know, in a -- in a most basic sense regulatory
10 needs are things that the Program Office -- in this
11 case, NRR -- has encountered during the course of our
12 reviews where we've been left with a question of -- or
13 an answer, I guess, to a question of I don't know --
14 which would maybe trigger us to consider user needs to
15 get the answer that we couldn't -- couldn't have.
16 Or if during the course of our reviews
17 we've identified flaws or holes in our rules or our
18 guidance -- and then another case could be something
19 that comes out of the inspections and where we -- we
20 end up supporting our regional inspectors with topics
21 of research that NRR basically represents -- the
22 regional staff. And then engages research to answer
23 their questions.
24 And then lastly, in areas where our
25 licensees have expressed a problem to us and has said

1 we need to, you know, this isn't right. We need to
2 figure this out and get an answer to this. So that's
3 sort of the gamut of what would constitute a
4 regulatory need where NRR would -- would write user
5 needs to Research. So, you know, how that matches up
6 with everything on this list obviously varies. But
7 just some context to, you know, how that process
8 works.
9 MR. CASTO: So as examples that Victoria
10 was asking about earlier, Task 14 and 15 are
11 representative of -- of areas that aren't implemented
12 yet that could be modeled based on licensee input --
13 from this meeting, for instance.
14 MR. STONE: Quick question, I -- maybe it
15 was explained, but I wasn't quite sure what we're
16 trying to do with 16. Are we -- are we looking at FDS
17 and trying to improve that -- the FDS modeling? Or
18 what -- what's the -- I am not quite sure I understand
19 the impression --
20 MR. SALLEY: Sure. I will give you a
21 little back story on PRISME. PRISME is a large
22 international program. It's -- deals with a number of
23 fire dynamics things. IRSN in France is the -- the
24 host country that's running it.
25 They've got a unique facility that's

1 designed -- basically a nuclear plant that they can go
2 in and build actual-size fires so you can get real
3 live data so that if -- if we take a -- a compartment
4 that we ran at NIST that we did with sheetrock and
5 gypsum and we got values for heat transfer through the
6 assembly, we can look at this data that was run here
7 and say, okay, how accurate was that? You know, what
8 uncertainty to do we have in our fire modeling?
9 So it helps us along with the V&V work.
10 So that's kind of the work that happens there with
11 that. It's international fire dynamics.
12 MR. STONE: As a follow-up, do you expect
13 to try to -- is it a revision or changes to inputs in
14 how we use FDS? Or --
15 MR. SALLEY: No, no. What we -- what we
16 find with this -- and if you go back to the original
17 NUREG-1824 and you look at some of the tests that we
18 used to validate the models, there was a number of
19 them that we had brought in from this program -- that
20 we used to actually help validate our models. So it
21 reduced the uncertainty and invalidated some of our
22 models. So that's -- that's one of the way we use
23 this.
24 MR. MUSSATTI: Okay, I bet several points
25 of clarification. Number 12 -- is that in progress?

1 Or not? I've got a list here of the ones that are
2 done, in process, yet to start and --
3 MR. SALLEY: Twelve is ongoing.
4 MR. MUSSATTI: Twelve is ongoing?
5 MR. SALLEY: I mean, it's --
6 MR. MUSSATTI: It's a -- like a
7 continuous, all the time thing? Okay, thank you.
8 MR. SALLEY: As Greg sees fit we -- we
9 support FAQ.
10 MR. MUSSATTI: Okay and I have on my notes
11 here that 1, 2 and 4 are -- are done. So there's not
12 much sense in us debating them.
13 MS. LINDEMAN: This is Ashley. So -- so
14 for Task 1 -- now this is a joint publication and
15 there's three volumes and the third is in publishing.
16 But, Mark, correct me if I'm wrong, but Task 1 is to
17 revise Volume 1 based on Volume 3 conclusions?
18 MR. SALLEY: It's to clean it up and to
19 bring it forward. And Gabe will take the line, share
20 working with you on that, Ashley, so I don't think we
21 even need to bring the team back. We will take the
22 list on that.
23 MS. LINDEMAN: There's no easy joint
24 publication. I will just say that.
25 MR. MUSSATTI: Okay, so it's done in air

quotes. Number 2 is done?

MR. SALLEY: Number 2 is waiting to be published, correct.

MR. MUSSATTI: Okay, and then number 4 I saw -- I heard was done, electrical cable coatings?

MR. SALLEY: Yes, take on number 3 that I have in action from a -- a question from Rob there that can we make that training public? We will need to look into that.

MR. MUSSATTI: Otherwise it's done?

(Simultaneous speaking.)

MR. SALLEY: The video training.

MR. MUSSATTI: It would be done if it wasn't for that -- that one action item?

MR. SALLEY: Just a matter of publishing 1778, yes.

MR. MUSSATTI: Okay, so I am going to put three up there in the done, with air quotes around it again. Five, six, seven and eight are in process. Nine, ten, eleven, fourteen, fifteen and sixteen are yet to start items that you've got going.

MR. SALLEY: No, 10 is started.

MR. MUSSATTI: Ten has started already?

MR. SALLEY: Yes. And 9 is well into its second phase.

1 MR. MUSSATTI: Okay. I misunderstood,
2 thank you. And 13 -- I've got this down here as just
3 being described as having a low level of effort? But
4 I --
5 MR. SALLEY: Annual. It's an annual
6 event.
7 MR. MUSSATTI: Annual, so it's ongoing.
8 MS. LINDEMAN: It's ongoing so -- just to
9 give a little background. We've had it for, you know,
10 a dozen years. We used to have two sessions. Now we
11 have one. You know, I think we're -- do it according
12 to the industry and NRC need. And you know, at least
13 I revisit this on an annual basis. And looking for
14 feedback from, you know -- all.
15 MR. STONE: I'd say it's still very useful
16 for us. We continue to send folks there for training.
17 So -
18 (Simultaneous speaking.)
19 MR. MUSSATTI: Okay, among -- among the
20 four that are on that one slide -- 5, 6, 7 and 8 --
21 are any of those far enough along that it would be an
22 impediment to try and change where it's going to be
23 able to suit what the industry is presenting here?
24 MR. SALLEY: Five, six, seven and eight --
25 we are just a bit player to the larger work that's

1 being done. Victoria, that's -- that's the work that
2 you and Ashley have going on.
3 MS. LINDEMAN: So 5, 6 and 7 are together
4 and anticipated to be published in the same report.
5 Task 8 is separate and I'd say it's in the early
6 stages but nowhere near as mature as 5, 6 and 7.
7 MR. SALLEY: I guess the question were --
8 we want to continue on with those, Ashley? Are we
9 planning to?
10 MS. LINDEMAN: Well, I think they're
11 nearly done. Of course, we can always seek input from
12 the greater group. But I think in many cases -- and
13 Francisco, you can chime in.
14 MR. JOGLAR: Well, I thought A, it's also
15 part of what Ashley presented earlier on --
16 MS. LINDEMAN: Yes, it's our Item number
17 5.
18 MR. JOGLAR: So 8, we had started that
19 with -- with the Office of Research. And EPRI still
20 has it. You know, it shows in the skyline as
21 something that needs research, so we were planning to
22 continue.
23 MR. MUSSATTI: Okay, what I am looking at
24 here is I am trying to find a nexus between what we
25 are saying are new things that need to be looked at

1 and what you've got up there that's either planned or
2 -- or in its development stage now where we could find
3 this overlap. And perhaps that's a question for after
4 the break so that we've got a starting spot. Okay,
5 let's take a --
6 MR. COYNE: I've got a -- a question,
7 actually. So Victoria, now that Mark has gone through
8 the 16 items, I guess I am curious from your
9 perspective, which ones do you think aren't associated
10 with any regulatory need?
11 MS. ANDERSON: I don't understand the
12 regulatory driver for the HEAF work, nor do I
13 understand the regulatory driver for the fire modeling
14 V&V.
15 MR. MUSSATTI: Okay. Let's consider
16 ourselves coming back at twenty minutes until 3:00.
17 That gives us a 16-minute break and then we can -
18 (Whereupon, the above-entitled matter went
19 off the record at 2:24 p.m. and resumed at 2:44 p.m.)
20 MR. MUSSATTI: All right. As Victoria told
21 me earlier today, this is where I get to earn my pay.
22 This is going to be -- excuse me. We got a lot to do
23 and a short time to do it. That was kind of a
24 mischaracterization of a line from out of Smokey and
25 the Bandit, actually, but -- we're going to do

1 something a little bit different here.
2 We've got 16 items that are being worked
3 on by the NRC, or are planned in the near future for
4 NRC. And we're going to start by putting those items
5 up on the list in the middle and we're going to try to
6 get the impressions from industry as to how they see
7 those ranking, as far as importance and that, with
8 what the NRC would like to do.
9 And then, we're going to see where we've
10 got commonality and try to work together to see what
11 kind of synergy we can develop.
12 This is kind of a moving target, we're
13 making it up as we go a bit, because this isn't the
14 kind of thing that's going to lend itself to the
15 chart, mainly because the chart is so little in some
16 respects, and the voting type of things that Ken and
17 I had talked about, just based on the dynamics of
18 what's going on.
19 So, we may not change horses in midstream,
20 but we may try to change saddles in midstream with the
21 same horse, if you don't mind me beating a metaphor to
22 death.
23 But you're putting up everything that was
24 on the list, including the ones, 1 through 3, that
25 were completed?

1 MR. HAMBURGER: Yes, and then, I'll go over
2 to industry and add any topics that they would like to
3 see. So, just starting with the NRC's draft Fire
4 Research Plan.
5 MS. ANDERSON: So, I would say, add
6 everything that is on the -- that was on the agenda
7 yesterday. That covers it, right, Ashley? And will
8 the -- so, do you -- does he have a copy of that that
9 he can work from?
10 MR. MUSSATTI: I -- yes, it's the first
11 items that are on the list on the agenda from
12 yesterday, isn't that correct?
13 MS. LINDEMAN: The EPRI plan would be --
14 MS. ANDERSON: Right, but I think --
15 MS. LINDEMAN: Are the other --
16 MS. ANDERSON: Is everything in there also
17 on the list of what we covered yesterday? Is there
18 anything missing?
19 MS. LINDEMAN: Yes, I think the --
20 MS. ANDERSON: Okay. So, why don't --
21 MS. LINDEMAN: Yes, maybe not explicitly,
22 though.
23 MS. ANDERSON: Okay. Take a look and see
24 --
25 MS. LINDEMAN: Okay.

1 MS. ANDERSON: -- if there's anything
2 missing, just because the agenda is going to be an
3 easy thing for him to work off of, because he has a
4 copy of it.
5 MR. MUSSATTI: Okay. While the list is
6 being developed by Ken, I'm going to solicit some sort
7 of a directional input from the NRC, either from NRO
8 or from RES, to help clarify things, because I didn't
9 do a very good job of clarifying this myself. Maybe
10 I did a better job than I thought. You're good to go?
11 MS. ANDERSON: Yes.
12 MR. MUSSATTI: Okay.
13 MS. ANDERSON: Yes. So, I think when we --
14 okay, Ashley, what's missing?
15 MS. LINDEMAN: I would add fire progression
16 event tree, credit for plant personnel suppression --
17 MR. HAMBURGER: Separate item?
18 MS. LINDEMAN: Yes. A separate item for
19 plant trip probability. HEAF is sort of covered under
20 Mark's number nine. Transience is covered under
21 Mark's number five. And then, main control board fire
22 modeling, I would add.
23 MR. MUSSATTI: Okay. Once we hit 15-16, we
24 got a complete list?
25 MS. ANDERSON: And then, we need to add

1 everything that was on the agenda yesterday.

2 MR. MUSSATTI: Those were not the items

3 that were on the agenda yesterday, those are

4 different?

5 MS. ANDERSON: Right, those are different

6 from those.

7 MR. MUSSATTI: Okay.

8 MS. ANDERSON: Those are the ones that

9 aren't covered by the agenda from yesterday. Well, he

10 has a copy of the agenda.

11 MS. LINDEMAN: Okay. But some are already

12 noted in the --

13 MR. MUSSATTI: Yes, I think --

14 MS. ANDERSON: Okay.

15 MR. MUSSATTI: -- it would be good if you

16 were to go through those and tell us where they are

17 listed on it, if they're already covered on one of the

18 items that's up there.

19 MS. LINDEMAN: Okay. So, cabinet-to-

20 cabinet propagation is covered under Task 5. Revised

21 growth curves is really under the EPRI task that you

22 already put in there. Okay. Yes, and Task 14. I

23 just put the updated EC NSP curve, just because that

24 was some data.

25 I would add a line for fire damages only

1 part of equipment in cabinet. I'd add a line for
2 reduce NSP floor from 1E-3 to 1E-5. Add a line for
3 HEAF event frequency. Add a line for transient
4 controls within a PAU, FAQ 14-007. Add a line for
5 improved HEAF NSP, FAQ 17-013.
6 MR. HAMBURGER: What was that FAQ number?
7 MS. LINDEMAN: 17-013. A new line for
8 cable tray ignition at 500 degrees C, FAQ 16-011. A
9 line for cable fire spread. Let's see, obstructed
10 radiation is covered in Task -- one of the Tasks, I
11 can't remember which one, 6 or 7. And then, 2180, I
12 would add a new line for that.
13 MS. ANDERSON: 2180 enhancement, I guess we
14 could say.
15 MS. LINDEMAN: Yes, sorry, just maybe more
16 than 2180, FAQ 17-012. The radiation ZOI, I think
17 that's kind of covered in obstructed radiation, right?
18 Okay. All right, that should be it. Yes.
19 MR. MUSSATTI: I think it would be helpful
20 if you made that blue a little bit lighter, so that
21 it's a little easier to read from a distance. That'll
22 do. Okay. And then, explode the screen out a little
23 bit more, so it's more readable from a distance and I
24 think we're good to go.
25 MS. ANDERSON: So, I would suggest, rather

1 than try to do a rank prioritization of over 30 items,
2 why don't we, for our initial cut, try to decide on
3 high, medium, or low.
4 MR. MUSSATTI: Very good. That's kind of
5 where we were thinking about going. And what is the
6 high, medium, and low defining? Is it defining the
7 level of effort that's involved or the level of
8 importance to the project?
9 MS. ANDERSON: I think it's level of
10 importance.
11 MR. MUSSATTI: Level of importance? Okay.
12 MS. ANDERSON: High means we definitely
13 want it done in two years. Medium would mean, maybe
14 we want it done in two years. And low would mean, it
15 probably doesn't matter. Does that work for
16 everybody?
17 MR. MUSSATTI: High means it needs to be
18 done right away, low means it probably doesn't matter?
19 MS. ANDERSON: Well, yes, low means, we can
20 wait more than two years. Medium means, maybe.
21 MR. MUSSATTI: Depending on resources?
22 MS. ANDERSON: Right.
23 MR. MUSSATTI: Yes. Okay. Industry first.
24 How many people from industry do we have here that are
25 willing to vote on these things, so we can -- we've

1 got one. All right. Okay. Pretty much everybody.
2 How many consider NUREG/CR-7150 Volume 3 to be a high
3 priority?
4 MS. LINDEMAN: Sorry. I think we need to
5 clarify, Volume 3 is in publishing, but the Task
6 proposed is a revision to Volume 1 to clear up any
7 changes imposed by Volume 3. So, it's essential Rev.
8 1 to 7150. No, I don't believe there's any new
9 technical work, it would just be revising based on
10 Volume 3.
11 MR. MUSSATTI: For consistency, not for new
12 information necessarily?
13 MS. LINDEMAN: Correct.
14 MR. MUSSATTI: Okay.
15 MR. COYNE: And can you go back through
16 what the priority is again? How you've characterized
17 the scheme you're using?
18 MR. MUSSATTI: If it is ranked as a 1, that
19 is a very high priority, it's something that needs to
20 be done. 2, it's kind of in the middle and it's
21 resource constrained, but we should get to it someday.
22 And the third one, if it's ranked 3, then it's a very
23 low priority and that would be, I've got nothing else
24 to do, kind of stuff.
25 MS. ANDERSON: Our near-term is two years.

1 So, is it in the two years category? That's high. Is
2 it maybe in the two years category? That's medium.
3 And not --
4 MR. COYNE: And that was my concern, it
5 seems schedule-driven rather than safety-driven. Just
6 curious where safety comes into the prioritization of
7 the resources?
8 MS. ANDERSON: Well, safety comes in
9 because we have improved realism in our fire PRAs and
10 then, we are better able to support implementation of
11 risk-informed applications that ultimately enhance the
12 safety at our plants.
13 MR. MUSSATTI: Does that clarify it?
14 MR. COYNE: Still looking for a definition
15 of what realism is, but we can move forward.
16 MR. MUSSATTI: I think part of the dynamics
17 of this is that everyone gets their own kind of
18 definition of what these things are and then, they'll
19 be slightly different for each person based on their
20 value-structure, and that's not a bad thing.
21 So, how many would consider the proposed
22 revision to the NUREG to be a high priority item,
23 needs to be done right away? Medium?
24 MR. STONE: Sorry, Jeff Stone. Not quite
25 sure I understand the implications if we don't update

1 this any time soon. Is it bad? I mean, are we going
2 to have difficulty using Volume 3?
3 MS. LINDEMAN: I don't believe so.
4 MR. CAVEDO: It's producing information
5 that we're essentially already using.
6 MR. MUSSATTI: Well, considering that we
7 were -- that it was --
8 MS. LINDEMAN: Oh, sorry, we have the
9 author, Andy, so I'm not sure if you want to provide
10 some insights.
11 MR. RATCHFORD: This is Andy Ratchford at
12 Jensen Hughes. Volume 1, just to kind of set up the
13 criteria for leading into the PRA, spurious operation
14 probabilities, things that happen throughout the
15 course of all three JACQUE-FIRE things identified some
16 decisions were made in Volume 3 that never got rolled
17 back in, such as the CT open circuits as an incredible
18 event, would be one of them.
19 And a few other items that were decided,
20 just so we didn't leave information in Volume 1 that
21 was out of date. So, that's all it was. And they're
22 probably -- I think it was just a handful of things.
23 MS. LINDEMAN: Maybe five?
24 MR. RATCHFORD: Yes.
25 MS. LINDEMAN: At max?

1 MR. RATCHFORD: Right. And it's
2 credibility or incredibility. It actually has nothing
3 -- it doesn't feed into the PRA directly, other than
4 considering CT open circuits or some incredibility
5 things, it doesn't affect any numbers.
6 MR. BARRETT: Andy, this is Harry Barrett,
7 NRR. You also have to look at, for the deterministic
8 plants, I mean, it's maybe more important for the
9 deterministic plants than it is for the PRA
10 applications.
11 MR. RATCHFORD: Right. I agree and so does
12 getting NEI, getting the regulatory footprint on NEI-
13 001 Rev. 4 is also very important.
14 MR. BARRETT: This crowd is probably --
15 MR. RATCHFORD: But it's outside of --
16 that's another story.
17 MR. MUSSATTI: Okay. Does that provide any
18 clarification to everybody here?
19 MR. SCHAIRER: Just one other
20 clarification, this is Mark Schairer. So, it sounds
21 like the effort is small and maybe the importance is
22 not as important, but it's one of those things where,
23 does it make sense to just do it now?
24 MR. MUSSATTI: Okay. That is a
25 consideration, that there's a lot of inertia behind

1 this already, it's going to get finished, it sounds
2 like, and these need to be incorporate, otherwise the
3 entire project is kind of flawed, so making these
4 changes in the first volume based on what's in the
5 third is kind of a necessary thing, isn't it?
6 MR. RATCHFORD: This is Andy Ratchford. I
7 think it is, because if it doesn't get done soon, it
8 probably will not get done and you won't know it's a
9 problem until years from now, when you have two
10 documents that say something completely opposite.
11 MR. BARRETT: Yes, with the things that
12 conflict, you probably want to get that straightened
13 out before your next inspection.
14 MS. ANDERSON: Okay. So, can we just say
15 medium, because nobody's jumping up and down either
16 way?
17 MR. MUSSATTI: Okay. We tried one, but now
18 we've got -- okay. We're going to go with a medium on
19 this? Any dissenters? Okay. Let's move on to the
20 next one. Small-scale instrumentation circuit
21 testing.
22 Basically, it was originally characterized
23 to us as done or very, very near done. Any
24 clarification on that that we need before we move on?
25 Because if it's done, we can probably skip voting on

1 it.

2 MR. SALLEY: No, it's complete and it's in

3 publishing.

4 MR. MUSSATTI: That's what I thought. So,

5 we should skip that one, we don't really need to do

6 anything. Not applicable.

7 MR. SALLEY: The only -- again, for

8 completeness, there was a second piece on this one,

9 and I guess this would be the question I would put to

10 the group, do we want to move and do large-scale

11 testing to do some work similar to what we did with

12 control circuits, for instrument circuits? Is that

13 something the industry needs? Okay, then.

14 MR. MUSSATTI: Not applicable. Okay.

15 Number three, that is post-fire safe shutdown

16 training?

17 MR. SALLEY: Again, that one's complete.

18 MR. MUSSATTI: Okay.

19 MR. SALLEY: And we have an open question

20 from Rob there, that if we can make the training, the

21 video training public, I need to check with our folks

22 at iLearn.

23 MR. CASTO: I've got that as an action as

24 well, I'll follow up.

25 MR. MUSSATTI: You'll take that one, Greg?

1 MR. CASTO: Yes.

2 MR. MUSSATTI: Okay, great.

3 MR. HAMBURGER: I just want to jump in here
4 and let the folks on the webinar know that I'm working
5 on two separate computers, so they're probably looking
6 at a blank screen right now, but I'll do my best to
7 get it over to them.

8 MR. MUSSATTI: Okay. All right. We have
9 a new typist on the screen and Ken is going back to
10 the webinar --

11 MR. HAMBURGER: We also have a suggestion
12 that we possibly, for each of these items, talk about
13 whether or not testing is necessary.

14 MR. MUSSATTI: Okay. Electric cable
15 coatings, it was listed as done or in its very final
16 stages, close enough to done that it's pretty much
17 done. Is it done?

18 MR. SALLEY: I'm sorry?

19 MR. MUSSATTI: Number four, electric cable
20 coatings?

21 MR. SALLEY: Yes. Harold and I had the
22 last piece, so we've got the action to take care of
23 that.

24 MR. MUSSATTI: Okay. So, that's not
25 applicable. On my list that I had originally made,

the next one, number five, was considered to be in-progress and that was obstructed plume zone of influence.

MS. LINDEMAN: I actually think the title is obstructed radiation, obstructed plume was already published.

MR. MUSSATTI: Okay. Obstructed radiation zone of influence? Is that a high priority?

MS. ANDERSON: Does anybody disagree?

MR. MUSSATTI: Okay.

MS. DeJOSEPH: Are we staying on the industry side or are we doing both?

MR. MUSSATTI: No, we're just saying on the industry side, I think NRC is going to need to assimilate this information before they can move on on it.

MR. CASTO: Clarification question, since we --

MR. MUSSATTI: Yes?

MR. CASTO: -- started this, is this -- is what is currently being done aligned with where industry sees the benefit or potential benefit to realism?

MS. LINDEMAN: I think at this point, I don't believe it's as impactful and quantitative. I

1 think the value was a few percent, but the technical
2 work is complete and we should just publish it so we
3 can move on to other high-priority work.
4 MR. STONE: I just had one quick question.
5 We said we weren't going to be asking the NRC about
6 their thoughts on the importance, it seems like if
7 we're going to be here together, it should be -- we
8 should get input from both sides.
9 MR. MUSSATTI: Well, yes, you're absolutely
10 right.
11 MR. STONE: Okay.
12 DDD: I probably mischaracterized that a
13 little bit, because this has been a moving target for
14 me, being outside of the fire industry here. Where do
15 we see obstructed radiation zone of influence in our
16 work?
17 MR. METZGER: Well, one question I have,
18 just after hearing the presentations this week is, and
19 I asked this a couple times, when we're seeing the
20 sensitivities, a lot of sites didn't use even the
21 obstructed plume portion that was in 2178, so it kind
22 of makes sense that maybe they also didn't use the new
23 radiative component of that.
24 So, one of the questions I'm left with is
25 wondering what that impact actually is, if you were to

1 use the old and the new obstructive -- old being two
2 years old. But there seems to be a little bit of a
3 gap there.
4 MS. ANDERSON: Is that in the scope of the
5 current discussion? On trying to assign
6 prioritization?
7 MR. METZGER: I don't know, just bringing
8 it up, I guess. You guys tell me.
9 MR. MUSSATTI: Well, Victoria, I think
10 you're considering it to be high, because most of the
11 work is already done and why let it die on the vine
12 when we can get it out of the way and not have to
13 worry about it? Would that characterization be the
14 same for you, that kind of an argument?
15 MR. METZGER: Yes, I believe we all agree
16 that accounting for the obstruction of a cabinet has
17 a decent or potential impact. It's obviously
18 scenario-specific, but, yes, I think we consider it
19 high enough.
20 MR. MUSSATTI: Dave, you worked on that,
21 didn't you? That was one you worked on? Did you work
22 on this one? What's your thoughts on this, from our
23 side?
24 MR. STROUP: Well, as most people know, the
25 obstructed radiation zone of influence, the electric

1 pump and motor and the cabinet are all part of the
2 RACHELLE-FIRE II exercise. And we have drafts of all
3 that, it's just a matter of crossing the Ts, dotting
4 the Is and getting the stuff published.
5 MR. MUSSATTI: How about a different color?
6 That set that you've got painted there, so that we can
7 -- since they're all kind of tied together, how does
8 that sound? Okay.
9 Can we consider that to be a bundle and
10 give them all the same ranking, since they're all in
11 process and they're all kind of interrelated? Is
12 there agreement on that? Industry and NRC? Okay.
13 So, we've made vast progress. All right.
14 Transient fire HRR, whatever that is.
15 MS. ANDERSON: Heat release rate.
16 MR. MUSSATTI: Thanks. What is your sense
17 on that, industry? High? And who's worked on that on
18 the NRC side that might be here? There were -
19 somebody that can characterize it? Dave? How do you
20 -- do you consider that to be kind of a low-hanging
21 fruit, close enough to done that we need to finish it?
22 MR. STROUP: Yes.
23 MR. MUSSATTI: Okay. So, that would be a
24 high as well. HEAF? Twelve? Low? Extra low and
25 extra high, okay. Well, that's going to tell us

1 something.

2 MR. CASTO: So, as a quick question,

3 because that showed up on the top, I thought the top

4 five of --

5 MS. LINDEMAN: Yes, I mean, it's --

6 MS. ANDERSON: It's different work that

7 we're talking about.

8 MS. LINDEMAN: It's -- yes. So, in theory,

9 I think we agree that not all HEAFs have the same zone

10 of influence, but --

11 MS. DeJOSEPH: So, do you want me to make

12 this HEAF, so we have HEAF and then, we have HEAF

13 event frequency --

14 MS. LINDEMAN: Well, that's later on --

15 MS. DeJOSEPH: No, I know, I'm just saying,

16 do we need to --

17 MS. LINDEMAN: No, well --

18 MS. DeJOSEPH: -- put it better?

19 MS. LINDEMAN: I guess we need to clarify

20 what's actually --

21 MS. DeJOSEPH: Right.

22 MS. LINDEMAN: -- going to be accomplished

23 in this task.

24 MR. HYSLOP: I guess, I was under the --

25 had the understanding from talking to Nick that most

1 of the money that needed to be spent had been spent,
2 the testing had been done, it was a matter of doing
3 the analysis with the testing.
4 MS. ANDERSON: Well, analysis is not an
5 infinite resource.
6 MR. HYSLOP: No, but if you're talking
7 about whether you want to complete a project, you
8 would think that you'd want to know if you've invested
9 the bulk of the money that you need into it.
10 MS. LINDEMAN: So, maybe a different
11 perspective would be that the HEAF Phase 2 testing is
12 not scheduled to being until 2018 and I think the
13 schedule I saw, the duration was two years. So, I
14 guess, by virtue, this can't be high, because the
15 technical work can't be completed in two years.
16 MR. MUSSATTI: Joelle? Could --
17 MS. DeJOSEPH: Yes?
18 MR. MUSSATTI: Could you just hit escape
19 right now, so I can see what the original -- or back
20 button, whatever. I want to see what the original
21 thing said there.
22 MS. DeJOSEPH: HEAF.
23 MR. MUSSATTI: It just said HEAF? Okay.
24 MR. HYSLOP: But is it HEAF ZOI? What is
25 it exactly?

1 MR. SALLEY: Yes, if I could -- let me try
2 a different approach here and, Ashley, correct me if
3 I'm wrong, we kind of got two things with HEAF.
4 We've got the larger HEAF program, where
5 we've done the experimental work and we're working
6 with the internationals, the OECD, and I think the key
7 driver here is actually, it's out of Greg and mine's
8 hands in the fact that we put it into the Generic
9 Issue Program.
10 So, it's going to go as the Generic Issue
11 Program goes and it's up to our managers. So, yes, so
12 it's doing that. Now, if there's additional work,
13 Ashley, that you want to do independent of the Generic
14 Issue that could help inform it, I could see that as
15 another Task.
16 MR. CASTO: Right. I think primarily, the
17 Generic Issue, and you can correct me, it was
18 primarily looking at HEAF aluminum.
19 MR. SALLEY: Yes, that the driver.
20 MR. CASTO: Right.
21 MR. MUSSATTI: Okay. So, this is --
22 MR. CASTO: So, originally, we had two HEAF
23 Tasks and over the writing period, we combined them.
24 So, there's nothing to say we can't separate those if
25 they're two separate elements and there may be benefit

1 to separating those out.

2 MR. SALLEY: That's a good point, Greg.

3 And we did separate them, but then, they do join again

4 when they go to the International Programs. So, they

5 kind of fork and come back around. So, I think for

6 the HEAF, if we just called it Pre-GI-18, that's all

7 we can do here and let the Generic Issues process run

8 its course.

9 MR. CASTO: Is there a benefit then to a

10 secondary effort related to HEAF, since it seems to be

11 one of the top contributors?

12 MR. SALLEY: No, I think --

13 MS. LINDEMAN: Yes, I guess I'm still not

14 clear, is the Task at hand focused on the ZOI,

15 aluminum, both, something else? It's just not clear

16 what the objective is.

17 MR. SALLEY: Okay. For the Generic Issue,

18 it is being driven by the aluminum piece. But, again,

19 it is looking at the zone of influence across the

20 board for HEAF.

21 MS. LINDEMAN: So, what's the research

22 task? What's the objective of the research task?

23 MR. SALLEY: I wish I had the GI in front

24 of me, but what the last phase of the part -- Harry,

25 can you -- is Harry still here? From memory, can you

1 speak to the actions that we came up with as your
2 panel?
3 MR. BARRETT: Yes. We need to try to
4 understand the phenomena that we saw in the testing
5 that we did with the international stuff. There was
6 several tests that had zone of influence potential to
7 go well beyond what was in 6850.
8 So, I think the testing would be primarily
9 to understand the phenomena well enough to know, under
10 what conditions would you end up having a zone of
11 influence larger, and try to get some kind of
12 frequency on that, so that we have a way of actually
13 measuring the risk. But that's what the testing is.
14 Now, the rest of it, it would be expert
15 elicitation and then, we'd need to figure out exactly
16 what documents or how we're going to put that out as
17 guidance and all that, but that's further down in the
18 process.
19 MR. HYSLOP: That's the aluminum HEAF,
20 right, Harry?
21 MR. BARRETT: Yes.
22 MR. HYSLOP: So, there's the aluminum HEAF,
23 we is going through the Generic Issue process. And
24 then, there's the other HEAF, which is the zone of
25 influence on the existing HEAF we're quite accustomed

1 to looking at. And my understanding was, that testing
2 was done and that it was just a matter of doing the
3 analysis.
4 Now, so they're two different projects,
5 even though they're called one on that screen. Now,
6 maybe they both come back in the international arena,
7 I don't know what Research's constraints are.
8 MR. SALLEY: Yes. And they do come back
9 into the international arena and I guess the thing
10 that's different or that we could work on
11 independently is the frequency. I mean, that's not
12 something -- Harry, did we do anything with the
13 frequency in the Generic Issue Program?
14 MR. BARRETT: Not yet.
15 MR. SALLEY: Right. So, that's an area
16 that's open, that we haven't got to yet.
17 MR. BARRETT: But are --
18 MR. SALLEY: But, again, Generic Issues,
19 guys, if you're familiar with Generic Issues, that
20 process moves very slowly and very deliberately.
21 MS. ANDERSON: Right. So, then, by
22 definition, it's low, because we're talking about
23 stuff in the next two years.
24 MR. SALLEY: You're not going to see this
25 in the next two years.

1 MS. ANDERSON: Exactly, so it's low. So,
2 we can move on.
3 MR. CAVEDO: But I thought what you were
4 generating, just so we have it clear up there, is that
5 you were going to generate a zone of influence model,
6 set of models, for enclosures, for bus ducts, and
7 then, with or without aluminum. Wasn't that the
8 structure?
9 MR. SALLEY: That's the end game of it,
10 yes.
11 MR. CAVEDO: That seems like that would be
12 worthwhile to have, because it would give us a wider
13 range of zone of influences that would be there. So,
14 I don't know, I think --
15 MS. ANDERSON: Okay. So, you think the ZOI
16 would be medium, maybe?
17 MR. CAVEDO: Yes, I think developing --
18 MR. SALLEY: Zone of influence --
19 MR. CAVEDO: -- the different zone of
20 influence profiles for the different types of HEAFs --
21 MS. ANDERSON: Okay.
22 MR. CAVEDO: -- would be useful.
23 MR. MUSSATTI: Then, the General Issue,
24 there, that one would be low?
25 MR. SALLEY: But, again, for those issues,

1 Joelle, Pre-GI-018, that's it's number, and it'll work
2 through the system, independent of what we do here.
3 MR. STONE: Well, I had a question. What
4 I don't want to see is that we use existing data and
5 reduce our zone of influence and then, in three or
6 four years down the road, go back and decrease my zone
7 of influence. I want to make sure we don't end up
8 there. At least, what I would think, from my
9 perspective, from Exelon's perspective.
10 MR. BARRETT: Yes, Jeff, I think when we do
11 this in the Generic Issue process, we'll try to figure
12 out what physical parameters dictate when you'd end up
13 having a bigger zone of influence, so that you'd only
14 use that when you have those physical parameters.
15 MR. STONE: I understand. I'm just
16 concerned that I have some subset of my breakers or
17 components that might have aluminum that -- I'm not
18 sure what we're going to be working on as far as zone
19 of influence here, before the Generic Issue is
20 addressed.
21 MS. LINDEMAN: Jeff, I think that's why
22 Victoria is saying it's not high, because the testing
23 isn't supposed to finish until the end of 2019. So,
24 there's no way that you can provide a revised ZOI --
25 MR. STONE: Oh, I understand.

1 MS. LINDEMAN: -- prior. Okay.

2 MR. STONE: So, we're not going to go

3 forward with the HEAF zone of influence a couple rows

4 above that? Or what's that?

5 MS. ANDERSON: We're not making any

6 determinations today, we're talking about what we

7 think is work that we definitely need done in the next

8 two years, work that we might want done in the next

9 two years, and work that we're fairly certain we don't

10 need done in the next two years.

11 MR. MUSSATTI: Based on that philosophy,

12 does NRC agree that it should be medium for the ZOI

13 HEAF and low for the aluminum?

14 MR. STILES: As long as we caveat it and

15 make sure that it's being driven by the Generic Issue

16 process, I'm fine with that.

17 MR. CAVEDO: Can you clarify Row 10 up

18 there? So, Row 10 is copper zone of influence and Row

19 11 is aluminum zone of influence? Because they're

20 both zone of influence, just so we're clear.

21 MR. MUSSATTI: Okay.

22 MR. HYSLOP: I've got one question, I guess

23 it goes to what we're going to do with this when we're

24 finished. If you're not going to -- if the idea is

25 whether or not research is going to be done, I don't

1 think classifying the aluminum zone of influence as
2 low is very meaningful, because if the Generic Issue
3 needs it, it's going to get it done.
4 MS. ANDERSON: Right. That's why there's
5 a note in there that says, it's proceeding based on
6 the GI schedule.
7 MR. HYSLOP: Okay. If that's what that
8 means, that's fine.
9 MR. MUSSATTI: Yes.
10 MR. SALLEY: Yes. Just, I'll tell you
11 what, take the low out of there, I know the low
12 troubles me, and just leave the note.
13 MR. HAMBURGER: Yes. So, on the NRC side,
14 let's put an N/A for the GI item.
15 MR. SALLEY: Yes.
16 MR. HAMBURGER: And, yes, just leave a note
17 in the notes column that it's going to be driven by
18 the GI process.
19 MR. ZEE: This is Kiang, while Joelle's
20 typing, and maybe this is a little bit off topic. But
21 the testing, all the testing that happened, that
22 generated the aluminum HEAF and all of the fantastic
23 videos that we've been seeing, I don't know that I
24 have seen the details of that test, in terms of all
25 the electrical parameters.

1 Not that I need to see it, I guess I just
2 want to ask, this might be a semi-rhetorical question,
3 but has Staff gotten your electrical guys to look at
4 all of the analytical part of it, so that there's an
5 understanding of what this equipment was actually
6 exposed to? Not what was measured, but what it was
7 actually exposed to by analysis?
8 MR. SALLEY: I'm not following you on what
9 you're looking for on that.
10 MR. ZEE: Well, I mean, I get sort of
11 information from the side and it's mentioned things
12 like, KEMA had a generator, the sustained fault was
13 this number, it's capable for sustaining it for this
14 level of time.
15 But it's a generator, so we know there's
16 a short-circuit decrement curve, so if you give me a
17 number of what the short-circuit was after a certain
18 number of seconds, I know the peak current it was
19 exposed to on a transient basis is four to ten times
20 higher.
21 So, did you expose it to an amount of
22 current that was beyond its rating? In which case,
23 the fact that it blew up is something that was
24 predictable, you should have blown it up, because you
25 exceeded its capability.

1 MR. SALLEY: But this isn't --

2 MR. ZEE: I mean, those are all these post-
3 process -- so, we have these videos and if I wanted to
4 blow up a piece of equipment, I could make a piece of
5 equipment blow. I just expose it to something greater
6 than what it was designed to withstand.

7 So, I just -- I personally, I'm an
8 electrical guy and I'm, like, drooling, like, give me
9 a single line, give me subtransient reactances, I want
10 to see time constants, I want to do the math. But I
11 can't, because I don't have any of the data.

12 So, I'm just asking the question, is there
13 a short-term thing that you guys have already done to
14 sort of evaluate all that stuff? And my context is,
15 independent of any testing, if I was designing a new
16 plant, your electrical branch guys would make me do
17 short-circuit calculations. That's cookbook, textbook
18 calculations. Have you guys, someone done the
19 equivalent of that for the test?

20 MR. MUSSATTI: Okay. Well, I think we're
21 trying to find the weeds to head into, with this
22 question. We really would like to get this kind of a
23 casual ranking on here, so we can figure out what in
24 the heck we're going to do next. And this sounds like
25 it's a sidebar type of a question.

1 MR. HAMBURGER: I'm not going to address it
2 here, but I will say, it is being addressed, because
3 this is -- you probably submitted the comment, this is
4 word-for-word one of the comments we got on our Phase
5 2 Test Plan. So, we're going to address it.
6 MR. ZEE: Darn, I gave myself away.
7 (Laughter.)
8 MR. MUSSATTI: Okay. The HEAF copper, is
9 that a medium for NRC?
10 MR. CAVEDO: Before we leave, we didn't
11 really vote on that and I think we should vote on the
12 Row 10 for the industry.
13 MR. MUSSATTI: On -- okay. On the HEAF
14 copper, for industry standpoint?
15 MR. CAVEDO: Yes.
16 MR. MUSSATTI: I think it was medium,
17 because it's going to get done in the next few years,
18 it's well along its way.
19 MS. ANDERSON: We can vote, it's fine.
20 MR. MUSSATTI: Okay.
21 MS. ANDERSON: So, who thinks it's high?
22 MR. CAVEDO: I think it's high.
23 MS. ANDERSON: Raise your hands, so that we
24 can -- okay. Anybody from the industry --
25 MR. MUSSATTI: It's industry, both

utilities --

MS. LINDEMAN: All the utilities said high.

MS. ANDERSON: Okay. All the utilities said high, so fine, say high.

MR. CAVEDO: This will be a big deal, if we can get it reduced --

MS. ANDERSON: That's fine, you said high.

(Laughter.)

MR. MUSSATTI: Okay. So --

MS. LINDEMAN: Yes, I think the schedule risk is, from what I've seen, the Phase 2 plan is going to test both copper and aluminum. So, I'm just wondering how to not do rework, if we have to wait for the Phase 2 test results to be -- okay.

MR. STONE: Ashley, are you insinuating that the copper could also change based upon the Phase 2 testing?

MS. LINDEMAN: No, I'm just stating a fact, that the Phase 2 testing is not just aluminum, it's aluminum and copper equipment. So, that's it, nothing beyond that.

MR. STONE: Okay.

MS. DeJOSEPH: Are you guys voting high on this one because of where it is in the skyline?

MR. VINCENT: I mean, I would say that,

1 like -- Keith Vincent for NextEra. I'm voting high
2 because it's a dominant risk contributor to one of my
3 stations, it's not because --
4 MS. DeJOSEPH: So, we keep it high and we
5 see how we work it?
6 MR. MUSSATTI: Yes.
7 MS. DeJOSEPH: Okay.
8 MR. MUSSATTI: This isn't locked in stone,
9 this is kind of locked in putty. So, we can change it
10 as we go.
11 MS. DeJOSEPH: And I'm not using ink.
12 MR. MUSSATTI: And medium? High for NRC?
13 MR. SALLEY: Again, it's driven by the
14 Generic Issue Program, so I'm going to stick with
15 that.
16 MR. CASTO: Even the copper part is still
17 under the GI Program, so it's going to work at its
18 schedule, which may not be within two years. I guess,
19 that's --
20 MR. SALLEY: Right. I mean, the aluminum
21 piece is clearly the piece that we're most concerned
22 with, but again, as we go to the OECD/NEA and work
23 with a lot of our partners, again, Germany is an
24 example, they don't care, but they care about copper,
25 so they're donating a lot of copper equipment that

1 we're going to work with and do.

2 So, again, it's the International Program.

3 So, again, the GI, Harry, and I believe that we took

4 credit in the Generic Issue response that we were

5 going to work this international piece to get you guys

6 data for the next phase?

7 MR. BARRETT: Yes, I'm not sure I remember

8 that. But I do know that we tried to engage the

9 industry, through NEI, and we got a survey, a couple

10 surveys, and --

11 MS. ANDERSON: We got 63 surveys.

12 MR. BARRETT: Well, we got two sets of

13 results from surveys that you did.

14 MS. ANDERSON: I mean, you got --

15 MR. BARRETT: We did an initial one and

16 then, we got a second one that ended up having

17 whatever we got, which I guess it was like 60 percent

18 of the plants ended up --

19 MS. ANDERSON: Right.

20 MR. BARRETT: -- responding. It wasn't all

21 the plants. I'm not sure that's going to be good

22 enough for us to end up resolving the issue, we might

23 end up having to go out and actually get valid

24 information on every plant.

25 But as far as the international piece, I

1 was under the impression we were going to end up doing
2 this within the NRC, working with the industry if we
3 can, but if we don't get the support, then we'll end
4 up having to deal with it ourselves.
5 MS. ANDERSON: So, if that's the conclusion
6 you come to, if you can get in contact with us and we
7 will go after the other plants for you. If you tell
8 us that, it's a lot easier for us to go to the other
9 plants. But that's --
10 MR. BARRETT: Well, I think --
11 MS. ANDERSON: -- an offline discussion.
12 MR. BARRETT: I think we informally told
13 you that before, but I know --
14 MS. ANDERSON: Well, what I informally
15 heard before was that about two-third would be fine.
16 So, we'll take this discussion offline.
17 MR. MUSSATTI: Yes, thank you. Let's move
18 on to the two yellow HEAF items in there and get a
19 characterization from industry as to their relative
20 importance.
21 MS. ANDERSON: High and high?
22 MR. MUSSATTI: High and high? Because you
23 guys were the ones that thought of it?
24 (Laughter.)
25 MR. MUSSATTI: Pretty much? Okay. NRC, on

1 these two yellow HEAF issues?

2 MR. CAVEDO: Why is Row 11 still low?

3 MS. ANDERSON: Because that's driven by the

4 GI process and it won't be done in the next two years.

5 MR. CAVEDO: But the importance is high, if

6 it doesn't get done, it doesn't get done. But we'd

7 still like to have --

8 MS. ANDERSON: Because the metric --

9 MR. MUSSATTI: Well, the importance for our

10 ranking purposes is driven by the within two years, if

11 it can be scheduled to be done that way.

12 MR. CAVEDO: If it can't be done faster, it

13 can't, but the priority -- well, maybe we need two

14 different columns, because the priority is what we

15 would like to have done, because this would really

16 affect our rankings. I mean, we've got aluminum in

17 significant areas --

18 MR. HAMBURGER: Rob, can we use the mics,

19 please?

20 MR. CAVEDO: We have aluminum in

21 significant areas in the plant and that's driving risk

22 and safety insights. So, from a ranking standpoint,

23 it should be high. If it can't get done when it's

24 high, it can't get done, but --

25 MR. MUSSATTI: Changing the definition of

1 our ranking.

2 MS. ANDERSON: Yes.

3 MR. CAVEDO: I'm not changing the

4 definition, I'm changing when I'd like to have it

5 done. You're saying you can't give it to me.

6 MR. HYSLOP: I'm afraid with the current

7 definition, in a couple weeks when we go back and look

8 at this, we're not going to know what we were deciding

9 on, because importance to me means it's important to

10 risk or important to deciding it.

11 And if all of a sudden, some of these

12 rankings have time limitations and things on that, I

13 don't know how we're going to reproduce this.

14 MS. ANDERSON: Well, no. So, basically,

15 what we're doing is a prioritization, right? And

16 prioritization considers potential payoff, which

17 includes --

18 MR. HYSLOP: I agree with --

19 MS. ANDERSON: -- schedule.

20 MR. HYSLOP: I agree with you, but I'm just

21 saying, if we don't record that, we're not going to

22 know what drove the results.

23 MS. ANDERSON: Don't worry, I've got a good

24 memory, J.S.

25 MR. HYSLOP: Oh, yes.

1 MR. SALLEY: Let me ask something simpler.
2 If we can -- I get where you're going with that, J.S.,
3 can we get a column in there, can this be done in two
4 years, yes/no? That's an easier way to do it.
5 I mean, Rob, I'm with you on the
6 importance and I think that's there, but what if I say
7 it's two years and one month? Well, then, that's a
8 no.
9 MR. METZGER: We can always have a roll-up
10 column that's your total final prioritization, but it
11 --
12 MR. SALLEY: But let's put a column in
13 there for time.
14 MS. ANDERSON: I think we're way overdoing
15 this. This is --
16 MR. SALLEY: No, let's --
17 MS. ANDERSON: -- we're never going to get
18 through it if we're trying to get this --
19 MR. SALLEY: Let's get a column in there
20 for time.
21 MS. ANDERSON: -- level of priority.
22 MR. SALLEY: We can stay all night.
23 MR. MUSSATTI: What are we having for
24 dinner?
25 (Laughter.)

1 MR. SALLEY: But put a column in there for,
2 can this be done in two years or less?
3 MR. MUSSATTI: We've got about an hour here
4 that would fill up our schedule perfectly. And we've
5 got this place until 5:00, if we need it. If you've
6 got to catch a train, you've got a carpool that would
7 be held up by you staying any longer, feel free to
8 just say your goodbyes.
9 But I think we can keep on going until
10 very close to 5:00, if we have to. I think we're
11 making good progress and we're exchanging ideas.
12 MR. CAVEDO: Thanks.
13 MS. DeJOSEPH: You guys, now, this is going
14 to -- do we need to change this for the NRC side?
15 Right?
16 MR. MUSSATTI: Put your mic down lower.
17 MS. DeJOSEPH: You mean, I'm not tall
18 enough. Does the priority change on any of these for
19 you guys? Does the N/A change for anything? Do you
20 want me to make that high? I don't think N/A is
21 appropriate, but --
22 MR. SALLEY: If you've got put something on
23 there, put high. But, again, we were -- it's being
24 driven by a different process. High is fine.
25 MR. MUSSATTI: Okay.

1 MS. DeJOSEPH: The HEAF are --

2 MR. MUSSATTI: Tell me about these HEAFs,
3 I still don't understand how industry feels -- or how
4 NRC feels about these HEAFs. Event frequency and NSP
5 FAQ 17-013.

6 MR. HYSLOP: The FAQ, the NSP FAQ I think
7 is high, from my perspective. It's almost done and
8 clearly some of those events are longer than they need
9 to be. And that's been taken into account, you've
10 almost done it, right? So, I think that's a high.
11 Anybody disagree with me? We're all on board for
12 high.

13 MR. MUSSATTI: Okay. High?

14 MR. HYSLOP: There's 1E, I don't really
15 know enough about this distinction, I'll let someone
16 else weigh in on the other one, the 1E versus non-1E.
17 Harry, what do you think?

18 MR. BARRETT: I think it would be great to
19 get it done.

20 MR. HYSLOP: Talk into that.

21 MR. CASTO: How big is this as a
22 contributor?

23 MS. LINDEMAN: It depends.

24 (Laughter.)

25 MR. CASTO: Good answer.

1 MR. MUSSATTI: Sound like an economist.
2 MR. VINCENT: In reference to your
3 question, for NextEra, one of our plants was, like, 12
4 percent reduction in total CDF if we could partition
5 them appropriate to the class of electrical bus.
6 MR. CASTO: Did that seem to be an outlier,
7 though, to the other plants?
8 MR. CAVEDO: No, I think that makes sense.
9 But we shouldn't be setting the NRC priority, we said
10 it was high.
11 MR. CASTO: Well, I'm asking the question
12 and then, we'll set the priority.
13 MR. VINCENT: There were some others that
14 were not necessarily ten percent, but there were some
15 that were in that range. It's not 0.1 percent, this
16 is not -- this is something that you would see a
17 trivial or, not a -- a non-trivial change into your
18 overall risk profile.
19 MR. CASTO: And would we see this in the
20 form, I don't know, with this kind of collective, do
21 we see this in the form of an FAQ or would this be
22 addressed under the HEAF umbrella?
23 MS. ANDERSON: I think --
24 MR. CASTO: It seems --
25 MS. ANDERSON: -- that's TBD.

1 MR. CASTO: -- independent of the HEAF
2 testing.
3 MS. ANDERSON: Yes, I think that's TBD and
4 probably, yes, probably outside of the scope of today.
5 That's probably in the follow-up meeting --
6 MR. CASTO: Okay.
7 MS. ANDERSON: -- where we decide a
8 vehicle.
9 MR. CASTO: All right. We can hold onto
10 that.
11 MR. MUSSATTI: Why don't we split the
12 difference here and just call it a medium --
13 MR. CASTO: Medium?
14 MR. MUSSATTI: -- for right now?
15 MR. CASTO: That's fine for now.
16 MR. MUSSATTI: It does have some merit, but
17 it doesn't seem to have --
18 MR. CASTO: Probably not low.
19 MR. MUSSATTI: -- enough information for
20 anything else. Okay. MCR abandonment HRA, it can be
21 done within two years and --
22 MS. LINDEMAN: I hope so, yes.
23 (Laughter.)
24 MR. MUSSATTI: Well, it says so now.
25 Maybe? Okay.

1 MS. DeJOSEPH: How about, maybe yes?
2 MR. MUSSATTI: Well, maybe yes also implies
3 maybe no.
4 MS. ANDERSON: Priority from industry?
5 MR. MUSSATTI: If they're all high, you'll
6 never get anything selected.
7 MS. ANDERSON: Anybody medium?
8 MR. VINCENT: I would have to say high --
9 I'm sorry, from NextEra's perspective, it would be
10 high for us, due to some of the other --
11 MR. STILES: Yes, I think it should be high
12 --
13 MR. VINCENT: You're right about too much
14 high.
15 MS. ANDERSON: Okay.
16 MR. STILES: -- also, I think that's a
17 pretty important thing.
18 MS. ANDERSON: All right. So, between
19 those two fleets, that's like a quarter of the
20 industry.
21 MR. VINCENT: Yes, we're eight plants and
22 you're a good chunk.
23 MR. STONE: I'm not sure I would be in a
24 big hurry for it, though.
25 MS. ANDERSON: Okay. So, we could split

1 the different and say, medium. Because it's very
2 important to some plants and --
3 MR. MUSSATTI: It's not for others.
4 MS. ANDERSON: We can always revisit.
5 MR. CASTO: But that's work-in-progress for
6 us anyway, so it's on a schedule to complete within
7 two years, yes.
8 MS. ANDERSON: Right.
9 MS. LINDEMAN: Yes, I think what we're
10 debating is the schedule.
11 MR. MUSSATTI: Does this one have enough
12 inertia that it's on its own and doesn't need any
13 extra attention from NRC? Maybe that would put it at
14 a medium, rather than a high. Does that sound
15 reasonable? Okay. Remember, this is just the first
16 cut.
17 MS. LINDEMAN: So, I think --
18 MR. SALLEY: From the NRC's standpoint, on
19 the -- we're happy to work it, we've got the resources
20 and research to do. But I will look to NRR as to, how
21 much do you need this product? And, again, everything
22 is done except for the quantitative piece. The
23 qualitative is done, 1921 is done, this is for the
24 last piece.
25 MR. HYSLOP: We got beaten up a lot by the

ACRS in terms of not looking at things closely. And with the higher frequencies, main control room abandonment is going to be higher. I'm not sure whether it's a medium or a high, but it's one of the two for me.

MR. BARRETT: Yes. I would say that, now that we're starting to knock down cabinets and you separate out the BIN-15 and take out the control cabinets, low voltage control, your next biggest thing is going to be the control board, based on 2169 giving you significantly higher frequency for a control board.

So, I would think this would end up being high for everybody, because as we knock down some of the other conservatisms, this is going to pop up to be a very important thing.

MR. CASTO: So, let's go high and we'll add that to our list.

MS. ANDERSON: Okay. I think the next two are basically N/A. That's ongoing work as needed. Mark, do you agree? The vetting panel FAQs, that's just --

MR. SALLEY: Yes, those are ongoing.

MS. ANDERSON: -- they're going to get done.

1 MR. SALLEY: Those things are --
2 MS. ANDERSON: Yes.
3 MR. SALLEY: -- they've got an impetus of
4 their own.
5 MS. ANDERSON: And I think fire PRA
6 training, we might also be able to call N/A.
7 MR. SALLEY: Yes.
8 MR. MUSSATTI: All right. Fire growth
9 methodology revision? How important is that to
10 industry right now? High? Very high?
11 MR. STONE: I have a question, what's the
12 difference between that one and the fire progression
13 entry?
14 MR. MUSSATTI: Mic down.
15 MR. STONE: This is Jeff Stone. What's the
16 difference between the fire, this one and the fire
17 progression of entry further down? You've got -- we
18 have two, fire growth and fire progression, what's the
19 difference?
20 MS. LINDEMAN: So, this is my perspective,
21 I think they say the same thing. From what I've read,
22 the approach is fundamentally different. So, what
23 I've read is looking at precursors and testing and
24 what I've proposed is looking at OPEX and making
25 better decisions on how to use the data. But I think

1 the intention is the same by both EPRI and the NRC.
2 MR. MUSSATTI: There's -- number 18 and
3 number 21 are basically the same thing, as far as what
4 the target is at the end?
5 MR. CAVEDO: No, they're very different.
6 The 21 is going to give us a new non-suppression
7 probability and 18 is going to give us a different
8 growth model. So, those are two different animals.
9 MR. METZGER: And 18, again, is just sort
10 of wide open, it's more of an abstract concept of,
11 hey, I think what we've heard is everyone agrees that
12 there's something to do with how we characterize heat
13 release rate, essentially, whether that's only the
14 growth piece of the curve or the whole curve.
15 MR. MUSSATTI: Okay. So, one is the subset
16 of another. Did I characterize that right? Or are
17 they completely different?
18 MR. METZGER: They're just two different.
19 MR. MUSSATTI: They're just two different?
20 Okay. We have industry saying that this is a high
21 priority for the fire growth methodology. And how
22 does NRC feel about this? Is this something that is
23 really going to shake the trees for us and get stuff
24 --
25 MR. CASTO: No, I think if it's of benefit

1 to realism, then it's of interest to us.

2 MR. METZGER: Yes, I mean, this was

3 originally part of the work of the RACHELLE-FIRE II

4 Working Group.

5 MR. MUSSATTI: Okay.

6 MR. METZGER: That's kind of where this

7 topic originated. It's since sort of fallen out of

8 that and maybe it's expanding, maybe it's focused.

9 But I mean, in something like this, it's at least

10 medium for us.

11 I think if industry thinks it's high,

12 we're on board with that as well, though, because I

13 mean, it's one of these things that certainly has a

14 big potential.

15 MR. MUSSATTI: Okay. All right. So, I'll

16 let that -- I'm sensing that high is probably where we

17 want to be for both, is that correct?

18 MR. CASTO: Yes.

19 MR. MUSSATTI: Okay. So, let's move on

20 down to the refining the BIN-15 --

21 MS. DeJOSEPH: Within two years?

22 MR. MUSSATTI: Can this be done in two

23 years?

24 MR. CASTO: Yes.

25 MR. CAVEDO: It could be.

1 MR. MUSSATTI: It could be?

2 MR. CAVEDO: Well, an aspect that could be
3 issued just by you guys sending out a nice little
4 quick letter would be, if we did comport the ignition
5 frequency data, which assumes detection at T equals
6 zero, if we got to start using our NSP curves right
7 away, because the data always has detected fires,
8 because that's where the ignitions came from, if we
9 could start at T equals zero, you could just send out
10 a letter right now that we could start doing that.

11 And then, that would be a big short-term
12 benefit that could just be done in a month.

13 MR. MUSSATTI: That sounds like it's
14 shorter than two years.

15 MR. METZGER: It kind of brings up, we
16 talked a little bit about T equals zero in general
17 yesterday and today, should that be a separate item?

18 MR. CAVEDO: Well, it's part of it, or we
19 could make it a separate item if we could get
20 something in the real short-term, like a month or so.

21 MR. MUSSATTI: Okay.

22 MR. METZGER: I suspect it's not actually
23 --

24 MR. MUSSATTI: We're not going to --

25 MR. METZGER: -- as closely --

1 MR. MUSSATTI: -- be able to --

2 MR. METZGER: -- tied to that as we --

3 MR. MUSSATTI: You need to speak into the

4 microphones, because we're not going to be able to get

5 a good transcript of what's going on here to be able

6 to go back and understand what we've been talking

7 about.

8 So, if you've got to move the microphone

9 over so that you can aim yourself and still be able to

10 use the mic, please feel free to do so. Okay.

11 Let's move on to the next one, refining

12 the BIN for the electrical --

13 MR. CASTO: We didn't answer that, I guess.

14 It sounds like it can be done in less than two years.

15 MR. METZGER: It's certainly possible to do

16 it within two years.

17 MR. MUSSATTI: Okay.

18 MR. STILES: Maybe you could add a note up

19 there about issuing a letter.

20 MR. CAVEDO: I agree, that would be a great

21 note.

22 MR. METZGER: I'm not sure what that letter

23 would say. So, we'll have to -- that's a separate

24 conversation, I think.

25 MR. MUSSATTI: All right. Everybody raise

1 your hand when I've finally got control of the meeting
2 back.
3 (Laughter.)
4 MR. MUSSATTI: Let's see what we can do
5 with this next one, refining the electrical cabinets.
6 We have several that are cabinet-related in here,
7 there's one right down there in 28. Are any of these
8 things synergistic? Overlapping? Anything like that?
9 MR. CASTO: Yes, for industry, there didn't
10 sound like there was large interest in BIN-15 focus.
11 MR. CAVEDO: No, we --
12 MR. MUSSATTI: Okay.
13 MR. CAVEDO: -- want that.
14 MR. MUSSATTI: Is that correct?
15 MR. CASTO: Yes, I thought part of this one
16 was --
17 MR. CAVEDO: Okay.
18 MR. CASTO: -- non-suppression probability,
19 wasn't it?
20 MR. CAVEDO: But it was --
21 MR. CASTO: If I recalled what Mark's line
22 --
23 MR. STILES: I thought this one was
24 separating out the power versus the non-power
25 cabinets.

1 MR. CAVEDO: Yes, this was the ignition
2 frequency, breaking it out, just as Harold said.
3 MR. MUSSATTI: Is this a low thrill level
4 for industry?
5 MR. CAVEDO: No, this is a high.
6 MS. ANDERSON: I think it's high.
7 MR. MUSSATTI: High? Okay. All right.
8 Industry's got that at high. And I imagine NRC's got
9 it at least at a medium, because it's on their list of
10 things that are planned for in the near future.
11 MR. HYSLOP: No --
12 MR. MUSSATTI: It's a high?
13 MR. HYSLOP: -- they're both high.
14 MR. MUSSATTI: High-high? Okay.
15 MR. CASTO: Now, this one is driven by data
16 collection, correct?
17 MR. HYSLOP: No, this is simply breaking
18 out the BIN-15s. And with the old methodology, the
19 component frequency, which is something eventual, has
20 to do with the data collection. The data already
21 exists for this.
22 MR. CASTO: Okay. Thanks.
23 MR. MUSSATTI: Okay. So, how do you
24 pronounce that? PRISME?
25 MS. DeJOSEPH: PRISME.

1 MR. MUSSATTI: PRISME? Okay. The E would
2 never be silent on the end of an American word.
3 PRISME III, this is the international work. How high
4 a priority is this? Is it, you've agreed to do this
5 and it's got to be done?
6 MR. SALLEY: Give it a medium for Research,
7 for NRC.
8 MS. ANDERSON: Yes, and I think, based on
9 what we know about it, we would say, low.
10 MS. DeJOSEPH: What about that, Mark?
11 MR. MUSSATTI: It would not surprise us.
12 MR. SALLEY: It's like a five-year program.
13 MR. MUSSATTI: Okay. Fire progression
14 event tree? We spent a good deal of time talking
15 about that yesterday. Industry? We got a --
16 MS. LINDEMAN: I think, high --
17 MR. MUSSATTI: High?
18 MS. LINDEMAN: -- at least for me.
19 MR. MUSSATTI: High priority. And where
20 does that put it with NRC and NRR and RES?
21 MR. CASTO: What would that look like, as
22 far as work? Is that an EPRI/NRC MOU type --
23 MS. LINDEMAN: So, we're interested in
24 working with the NRC and all stakeholders, but I think
25 our main concern is that we need to hit the schedule,

1 especially getting something done before 2019.

2 MR. HYSLOP: That's what I was trying to

3 say, this seems to be pretty -- it's valuable, but I

4 think it might be awfully ambitious to say this is

5 going to be a relatively quick turnaround.

6 MS. LINDEMAN: Yes. So, what -- we're

7 willing to pour more resources and attention to get

8 this done, because we believe it's high priority.

9 MS. DeJOSEPH: So, right now, no, but that

10 might change?

11 MS. LINDEMAN: No, yes, it can be.

12 MR. MUSSATTI: You might want to put a note

13 on that --

14 MR. CASTO: I think I'd probably put that

15 at medium.

16 MR. MUSSATTI: -- based on EPRI resources.

17 MR. CASTO: I know it's important to the

18 other side, but I'm not sure that we would end up --

19 because if we end up having to make a decision on what

20 we're going to fund and what we're not going to fund,

21 that would probably be a medium for us, I think.

22 MS. LINDEMAN: Yes. See, this is

23 confusing, because this also integrates with the fire

24 growth profiles and a secondary effect might be BIN,

25 splitting up the BIN-15 frequency. So, this is all of

1 those and a little bit more put together.
2 MR. MUSSATTI: Are we talking about
3 changing the NRC's priority from high to medium?
4 MR. CASTO: Yes.
5 MR. MUSSATTI: Because it's going to --
6 it's a funding-driven thing?
7 MR. BARRETT: Well, I think what we're
8 going to have here is, we're going to have a whole
9 list of a lot of highs and I'm not sure we're going to
10 be able to fund them all and do them all. I mean,
11 that's part of the thing that we're trying to do here,
12 right?
13 MR. CASTO: Well, yes, but I think right
14 now, if we know -- well, that's a good point. Yes, we
15 can't know for sure what we can't fund, however, if
16 it's -- again, if it goes back to being a high
17 contributor to promoting realism, then we can consider
18 it high and then, we can look at that.
19 Some of it is also related to what we
20 think we can do or what the product looks like. So,
21 it's kind of trying to balance things.
22 MR. MUSSATTI: So, as far as you're
23 concerned, it should be a high, because it could be a
24 real contributor to realism? Is that what I just
25 heard?

1 MR. CASTO: Yes. I mean, data will show
2 that, but --
3 MR. MUSSATTI: Well, you're not going to
4 know that unless you do the work and if you don't --
5 MR. CASTO: Right.
6 MR. MUSSATTI: -- to do the work, you
7 should have it at --
8 MR. CASTO: Yes, that's our commitment.
9 MR. MUSSATTI: -- least as a medium.
10 MR. CASTO: Yes, you can leave it as high.
11 That -- I mean, what this is is, this is our
12 commitment to working to try to achieve it. So, we'll
13 keep that high.
14 MR. METZGER: Isn't it kind of -- I mean,
15 there's obviously a trend here, everything's high,
16 almost. And it kind of makes sense, because we
17 probably wouldn't be talking about it here, this week,
18 if it wasn't at least somewhat high on someone's
19 radar.
20 MS. ANDERSON: Well, this is our first
21 culling. So, maybe if we have more time tomorrow,
22 which I think we might, maybe we could do a second
23 culling of everything that's in the high category.
24 MS. LINDEMAN: Well, there's also parallel
25 paths. The FAQ is one vehicle, Technical Reports is

1 another.

2 MR. MUSSATTI: But we do have a whole half

3 day tomorrow and it's all wrap-up stuff that's written

4 on the agenda, so this wrapping up could be trying to

5 take this down one more notch as far as a different

6 criteria.

7 MS. ANDERSON: So, as Ashley said, Brian,

8 maybe some of the next culling could be, what things

9 could down the FAQ route, which doesn't take up the

10 same resources as the Research route.

11 Or which ones need testing, which sort of

12 takes up a lot of money, and which ones we can do

13 based on data we have. So, maybe those could be some

14 things -- everybody can think about that overnight

15 tonight.

16 MR. MUSSATTI: Yes. So, basically,

17 tomorrow, what we'll probably do is cull out the low

18 hanging fruit right away, the stuff that can be done

19 quickly, easily, and inexpensively. And then, start

20 looking at the remainders as to where they fit,

21 resource wise. And as far as impact on the overall

22 nuclear industry. Sound about right?

23 MS. ANDERSON: Yes.

24 MR. MUSSATTI: Okay, good. Okay. Credit

25 for plant personnel suppression.

1 MR. CAVEDO: I would say, I would recommend
2 this being low for two reasons. The plant personnel
3 credit is built into the non-suppression values now,
4 for the data that's there. And if we can -- if the
5 NRC will send that letter, that T equals zero --
6 MS. DeJOSEPH: No pressure.
7 MR. CAVEDO: -- is the detection
8 probability, then that essentially credits the plant
9 personnel for going in and detecting things. So, I
10 think between those two issues, we would already be
11 covered. So, my recommendation --
12 MS. LINDEMAN: So, I -- oh, sorry, go
13 ahead, finish.
14 MR. CAVEDO: No, go ahead, I'm done.
15 MS. LINDEMAN: Sorry. I guess I disagree,
16 mainly because we think that there is a synergy
17 between how the fire grows, how the fire is initiated,
18 and how it is suppressed.
19 And that's the same trap that we're in
20 right now, we don't have a good mechanistic way of
21 treating all those parameters together. And if we
22 don't address suppression, we don't fix the initial
23 problem.
24 MS. ANDERSON: Plant, people, utilities.
25 What do you guys think? High, medium, low, anything?

1 Harold, insights?

2 MR. VINCENT: I guess, so from our

3 perspective, making a decision on it from a plant

4 perspective. Like, we didn't do a sensitivity study,

5 sorry, Keith Vincent, NextEra.

6 We didn't do a sensitivity study so it's

7 hard to understand or gauge the overall impact of

8 this. And while there is something to be said that,

9 you do credit correlation, but for me to say it's high

10 would imply that I know that I'm going to get maybe

11 five to seven percent reduction in my risk profile.

12 And without having that it's a little hard

13 for me to just say high. I don't want to, but I know

14 Rob has, we have, specific people have feelings about

15 this and I guess it's hard to understand or gauge

16 that. Like, what is the overall impact for this

17 topic.

18 MR. SHUMAKER: Denis Shumaker. Ashley

19 gave us some numbers with respect to the percentage of

20 fires that were detected by the human nose and it was

21 very high, so I think that there should be, that

22 should be a significant contributor if you're seeing

23 that kind of detection rate, right?

24 MR. MUSSATTI: Harold even mentioned a few

25 of those yesterday in his discussion about how they,

1 they had a smell that they got and then later on, all
2 of a sudden, there's an alarm, son of a gun.
3 MR. STILES: I did. And then I do think
4 it occurs fairly frequently, I just think that we have
5 more higher priority things to work on so I'm going to
6 give --
7 MR. MUSSATTI: So basically what this is,
8 is that you're going to get some sort of a benefit on
9 your risk level because you're taking advantage of
10 people doing the right thing.
11 MS. ANDERSON: Yes. It could be, say,
12 medium for this.
13 MS. LINDEMAN: I mean, we already started
14 work on it from the EPRI side --
15 MS. ANDERSON: Okay.
16 MS. LINDEMAN: -- so, you know, medium is
17 fine.
18 MS. ANDERSON: So we could say medium and
19 then we could say, yes, it could be done within two
20 years.
21 MS. LINDEMAN: Okay.
22 MR. MUSSATTI: How about a medium for NRC
23 because the Industry is going to do all the work.
24 (Laughter.)
25 MR. CASTO: Shouldn't it be higher?

1 MR. MUSSATTI: It should be higher because
2 you guys are going to do all the work? I think medium
3 would be about right.
4 MR. CASTO: It's fine.
5 MR. MUSSATTI: It's also something that
6 there are things on there that seem a heck of a lot
7 more important as far as the safety side. This seems
8 more like a money saving side because of taking
9 advantage of that.
10 Okay, plant trip probability. In other
11 words, does the fire trip the plant, correct? And
12 where does Industry stand on this?
13 MR. CAVEDO: I would vote for a medium on
14 this. It's a lower contribution. But this is also on
15 the, the NRC could do us a favor and send us another
16 quick letter. Because if the fire doesn't impact
17 anything, then clearly saying that it doesn't cause a
18 trip is a reasonable supposition, so that would be
19 another quick thing that we could get some guidance
20 on.
21 MS. ANDERSON: So we could call it a
22 medium and then when we come back tomorrow we could
23 say this is one we could send down the FAQ path so it
24 wouldn't be taking up research resources.
25 MR. STILES: If I could point out --

1 MS. ANDERSON: Yes --
2 MR. STILES: -- we do have a hear me out
3 plant trip --
4 MS. ANDERSON: -- we do have that thing --
5 MR. STILES: -- already, of a process to
6 a --
7 MS. ANDERSON: Yes. We do have the sort
8 of documented thing wandering around.
9 MR. STILES: Right. And we have applied
10 it at some plants already.
11 MR. BARRETT: Not to throw a monkey wrench
12 in here, but you also have operators that are trained
13 any time they're feeling uncomfortable about where the
14 plant is, they're to trip it and put it in a safe
15 condition. So that's kind of a wild card that's
16 difficult to model.
17 MR. STILES: Well actually, the White
18 Paper does take that into account too.
19 MS. ANDERSON: Yes. So, anyway, we're not
20 going to problem solve today, but it's something that
21 we might be able to rapidly take care of.
22 MR. MUSSATTI: So, let's stick that as a
23 medium so that we don't overlook at it tomorrow, with
24 the proviso that it might turn into be a low for NRC
25 tomorrow when we make the next cut. Does that sound

1 like it's in line with what I'm hearing from NRC?
2 MR. CASTO: Sure. For now, yes.
3 MR. MUSSATTI: So we'll put that as a
4 medium. And weren't we going to be an FAQ note on
5 that one that this could be handled through the FAQ
6 process, and that would simplify things for us?
7 MS. ANDERSON: Yes.
8 MR. MUSSATTI: Okay. All right, MCB fire
9 modeling. I don't even know what an MCB is, but ---
10 Main control board, there we go.
11 MS. ANDERSON: All sorts of things to
12 learn today.
13 MR. MUSSATTI: Didn't we just talk about
14 control boards up above, on a different room.
15 MS. ANDERSON: Control room.
16 MR. MUSSATTI: Control room. The whole
17 darn room. Okay. Does that include the board?
18 Okay. Is this the subset of the one up
19 above or is this an entirely different --
20 MS. ANDERSON: You're trying to interject
21 way too much logic into this.
22 (Laughter.)
23 MR. MUSSATTI: I'm desperately trying to
24 figure out what it means. What is Industry's thought
25 on this?

1 MR. CAVEDO: Well, before we vote, maybe
2 someone could champion what they think we're going to
3 gain by this, is this an improvement to the Appendix
4 L curves or what is this exactly?
5 MS. LINDEMAN: So, Rob, this is to suss
6 out, maybe -- sorry, long day. Let me start again.
7 Perhaps we need heat release rates
8 specific for how fire grows in the main control board.
9 And that would be integrated into Appendix L. And
10 then we'd consider, well, and then we'd reevaluate
11 whether or not Appendix L is valid or there might be
12 a more realistic way of characterizing how the fire
13 grows and spreads in the main control board.
14 MR. STILES: If I could say also, I would
15 like to think they eventually would come up with a way
16 to replace Appendix L. I don't think it has very much
17 credibility. Other than it's an accepted method, okay
18 fine, we're using it.
19 MR. JOGLAR: But the --
20 MR. STILES: Oh, actually, we're not. In
21 one of our plants we did do fire modeling of the main
22 control board.
23 And what we found out is that where
24 Appendix L doesn't let you get outside the cabinet, up
25 near the cable trays, we get our greatest LERF impact

1 when the fire does impact the cable trays above the
2 control boards. So I would like to replace Appendix
3 L.
4 MR. JOGLAR: My opinion is, I've never
5 been completely convinced of our fire peer results
6 having the control room right at the top. Because
7 never seen a big fire in the control room, and it's
8 just artificially because the targets are a lot, but
9 the crude way we model the control board.
10 But we've never seen a big fire in this
11 place and it's an artificial because of the, right,
12 the CCDPs sometimes are high. So our vision here was
13 that we have to figure out a way of realistically
14 putting targets to this, that it's not all the cables
15 that end up in a given panel because there is no other
16 way of doing it right.
17 So, it goes to where you're going with
18 Appendix L, right? That's crude and has its
19 limitations. So kind of looking at all of that at the
20 same time.
21 MR. CAVEDO: Harold, could you state what
22 benefit you got when you went to that alternate
23 method?
24 MR. STILES: Well, I think that we had
25 greater confidence that we were in fact capturing the

1 true risk. I mean, if you look at the front side of
2 the control board and just measured the distance
3 between the knob sticking through, there seems to be
4 little correlation between that and where the cables
5 are. Where the fire risk are.
6 I mean, it's just hard to imagine how that
7 actually works. Okay?
8 Now, what we did was we did look at the
9 cables coming in there and took cut sets that resulted
10 from damaging those cables and then applied frequency
11 to those individual cut sets. So I feel like we
12 actually did capture the risk of that control board a
13 lot better.
14 MR. CAVEDO: I'm sorry, what do you think
15 the priority is?
16 MR. STILES: Well, I would also say that
17 where we did that, we also credited incipient
18 detection in that area too.
19 MR. MUSSATTI: Okay, given all of that,
20 where does Industry seeing this being, is this
21 important, moderately important?
22 Harold, what do you think? I mean, it
23 sounded like you're kind of skeptical about it because
24 of where it's going to be placed, is that right?
25 MR. STILES: I was going to give it a

1 medium because I do think it's important, I just don't
2 think we're going to get it done in two years.
3 MR. MUSSATTI: Okay. Then we'll put that
4 note onto it then. Unless there's a large outcry from
5 somebody else in Industry that wants something
6 different, I think a medium with a not possible in two
7 years is a reasonable starting point.
8 MR. JOGLAR: Yes. It's just that we see
9 it showing up in the skyline and it's among the top
10 risk contributors in all the plants. So if there is
11 something to improve, that's one of them.
12 MR. MUSSATTI: Okay.
13 MS. DEJOSEPH: Did I get that right?
14 Medium no?
15 MR. MUSSATTI: Yes, I believe that is
16 correct. And for Industry we're going to defer to NRR
17 on this. Or for the NRC I mean, we're going to defer
18 to NRR?
19 MR. METZGER: I mean, a lot of these
20 topics will be driven by what Industry tells us needs
21 to be a priority, so yes, if we need to put something
22 in here, sure, medium.
23 MR. MUSSATTI: Okay. And that actually
24 makes a lot of sense. All right, updated EC NSP
25 curve.

1 MR. CAVEDO: I would vote high.
2 MR. MUSSATTI: That's a high. Is that
3 because it was your work?
4 MR. CAVEDO: No.
5 MR. MUSSATTI: All right. Can it be done
6 in two years?
7 MS. DEJOSEPH: Yes.
8 MR. MUSSATTI: Rob, can it be done in two
9 years?
10 MR. CAVEDO: Oh, yes. Definitely.
11 MR. MUSSATTI: Does it need a letter?
12 MR. CAVEDO: A letter would be nice if you
13 guys could generate one, but Mark can probably take
14 care of it.
15 MR. MUSSATTI: Okay. And where would NRC
16 put that?
17 MR. HYSLOP: Did you --
18 MR. CASTO: Level of work.
19 MR. HYSLOP: Did you just look at the
20 times and change the times for the cabinets?
21 MR. SCHAIRER: No, I haven't done anything
22 with electrical cabinet.
23 MR. HYSLOP: It seems like we're doing a
24 lot of electrical. This seems like this would be a
25 low. Because we're already doing a lot of electrical.

1 MR. SCHAIRER: I only looked at a handful
2 of events, and yes. Same approach as FAQ 1713.
3 MR. MUSSATTI: Low for NRC?
4 MR. HYSLOP: Is everybody okay? I think
5 it's low because there is so much going on on
6 cabinets. We've got this progression tray, we got all
7 this stuff.
8 If you accomplish that, which I don't know
9 if you will, but if you do, we're going to be cutting
10 down the cabinets as it is. And so we really should
11 spread around our resources in the different areas, so
12 that's why I said low.
13 MR. MUSSATTI: Do you want to rebut that
14 mister electrical guy?
15 (Laughter.)
16 MR. SCHAIRER: I have a question for
17 Ashley. Is there any overlap between that one and Row
18 19?
19 MS. LINDEMAN: Sorry, I can't see. Is Row
20 19 plant personnel suppression?
21 MR. SCHAIRER: Fire progression of entry,
22 NSP.
23 MS. LINDEMAN: Well, so what I see is, I'm
24 guessing you'd like to pursue the EC NSP in FAQ?
25 MR. SCHAIRER: That hasn't been decided

yet, I don't know.

MS. LINDEMAN: The FAQ is just refining based on control time, right? So perhaps this is a near-term, and what we're doing in research is forward thinking.

MR. ZEE: Well, Ashley, maybe you were heading in this direction. My thoughts on this one is, is to the extent that the other electrical cabinet activities give you all the information you need to readily recalculate an NSP, we should do it.

So in that context I say it's high to the extent that it's a freebie. Given everything else that's going on.

So, J.S., I guess I'm kind of a modified agreeing with you. I'm saying we should do it if it turns out to be a freebie given everything else we're doing. We shouldn't do extra work to get this one forward.

MR. MISKIEWICZ: This is Dave Miskiewicz. I kind of was about to say the same thing you just said, is that if we change ignition frequencies and all that and this data is tied with that, then this should go along with that.

MR. CASTO: Then we can go with a medium with this based on that said, but it shouldn't be a

high.

MR. MUSSATTI: Okay. So you'd be able to harvest the data that's from other work in the same area and be able to recreate, or create what you need here?

Okay, Synergy. Okay, the next one down, fire damages, part of equipment in cabinet.

MR. CAVEDO: I would vote low for this.

MR. MUSSATTI: Low? We have a low. Any objectors here?

MR. METZGER: I agree.

MR. MUSSATTI: Okay. It seems to be low for Industry, that would probably mean low for us as well.

MR. ZEE: I would do medium.

MR. MUSSATTI: You would do a medium?

MR. ZEE: I would do medium.

MR. MUSSATTI: Do you want a microphone so everyone can hear you?

MR. ZEE: I would do a medium. My thoughts on this, kind of thinking out loud is, this should be a problem for the boilers. Most of the boilers did not go 805, so maybe we don't know what's going on there.

And most of you guys should have a non-

safety related cabinet somewhere in your plant that's got all the differential relays for all the offsite power stuff. So, if you don't have this then you're going to have a, you likely might have a single cabinet fire that results in total loss of offsite power.

And it probably already has, internally, some natural separations. So, I mean, I would put it in the medium bin.

MR. MUSSATTI: All right, a chance to revise going once? Industry, leave it low, put it medium?

MR. METZGER: NRC or Industry?

MR. MUSSATTI: Who was that?

MR. METZGER: Are you asking the NRC to answer that or Industry?

MR. MUSSATTI: Okay, NRC, what would you say?

MR. METZGER: Yes. I mean, to be honest, for the remainder of these topics the NRR's position is that they're low. Simply because we don't have a need to pursue them. But again, if Industry sees there is a need, then we're certainly open to that.

MR. MUSSATTI: Okay. All right. Then we'll just ask you to revise your opinion as we go

1 through the list.

2 Is this a medium now or are we going to

3 leave this as a low so we finally get rid of something

4 off this list for tomorrow? Going once, twice --

5 MS. DEJOSEPH: You hear a lot of lows.

6 MR. MUSSATTI: Okay, low.

7 MS. DEJOSEPH: What about within two

8 years?

9 MR. MUSSATTI: I don't know. Okay, reduce

10 NSP.

11 (Laughter.)

12 MR. MUSSATTI: What was that?

13 MS. LINDEMAN: A letter.

14 MR. MUSSATTI: A letter again, okay. Yes.

15 MS. LINDEMAN: This is everything.

16 MR. MUSSATTI: Okay, reduce NSP 4 from 1E-

17 3 to 1E-5.

18 MR. ZEE: I'd say low.

19 MR. MUSSATTI: Low. Are we developing a

20 trend here on these last ones that are on the list and

21 pretty much they're all kind of low or medium?

22 MR. ZEE: No.

23 (Laughter.)

24 MR. STILES: Maybe we could have a pile

25 and just because it does, just take a letter.

1 MR. MUSSATTI: Okay, was that, I heard a
2 low on that, how did it jump to a medium?
3 MS. DEJOSEPH: I heard a medium and then
4 I heard a high.
5 MR. MUSSATTI: A medium, a high and a low,
6 so it kind of evened out.
7 MR. SHUMAKER: If I go medium right now,
8 I don't know what all the other votes are.
9 MR. MUSSATTI: Okay, what's the logic
10 behind that?
11 MR. SHUMAKER: Benefit. I think we've
12 artificially created a floor that doesn't need to be
13 there. That's kind of where I am. I think that --
14 MR. MUSSATTI: It's unrealistic?
15 MR. SHUMAKER: It's unrealistic, right.
16 MR. MUSSATTI: Can that be done in two
17 years?
18 MR. CASTO: So what would justification
19 look like?
20 MR. MUSSATTI: Okay, maybe we should add
21 an extra column in there for letters.
22 (Laughter.)
23 MS. ANDERSON: We can do that tomorrow.
24 MR. MUSSATTI: That's for tomorrow?
25 MS. ANDERSON: Yes.

1 MR. MUSSATTI: Okay, we'll figure out all
2 the letters tomorrow.
3 MR. METZGER: When I hear this letter,
4 kind of what I hear is like a FAQ closure memo.
5 MS. ANDERSON: Yes. Yes, so that's --
6 MR. METZGER: The FAQ, which we'll talk
7 about tomorrow.
8 MS. ANDERSON: Right.
9 MR. METZGER: Okay.
10 MR. MUSSATTI: Is this anything that could
11 be done with an FAQ or is this just something that
12 needs to be worked through the system?
13 Okay. Transient controls. FAQ Number 14-
14 007. That's the spy FAQ.
15 MS. ANDERSON: I mean, that one's almost
16 done. Yes, I mean it's basically.
17 MR. MUSSATTI: It's basically done so we
18 should consider that to be at least a medium?
19 MS. ANDERSON: Yes.
20 MR. MUSSATTI: Does it take more resources
21 to do or is it --
22 MR. CAVEDO: Wait. For transient controls
23 I would vote for a high.
24 MR. MUSSATTI: Okay. Just because it is
25 so close to done and get it out of the way?

1 MR. CAVEDO: No. It provides a good
2 benefit in areas where we've put in controls and I
3 think that's important for realism.
4 MR. MUSSATTI: All right. We have a high
5 from Industry but we have a low from NRC. Do we want
6 to reconsider that low of ours to --
7 MR. HYSLOP: Which one are you talking
8 about here?
9 MR. MUSSATTI: We're talking about the
10 transient controls.
11 MS. ANDERSON: Cable tray ignition.
12 MR. HYSLOP: It's almost done. I would
13 call it a medium because it's almost done.
14 MR. MUSSATTI: Okay. Is that the same
15 condition with the cable tray ignition or did we get
16 ahead of ourselves here?
17 MS. ANDERSON: Cable tray ignition might,
18 I think has a little more work.
19 MR. MUSSATTI: Medium as well since it's
20 mostly done?
21 MR. METZGER: I mean, there's a fact
22 that's already, I don't know what percentage is done
23 but it's certainly more than half way done.
24 MR. CAVEDO: Yes, I would say 100 percent
25 done.

MS. ANDERSON: Says the FAQ author.

MR. HYSLOP: Hey, Rob, do you just need the letter?

(Laughter.)

MR. METZGER: Put that in meeting if it makes you feel better.

MR. MUSSATTI: Dear Rob.

(Laughter.)

MR. MUSSATTI: Okay. Cable fire spread.

MR. CAVEDO: I would vote low.

MR. MUSSATTI: Low?

MR. HYSLOP: Yes, that's low for NRC.

MR. MUSSATTI: Okay. Finally some agreement. Could it be done in two years if we got to it or is this going to require a lot of work?

All right, and then we're down on the last one now. 2180 enhancement, FAQ 17-012.

MR. HYSLOP: I'm going to say yes.

MR. MUSSATTI: Excuse me?

MR. HYSLOP: That's a yes.

MR. MUSSATTI: That is a yes? Oh, that's the wrong question. FAQ 17-012, is that a low priority or a high priority? For Industry.

MR. STILES: I'm going to recommend high.

MR. MUSSATTI: High. Rational?

1 MR. STILES: I think it's the only one up
2 there that actually reduces the real risk of fire.
3 MR. MUSSATTI: Well, that would be a good
4 reason. Can it be done quickly or is this something
5 that's going to take a little bit of work?
6 MR. STILES: It's going to be a lot of
7 work, but I think we can get it done in two years. We
8 have a plan to get something out by the end of this
9 year, in the revision by next year.
10 MR. MUSSATTI: Okay. Whose doing all the
11 work, is this primarily --
12 MR. STILES: It would be me.
13 (Laughter.)
14 MR. MUSSATTI: Primarily Harold. Okay,
15 well, congratulations, you've got job security. What
16 would NRC say on that, is that still a low for us on
17 the priority or --
18 MR. CASTO: Move that to medium.
19 MR. MUSSATTI: Okay.
20 MR. CASTO: It depends on completion of
21 the data collection and the work done by Industry, but
22 we'll standby.
23 MR. MUSSATTI: Okay. I think that was an
24 NA on that first one up there as well. For NRC.
25 MS. DEJOSEPH: We don't have any NAs

1 associated with an Industry priority not being an NA.
2 MR. MUSSATTI: No, we didn't. I'm going
3 to bring this up and ask her to put these at the
4 bottom. And can I have this?
5 MR. CASTO: Sure. Yes.
6 MR. MUSSATTI: I was just handed a set of
7 slides from this presentation from earlier and we did
8 miss a few things from NRC, and I'd like to ask these
9 to be added to the list and we go through them for
10 tomorrow. There's only one, two, three, four, five,
11 five bullets that are actually substantive.
12 MS. ANDERSON: One, two, three, four,
13 five?
14 MR. MUSSATTI: Yes. Digital I&C, those
15 sorts of things that we discussed earlier, but we
16 didn't really catch it because we were concentrating
17 on the one through 16 instead. So this will round out
18 the complete list of NRC issues. I apologize for
19 having missed those.
20 MR. CASTO: It's VEWFD, oh, well, let's
21 see. No, I guess you're putting more up there.
22 MR. MUSSATTI: While she's filling out the
23 other ones, we can at least start talking about the
24 first one. We'll paint those green because those are
25 NRC ones.

1 MR. SHUMAKER: Can I ask a question?
2 MR. MUSSATTI: Yes. That was a question.
3 MR. SHUMAKER: Yes. Okay, can I ask
4 another question?
5 MR. MUSSATTI: No, you need to ask two
6 more questions.
7 (Laughter.)
8 MR. SHUMAKER: In terms of Bin 15, I guess
9 I think, or I thought, I'm not sure what I voted on
10 exactly, but the situation, I think the most important
11 thing for me right now is we have a lot of cabinets
12 that are 28 volt DC I&C and 28 volt control that we
13 evaluate as cabinets, right?
14 So when we parse that out, I'm hoping that
15 those cabinets will see a different spot. And is that
16 within Bin 15 or not, do you know, Ashley?
17 MS. LINDEMAN: Yes, so we've gone through
18 the data and things like power equipment, MCC, switch
19 gear and load center are very easy to differentiate
20 from the event data.
21 When we look at the experience and control
22 cabinets it's a little bit tougher to differentiate
23 voltage, so I think that's why I didn't propose it as
24 the first means to move forward because I think we
25 recognize the difference in ignition potential.

1 MR. SHUMAKER: Because the only reason I
2 ask is that, I don't know, probably 50, 60 percent of
3 our CDF is in rooms that have a lot of cabinets that
4 are 28 volt and I really don't believe that risk is
5 real. And I'm trying to figure out how to --
6 MS. LINDEMAN: Kiang looks like he wants
7 to say something.
8 MR. SHUMAKER: -- how to solve that.
9 MS. LINDEMAN: Oh, did you want to say
10 something? Oh, never mind. Okay, I'm sorry.
11 MR. HYSLOP: Yes, I guess Harry's point of
12 view was that the low voltage cabinets would indeed
13 see a lower fire frequency so he thought there would
14 be a benefit from the Bin 15 split. So I don't know
15 if he's thinking about 28 volt, but certainly 125, 150
16 or below. That was NRCs perception.
17 MR. SHUMAKER: I guess my question was, if
18 it wasn't going to get covered by Bin 15 --
19 MR. HYSLOP: Bin 15 --
20 MR. SHUMAKER: -- I don't know if there's
21 a way to throw another one on the table, but that's
22 one that I feel is important.
23 MR. HYSLOP: Low voltage cabinets -- Oh.
24 MR. ZEE: This is Kiang. As a matter of
25 clarification, I mean, we like to talk about power

1 distribution cabinets and then we like to talk about
2 low voltage control cabinets.
3 And I'm not sure what people's mental
4 model are when you think of low voltage electrical
5 cabinets, but conceptually, imagine a control room or
6 a rad waste control panel that's entirely digital
7 control, or imagine going down in a plant and you have
8 two data processing cabinets associated with a digital
9 control system. In other words, it's all 5 volt
10 signal stuff going through, there's no, the only thing
11 that's 125 volt DC is maybe one little power supply
12 that's in there.
13 So I guess the thought process is, putting
14 that in the same category as low voltage electrical
15 cabinets is a little bit of a misnomer.
16 MR. HYSLOP: I guess we haven't
17 necessarily established the framework for the Bin 15
18 split. The Bin 15 split was just to divide those
19 electrical cabinets into suitable categories.
20 I'm not a plant person so I'm not going to
21 debate you, Kiang, on what --
22 MR. ZEE: Well, no, I'm just giving your
23 clarification in the terms of what Denis is trying to
24 get at.
25 MR. HYSLOP: No. But --

1 MR. ZEE: Because you can actually
2 subdivide all the low voltage control cabinets into
3 subcategories.
4 MR. HYSLOP: So that would be decided in
5 the Bin 15 split, but without the Bin 15 split you're
6 certainly not going to get what you want, with the Bin
7 15 split. I guess that's to be decided.
8 MR. SHUMAKER: Okay. Well, I mean that
9 was the highest priority but I wasn't sure for me.
10 For both of our plants. Actually, that one in
11 particular. And, okay, that's good enough. Thanks.
12 MR. MUSSATTI: Okay. Let's move on down
13 to those new items, starting with Line 32. Very early
14 warning fire detection system. There is some
15 remaining work on it.
16 MR. SALLEY: Again, these are the ones
17 that I added last minute based on some of the
18 discussion. I just went for completeness to put them
19 up here to make sure we got everything.
20 MS. ANDERSON: I think the remaining work
21 is mostly under the 2180, the enhancements, right? Or
22 is there, okay, so we can probably delete that row.
23 MR. MUSSATTI: Just delete the row and
24 then put that as a, we're not doing any work and --
25 MS. ANDERSON: Well, no, what I'm saying

is, 2180 enhancements and very early warning fire detection system remaining work are the same, so.

MR. MUSSATTI: Okay. What are the priorities now? That's fine. Okay.

Okay, instrument circuits spurious operation. I have no idea what that means. Industry?

MR. CAVEDO: I would vote low.

MR. MUSSATTI: Low?

MR. SALLEY: And again, I'll go to NRR, what their thoughts are. This is something we threw up.

MR. MUSSATTI: They're all low, as far as you're concerned, at NRR?

MS. ANDERSON: I think they're low -- I think it even works for us. Yes, I think they're all low for us too.

MR. MUSSATTI: Okay.

MS. ANDERSON: Anybody from Industry with a differing opinion please speak up.

MR. MUSSATTI: These were put up mainly for completeness just so that we didn't leave any lose strings to trip over.

MR. STILES: So I just wonder, did those relate to any of the ones above?

MS. ANDERSON: Does what?

1 MR. STILES: Were those last four related
2 to any of the ones above?
3 MS. ANDERSON: I don't think so.
4 MR. METZGER: That one, management, might
5 be higher. I mean, it depends on what you consider in
6 that, I mean, as far as like updating 7150, for
7 instance, could technically fall under that category
8 but it's already listed elsewhere. So, I'll defer to
9 Mark on that one.
10 MS. CHAN: Joelle, can you scroll up? I
11 thought we talked about instrument circuits earlier.
12 MR. MUSSATTI: Small scale instrument
13 circuits, is that --
14 MR. SALLEY: Yes, this is, the second one
15 was for the larger scale. So we have the small scale
16 is completed, we were getting ready to move into the
17 large scale. We stopped the program as part of
18 Project Aim. And that's again, just for something for
19 completeness. So if it's low, it's low.
20 MR. MUSSATTI: Well guess what, it's a
21 quarter after four. The two year?
22 MR. SALLEY: Joelle, the large scale goes
23 to Row 32.
24 MR. MUSSATTI: Large scale goes where?
25 MR. SALLEY: Row 32.

1 MR. MUSSATTI: Okay, have you finally
2 figured out how to save that then?
3 MS. DEJOSEPH: I can't save this, so --
4 MR. MUSSATTI: You saved it? You have a
5 copy?
6 MS. ANDERSON: So can you save that and
7 send it to me, tonight, and then I can send it out to
8 all the Industry people, and maybe you send it out to
9 all the NRC people participating? This way people
10 have it to look at tonight, you know.
11 MR. MUSSATTI: As a starting point.
12 MS. ANDERSON: Right.
13 MR. MUSSATTI: Keep notes on it as to
14 where you think we should go next.
15 MS. ANDERSON: Right.
16 MR. MUSSATTI: Yes, that one should have
17 been an NA because it was in process and it was
18 getting close to being done. Isn't that correct? The
19 first one that was on your list.
20 Okay. NUREG-7150. Mark, the first one up
21 there, NUREG-7150, was Number 1 out of the 16. The
22 one that I had listed down as having been done. It
23 has a little bit more work but basically there's
24 nothing else to do.
25 MS. DEJOSEPH: Oh, it's the cleanup work

1 that Andy was talking about at the beginning there.
2 MR. MUSSATTI: Okay.
3 MS. LINDEMAN: Well no, to clarify, it's
4 mainly a bookkeeping exercise. There's no technical
5 work to be done.
6 MR. MUSSATTI: Right. This was that
7 Volume 3, Volume 1 crosswalk issue? Okay. Yes.
8 MS. LINDEMAN: Yes, it was not in
9 progress.
10 MR. MUSSATTI: Yes, it's just an editorial
11 thing in progress.
12 MS. LINDEMAN: No, no, it's not started.
13 MR. MUSSATTI: Oh, it's not in progress?
14 MS. LINDEMAN: No.
15 MR. MUSSATTI: It still needs to be done
16 but it's not a big deal?
17 MS. LINDEMAN: Well --
18 MR. MUSSATTI: It's a big deal --
19 MS. LINDEMAN: -- I debate whether it's
20 not a big deal or not, but --
21 MR. MUSSATTI: I mean, as far as the
22 amount of the work. I mean, the importance of it
23 being consistent and everything is --
24 MR. FERRANTE: Well, I think we've gone as
25 far as we can with this. Tomorrow we can have more

1 columns that says, who, what, what status and when.
2 And that's going to maybe refresh people's minds on
3 what needs to be done.
4 MR. MUSSATTI: I tend to agree. I think
5 we've reached a good stopping point for the night
6 because we're starting to work through these. And we
7 got our first cut on these, and so tomorrow we can
8 take a look at it again.
9 Start out with a reality check to see
10 whether we should be dropping all the ones that say
11 either NA or low. And then rearranging the list from
12 there to see what we actually come out with as
13 priorities. Does that sound right?
14 Okay, again, keep your badges. Don't let
15 them get lost or otherwise you'll have to go through
16 the whole process tomorrow of going through the main
17 entrance up above, which is not a lot of fun.
18 And fill out the forms out here for the,
19 the feedback forms for the facilitators, if you get an
20 opportunity to. Remember that my dog needs to be feed
21 and this is part of my job. And I think we're
22 adjourned for the day.
23 (Whereupon, the above-entitled matter went
24 off the record at 4:16 p.m.)
25