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Test Plan Comment Resolution

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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HIGH ENERGY ARCING FAULT LARGE-SCALE TEST PLAN

COMMENT RESOLUTION

+ + + + +

WEDNESDAY,

MARCH 20, 2019

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ROCKVILLE, MARYLAND

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The public meeting was held in Room O-11B04, Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike, at 1:00 p.m., Mike Cheok, Deputy Director, Division of Inspection and Regional Support, presiding.

NRC STAFF PRESENT:

MIKE CHEOK, Office of Research

TOM BOYCE, Generic Issues Program Manager, Office of Research

STAN GARDOCKI, Generic Issue Program, Office of Research

KENNETH HAMBURGER, Office of Research

NICK MELLY, Office of Research

1 BRIAN METZGER, NRR Fire Protection

2 KENN MILLER, Office of Research

3 MARK SALLEY, Office of Research

4 GABE TAYLOR, Office of Research

5 MARK THAGGARD, Office of Research

6

7 ALSO PRESENT:

8 VICTORIA ANDERSON, NEI

9 JANA BERGMAN

10 PAUL GUNTER, Beyond Nuclear

11 CHRIS LAFLEUR, Sandia National Laboratories*

12 CASEY LEJA

13 CHICO PELIZZARI*

14 TONY PURTORTI, NIST*

15 MARKO RANDELOVIC, EPRI

16 RONNIE REYNOLDS, Exelon

17 MIKE SHAIRER*

18 OZZIE VIDAL*

19 KELLI VOELSING, EPRI

20 *present by telephone

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C-O-N-T-E-N-T-S

Welcome and Opening Remarks

Mike Cheok 4

Introduction

Mark Salley 5

Marko Randelovic 20

Nicholas Melly 25

Discussion and Comments 65

Adjournment 75

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

12:56 p.m.

MR. CHEOK: Thank you for coming today.

As you know this is a series of -- one in a series of public meetings. We will -- we had and will continue to have -- talk about the aluminum HEAF generic issue. Again, these meetings that we have periodically -- in between meetings we will continue to work in the work group with EPRI on things like the testing procedures, comments on doing risk analysis, on doing frequency determinations, and we'll continue to have these public meetings to basically inform everybody else what we do on -- on what we're doing and to get comments in a public forum.

So today's meeting is mostly to hear any additional public comments we have. We intend to be mostly in a listening mode because I don't think -- we got some of the comments beforehand, but at this point I think we want to listen to what you all have. And we'll offer a second meeting to be able to come back and respond to any comments you may have.

And the one thing I want to say is we have to keep in mind that this generic issue process is about, right? So we would like to have a schedule or type of -- we would like to finish things in a certain

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1 schedule. And also as part of the generic issue
2 process it's not -- we don't intent for a lot of
3 things to be research projects as such. And so we
4 will listen to all the comments on doing testing. We
5 will try to incorporate them without having to impact
6 on our schedules by too much. Plus we don't want this
7 generic issue to continue for a long time. We would
8 like to get it finished in time that we will -- it's
9 supposed to get finished by.

10 And so we will try to incorporate a lot of
11 the comments as much as we can and we'll keep
12 everybody involved. And we will keep you updated as
13 to what our responses would be and we will get your
14 feedback into our responses. So it will be a
15 continuing feedback process.

16 So with that I'll just let --

17 MR. SALLEY: Okay. So I guess -- good,
18 Mike. Thank you. I want to give -- just give you a
19 quick overview of this, and the meeting is for you
20 all, so we'll turn it over to you. We'll just do a
21 little quick intro, or a quick overview of the
22 project.

23 As we've been going through and doing the
24 testing we've tried to be as transparent as possible
25 in both the large and the small-scale test plans.

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1 We've put those out in the *Federal Register* notice and
2 we've asked for public comments. And you can just see
3 just a sample there of some of the comments we have
4 received. You'll notice the OECD ones there that we
5 also have a follow-on project that we're doing
6 internationally with 10 countries to further look at
7 HEAFs in total.

8 Again, a lot of the comments we received
9 a lot of interest, and it's a little bit of a hard
10 problem because we don't have an easy test standard.
11 We just can't pull a test standard off the shelf and
12 here is the IEEE or NFPA how to test a HEAF and get
13 all the information you need, much like a fire barrier
14 or something simple, penetration seal. So we're
15 having to put the test plan together and do it as we
16 move along.

17 There's an IEEE standard on arc faults.
18 I believe it's C37.20.7, and that's a good starting
19 point and it helped us out with some of the things
20 like the shorting wire, where to locate it, the size,
21 the ASTM slug for the calorimetry, but we're also
22 relying heavily on the National Institute of Standards
23 and Technology, NIST. Their thing is measurement.
24 They've got a whole fire measurement laboratory to
25 work with us.

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1 We're also reaching to Sandia to get some
2 of the experience from Sandia to help us put this
3 together. And most recently we've been working very
4 closely with EPRI under the MOU to again bring
5 additional talent to this to bring this together.

6 So that's a little bit by way of
7 background and our transparency. And another step to
8 the transparency is the comments that we've gone
9 through. We actually made the dispositions in that
10 and publicly released it. You can see the ML number
11 there for that.

12 January we held a public meeting. Kenny
13 did a very nice job of putting the package together.
14 Again, the ML number is there. It's in the
15 presentation and you can download everything from the
16 public meeting. And one of the things we walked away
17 from with the public meeting was that -- Victoria, you
18 asked that we'd have more interaction, which is the
19 purpose for today's meeting, to have additional
20 interaction to discuss the testing.

21 Kelly?

22 MS. VOELSING: Mark, I was wondering if I
23 could ask on the -- I realize we're talking about
24 comments on testing on a test plan that already
25 occurred and Mike mentioned -- you know, you mentioned

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1 timeliness and transparency, but as far as I know we
2 still haven't seen any data or results from a previous
3 testing. So where are we on that?

4 MR. MELLY: We have put -- at least as far
5 as the working group is concerned, we put a lot of the
6 raw data associated with the temperature probes, the
7 -- from NIST onto the Box sharing site that we're
8 using collaboratively. There are certain aspects of
9 the testing that occurred in September where -- that
10 we have not fully processed all the data yet to put
11 onto that Box site, primarily in terms of the
12 conductivity sampling as to the carbon tape and the
13 Aerogel probes.

14 A lot of that hasn't been done yet because
15 we wanted to identify how it was going to be used in
16 the modeling space before we do a lot of the resource-
17 intensive legwork of actually processing all that
18 data. We wanted to -- it to inform our modeling and
19 before we figured how we're going to incorporate it in
20 the modeling. We didn't want to just go batch and
21 sample 200 or so sampling points because we used a lot
22 of different locations to collect data. We want to
23 make sure that we're using the smartest technique to
24 process that data.

25 MS. VOELSING: But some of it's pretty

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1 fundamental and easy material characterization testing
2 that hasn't been done.

3 MR. MELLY: Some of it is.

4 MS. VOELSING: And it seems pretty
5 important to informing future comments on future
6 testing.

7 MR. MELLY: Yes, and we've done some
8 preliminary work to putting it out, but it hasn't been
9 processed in totality yet. So we haven't put it on
10 the Box.

11 MS. VOELSING: Is there a timeline for
12 that?

13 MR. MELLY: Gabe, is there a timeline?

14 MR. TAYLOR: No, like Nick said, the
15 modeling is driving the analysis, so the preliminary
16 stuff is on the Box, everything that we have.

17 MS. VOELSING: And what about the data
18 that was lost or missing?

19 MR. TAYLOR: So there was data lost during
20 one of the experiments due to human error, so we won't
21 capture that data. There was an issue with the data
22 acquisition.

23 MR. MELLY: And we have addressed that
24 with the test laboratory as to how to prevent that
25 moving forward. It happened in one out of the three

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1 of -- or one out of four of the days. We --
2 essentially human error. Someone pressed the button
3 twice to record the data and we did not record the
4 data for the AASTM probes for that test.

5 We did have redundant data from the NIST
6 thermocouples as well as tungsten slugs, however, that
7 was on one of the test days with the largest energy
8 release, so some of their data was lost due to
9 damaging the instrumentation wire and things like
10 that. So it was unfortunate that the NIST -- or that
11 the KEMA data was also lost on that day. But we're
12 dealing with all of that as it comes in and I believe
13 the raw data from KEMA has been shared on the Box site
14 as well.

15 MS. VOELSING: I think it would be very
16 helpful if we could list all the types of data that
17 you're expecting and whether or not you currently have
18 plans to analyze it and when we expect results to be
19 available. And then we could comment and say, well,
20 we understand that modeling is driving it, but we
21 think this one is really important to our future
22 comments if -- and understand when there's a plan to
23 have that information available.

24 MR. MELLY: Okay.

25 MR. TAYLOR: Kelli, I just got feedback

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1 from people on the phone. They're having trouble
2 hearing us --

3 MS. VOELSING: Oh, sorry.

4 MR. TAYLOR: -- so if we can move up
5 closer.

6 MS. VOELSING: Might have trouble hearing
7 me anyway.

8 MR. MELLY: Moving forward if we had
9 comments from outside the room, I'll try and repeat
10 them for the folks on the phone.

11 MR. SALLEY: Yes, and Kenny's going to
12 keep a running tab here of what we get at the meeting
13 as far as comments and such, so you'll see him going
14 back and forth to screen.

15 And, Kelli, that's a valid point. And
16 again, we had human error with some of the operators
17 that came on one of the biggest tests, which is -- it
18 hurts us a bit as well as we lost I believe some of
19 the NIST data, too, with -- we actually burned through
20 our leads.

21 MR. MELLY: Yes.

22 MR. SALLEY: -- which anybody who made the
23 RIC, if you saw the presentations from Sandia that
24 Anthony made on using the video as data, that will be
25 a third source of information. Hopefully we'll be

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1 able to recover some of this from Sandia's video. So
2 again, we're looking at it from multiple points.

3 MR. MELLY: But as part of the working
4 group with EPRI we did identify a lot of action items
5 that came out of our in-person meeting. That wasn't
6 one of the primary ones, but maybe it's one that we
7 need to add as to establishing a firm timeline for
8 measurements taken and when data will be available on
9 the Box web site.

10 MS. VOELSING: Yes, Marko and I were just
11 talking about it this morning. And I understand this
12 meeting we're really talking about comments that have
13 already been provided and how those comments are
14 dispositioned and are we all in alignment, but we were
15 just kind of discussing -- we kind of have to reserve
16 the right to say -- our comments are out there until
17 we seen some of the test results that we haven't seen
18 at all yet. So that was the reason for asking the
19 question.

20 MR. MELLY: Right.

21 MR. CHEOK: Fair enough.

22 MR. TAYLOR: Can I ask a question?

23 MR. SALLEY: Sure, Gabe.

24 MR. TAYLOR: So is there any test data in
25 particular that you're interested in?

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1 MS. VOELSING: Material characterization.

2 MR. TAYLOR: Right. So what type of
3 characterization are you looking for because if you
4 look at the small-scale tests, I mean, there is
5 probably six or seven different analysis techniques
6 that they can do it and characterize various aspects
7 of the particles. So maybe if we'd get some feedback
8 on exactly what are you looking for and where, is it
9 near-field, far-field, that might help us better
10 prioritize getting certain data sets together. So if
11 we could work on that.

12 MS. ANDERSON: I mean, I think chemical
13 composition was the big one, right? Like the chemical
14 composition we'd want both near-field and far-field.
15 I mean --

16 MR. TAYLOR: Right, and there's different
17 ways to analyze that. So if you said you wanted to
18 use a scanning electron microscope or whatever the
19 other approaches were, that would help us better
20 prioritize. But I don't need an answer right now.

21 MS. ANDERSON: I don't know if we've
22 gotten from -- I don't know if that's been presented
23 to -- like I don't -- I mean, maybe that's presented
24 in the working group, like here --

25 MR. MELLY: It was in the small scale.

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1 Small scale tested it.

2 MS. ANDERSON: -- are the analysis
3 techniques available.

4 MR. TAYLOR: It was in the small-scale
5 test plan, but the methods have been available. So if
6 you could get back to us on exactly what you're
7 looking for: size, speed, species, whatever it is, we
8 can kind of see how we'd move forward.

9 MR. SALLEY: So picking it back up, as we
10 look at the operating experience on the HEAFs, again
11 the root cause and what we've seen looking at
12 different events, there's a number of different
13 failures that can influence the test and how it is
14 performed. Again, with our testing is we're trying to
15 generate data to better understand the physics and the
16 phenomena of the high energy arc fault which we're
17 working with Sandia to hopefully have a model that we
18 can dial in.

19 Right now the way we're doing it with
20 6850, Appendix M, it's the 2001 SONGS events, so it's
21 a one-size-fits-all. We believe we can do a much
22 better resolution with this if we get a good model and
23 we inform it.

24 Again, with just these -- some of the
25 failures; and you've seen these if you've looked at

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1 the OpE, there's also a variation in electrical
2 equipment, and that's something that we need to think
3 about.

4 Next slide. Previously we talked a lot
5 about duration, so I really don't want to dwell on
6 that, but we did again look at the OpE and for the low
7 and medium-voltage we can see that the duration is
8 more than milliseconds in cycles, that the HEAF is
9 unique because we are looking at some form of failure
10 where it stays locked in.

11 Next slide. A question or a comment we
12 had from some of the industry execs was to get the
13 risk piece up front. And of course that starts
14 looking at things like the frequency of the event.
15 Again, working with EPRI; Kelli, you probably know
16 more about this than I do, is getting this together
17 with the frequency of it.

18 One way that we're trying to work a lot
19 smarter than we did in 6850 was with Bin 15 was so
20 inclusive of electrical enclosures that the HEAFs were
21 trying to subdivide different things with that so that
22 we can get a more defined resolution of the HEAF
23 events.

24 Kelli?

25 MS. VOELSING: I was going to say that

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1 would -- I think the working group has made good
2 progress on this one. I've been hearing good
3 discussions going on and good alignment. And we
4 definitely think the frequency is a piece of it --

5 MR. SALLEY: Definitely.

6 MS. VOELSING: -- but the frequency is not
7 going to allow us to evaluate risk without an
8 appropriate zone of influence. So it's only one piece
9 of it and we still have to have the zone of influence
10 in order to evaluate the risk.

11 MR. SALLEY: We agree.

12 MR. CHEOK: So I think I agree with you
13 all that the frequency is really important and the
14 zone of influence is just as important. And what I
15 said earlier was I think when we comment on the test
16 schemes and things like that, I think we might want to
17 focus on comments on the testing that would jive with
18 the frequencies of the HEAFs.

19 So in other words, I know when I talk to
20 Nick or Gabe and we're talking about some test
21 parameters and I -- my question to them always has
22 been, okay, so in the end -- or to guide us we still
23 will need to get the risk out of this. So to get a
24 risk out of this we need to have some frequency
25 definitions to be consistent with the parameters of

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1 the test.

2 So in other words, so let's do tests that
3 are now consistent with how we are going to be
4 defining the frequencies. I mean, that's kind of what
5 I meant by let's focus our comments on getting the
6 test parameters and the test characteristics so that
7 we can match the frequency.

8 MS. VOELSING: The intention was
9 considering -- start with the end in mind --

10 MR. CHEOK: Yes.

11 MS. VOELSING: -- and considering that up
12 front. Absolutely I'm in agreement with that. I just
13 was concerned when you said we got a -- an the
14 executive for saying we need to calculate the risk up
15 front. I was pointing out that we're still going to
16 need the zone of influence.

17 MR. CHEOK: Yes.

18 MR. SALLEY: Next slide. And moving
19 along, again with the testing, too, and we want to do
20 the testing in the most realistic manner as possible.
21 A couple things here that -- with our test program
22 we're not trying to recreate any specific event.
23 We're not trying to say, okay, SONGS 2001, let's
24 recreate this failure and see if we can do that.

25 Now that's a little bit different than

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1 what our colleagues in Japan are doing. We're working
2 very close with our colleagues in Japan. And their
3 thing of course is the Onagawa event. And they really
4 want to understand that and they tend to really want
5 to focus in on that one event.

6 Ours is a little more macroscopic rather
7 than microscope, looking at a specific event, to look
8 at a larger phenomenon of HEAF, but still we want to
9 stay grounded that when we do our testing there's a
10 form of realism to it, that it's a realistic test.
11 And looking at some of the post-test photos we can see
12 that we think we're achieving that.

13 Next slide, Kenny.

14 MS. ANDERSON: I mean, don't think you can
15 necessarily just look at photos and say that the
16 testing -- that that proves that the testing was
17 realistic just because the visual end-state might kind
18 of be similar. Maybe your eyeballs are better than
19 mine, but I don't think you can discern that the
20 inputs and the conditions were necessarily reflective
21 of realism just because it looks the same.

22 MR. SALLEY: You're absolutely right,
23 miss, and you can take a look at this next test for
24 example when we get to bus ducts. There's no way the
25 KEMA facility can generate the power that a nuclear

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1 power plant can, so we can never achieve those types
2 of events.

3 An important thing with the -- you can see
4 the damage in the duct. And important thing too and
5 what we learned with the Zion bus is we had copper
6 buses and we thought, okay, we're good with the
7 copper, but then it migrated to the aluminum. So we
8 saw that phenomena there that brought that to the
9 forefront.

10 Next slide. Again, the latest thing is;
11 and we talked about this in January, was that we were
12 teaming up under the MOU with EPRI to bring all the
13 best people together to work on this. We have the
14 group in place. In February they spent a week
15 together and had a full week-long meeting. I think a
16 lot of good stuff got accomplished; a lot of your
17 frequency stuff, Kelli, as well as starting to look at
18 the physical models of this. So that's working well.

19 And I want to close up just on a final
20 note here and I guess compliment EPRI on a document
21 that was released last week. It's EPRI Technical
22 Update 3002015459. It's publicly available. It's
23 titled The Critical Maintenance Insights on Preventing
24 High Energy Arc Faults dated March 15th, 2019. And I
25 see that as a very, very positive step moving forward.

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1 And again, we've heard from a lot of the
2 executives at different RIS meetings that prevention
3 is very key. Really want to -- the real success of
4 HEAF is you could possibly do a very good job
5 preventing them. I believe this is a step in the
6 right direction. And if you think back, when we had
7 the last Fire Forum in Charlotte I believe in 2017, we
8 talked about -- one of the things was a long-term
9 solution to HEAF. And again, and the way we do
10 business it's a defense-in-depth and I believe this
11 comes into the first layer of prevention where we talk
12 about things like safe work practices, maintenance and
13 arc-proof cabinets, if needed, but that prevention
14 element.

15 So again, Kelli, I think your folks did a really
16 good job getting that out and it's very timely.

17 So that's kind of the 10,000-foot quick
18 overview. And again, this is your meeting, so with
19 that I will turn it -- Marko, I believe you have some
20 stuff on the working group?

21 MR. RANDELOVIC: Yes. So my name is Marko
22 Randelovic. I am senior technical leader for EPRI.

23 MR. CHEOK: Mr. Marko, would you please go
24 on -- can we go around the room and just identify
25 everybody for -- since we didn't do that? We did

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1 it --

2 MR. HAMBURGER: Sure.

3 MR. CHEOK: -- for the phone people, but
4 not the room people.

5 MR. HAMBURGER: Sure. We'll go around the
6 room and everybody will please state their name and
7 what organization who you're here representing. Start
8 with the outside.

9 MS. VOELSING: Kelli Voelsing with EPRI.

10 MS. BERGMAN: Jana Bergman.

11 MR. LEJA: Casey Leja, electrical for
12 Exelon.

13 MR. THAGGARD: Mark Thaggard, NRC, Office
14 of Research.

15 MR. BOYCE: Tom Boyce, NRC, Office of
16 Research, Generic Issues Program Manager.

17 MR. GARDOCKI: Stan Gardocki, Generic
18 Issues Program.

19 MR. METZGER: Brian Metzger, NRR Fire
20 Protection.

21 MR. GUNTER: Paul Gunter, Beyond Nuclear.

22 MR. MILLER: Kenn Miller, NRC, Office of
23 Research, Electrical Engineering.

24 MR. TAYLOR: Gabe Taylor, Office of
25 Research.

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1 MR. CHEOK: Mike Cheok, Office of
2 Research.

3 MR. MELLY: Nick Melly, Office of
4 Research.

5 MR. SALLEY: Mark Henry Salley, Office of
6 Research.

7 MR. HAMBURGER: Kenny Hamburger, Office of
8 Research.

9 MR. REYNOLDS: Ron Reynolds, Exelon.

10 MR. RANDELOVIC: Marko Randelovic, EPRI,
11 Risk and Safety Management.

12 MS. ANDERSON: Victoria Anderson, NEI.

13 MR. HAMBURGER: Okay. So, Marko, back to
14 you.

15 MR. RANDELOVIC: Okay. So I prepared
16 couple of slides to go through the status of the
17 resolution of EPRI's comments that we have been
18 working on with the NRC Research for the last couple
19 of months. And since the effort kind of required
20 significant collaboration between EPRI and NRC, I
21 welcome Nick jumping in the presentation and provide
22 some additional details as we are discussing different
23 items.

24 So we initially had 29 comments and 25 out
25 of 29 comments were addressed and resolved. There

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1 were four comments that were left and needed
2 additional discussions between us. Since the initial
3 review EPRI has done additional research on the HEAF
4 events in the U.S. and with that growing state of
5 knowledge we had some additional recommendations and
6 suggestions for the next round of testing.

7 So with the old comments and the new
8 suggestions we decided to schedule a workshop in
9 February. We had colleagues from the NRC Research,
10 EPRI, industry experts, electrical, fire PRAs. We had
11 Sandia. And we worked for four days on different
12 topics including heat frequency and the testing. And
13 overall the meeting was very productive. I was -- I
14 personally liked the dynamics between members and we
15 ended up following the meeting assigning the action
16 items and we are making good progress regarding the
17 testing setup and the next testing.

18 MR. MELLY: Yes, and these -- the working
19 group meeting, the in-person meeting did go very well
20 and there were a lot of issues that needed to be
21 discussed kind of on a technical level in a lot more
22 detail than can be done in a simple -- here's our
23 comment to the test plan, here's a response to the
24 test plan. So we went over each of these four
25 comments that were previously on that comment

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1 resolution sheet in a lot of detail. We discussed
2 working group consensus moving forward and we
3 discussed kind of how we're addressing those comments
4 either explaining what NRC Research is doing, how it
5 relates to the test plan or ways that we can answer
6 those questions.

7 So we will be making that discussion and
8 the elaborate -- or elaboration of those issues
9 publicly available post-this type of meeting once we
10 have NEI's issues also more well-understood.

11 So we can move on.

12 MR. RADELOVIC: To go to the next slide,
13 yes.

14 So here are the four comments that
15 required additional discussions where we actually
16 brought more technical research and findings. So the
17 first one was EPRI's position -- initially EPRI's
18 position was that -- measuring the end-state of the
19 combustion cloud may not be sufficient to really
20 characterize the electrical properties of the fine
21 particles as they travel. And we suggested that we
22 perform the dynamic conductivity measurement.

23 So in the same time while we were looking
24 into this the NRC Research, the Testing Team has
25 already been looking into that. So when we met at the

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1 workshop the Testing Team had already had a design in
2 mind and we discussed the performance of the
3 conductivity probes, the issues that we might be
4 facing and how to interpret the results.

5 So, Nick, if you want to provide some
6 updates and --

7 MR. MELLY: Yes, this gets back to an
8 issue we were discussing earlier as to what are the
9 material properties of the ejecta that we're seeing on
10 these carbon tape samples or the Aerogel samples, or
11 is there a better way to measure the conductivity of
12 the cloud, of the ejected material from one of these
13 events and to figure out if it's going to have an
14 impact on other electrical systems within the room,
15 either energized or relay cards or things like that.

16 So we were trying to enhance the way that
17 we're doing our measurement techniques in terms of
18 gaining conductivity results either in a delta format
19 or static or dynamic, or what are better ways that we
20 can assess the condition if we had a conductive
21 environment.

22 So on the screen here we say that we do
23 have a need for dynamic conductivity measurements.
24 We've been talking with NIST and other -- and Sandia
25 and we're trying to work out the kinks of how we can

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1 do that. We have presented some ways that we can move
2 the conductivity measurement forward. And EPRI also
3 volunteered a conductivity type of approach for an
4 alternate power supply that they'll be discussing
5 later in the presentation which we think could be
6 valuable to getting more information as to the
7 environment in a HEAF event.

8 So we'll dive into that a little bit
9 later, but it's something we are actively moving
10 forward and we're enhancing the test plan to focus on
11 this area.

12 MR. SALLEY: You know, one thing, if I
13 could add to it, the dynamic measurement is going to
14 be very difficult. The after-test measure is a lot
15 more doable, and again it's a lot more cost-effective.
16 We've reached out in the past week or so to our
17 electrical colleagues. Kenn Miller is here and Tom
18 Koshy who have a lot of experience with this and they
19 have some ideas and some suggestions on how we could
20 analyze this for conductivity. We're trying to get
21 that together with Tom; he's in an IEEE meeting in
22 Germany, when he gets back. And we're going to work
23 with Sandia to just try some proof of concept, if you
24 will.

25 Again, this is an area where not a lot has

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1 been done. So we're trying that and when we find that
2 out, we'll be sharing it with the working group.

3 MR. RANDELOVIC: So, yes, because of that
4 lack of experience regarding the conductivity probes,
5 how they perform, how to read the results, how to make
6 sense of the results, we kind of took an option to
7 design a mock switchgear. I actually have a slide on
8 this, to be more representative of what we are seeing
9 in the plant. And we -- I will explain a little bit
10 later.

11 The second comment was regarding the
12 methodologies for the evaluation of the zone of
13 influence and the fragility assessment for cable
14 trays, cables and electrical components. We -- the
15 working group has not seen at that point the
16 methodology, how we are going to use the test data to
17 establish this. So we wanted to have a little bit
18 more input from the NRC Research and Sandia on how the
19 data will be used. And so, Sandia had a presentation
20 and NRC Research presented the overall methodology,
21 which sounded reasonable.

22 Nick, if you want to --

23 MR. MELLY: Yes, this gets down to linking
24 the data that we received from the modeling in terms
25 of our heat flux that we're receiving at our

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1 measurement devices to a fragility or a target
2 fragility, which was ranked high in the PIRT
3 assessment as to I have a heat flux from my measured
4 test. How do I link that with am I going to damage a
5 cable?

6 We know there are thermal response times
7 to damaging cable in and of itself, and we're talking
8 about a quick temperature rise, a quick influx of
9 heat. So we're going to be working with Sandia to
10 link the data that we're receiving from testing to
11 fragility assessment stages either using their solar
12 tower facility or other techniques that Sandia has
13 available to them to do more of a small-scale testing
14 approach to link the data that we receive from actual
15 testing to fragility values.

16 We're currently in the contractual phase,
17 right, Gabe --

18 MR. TAYLOR: Yes.

19 MR. MELLY: -- to get this out the door
20 and we're going to be sharing all that information
21 with EPRI and the working group as we move it forward.

22 MS. VOELSING: Will that information on
23 the front end include a V&V plan for how this model is
24 going to be validated?

25 MR. MELLY: Do we have a V&V plan right

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1 now?

2 MR. TAYLOR: We don't even have their
3 proposal yet on the models, how they're going to be
4 modified. I mean, the models that they currently have
5 do give V&V, so until we have their proposal we can't
6 really answer your question.

7 MS. VOELSING: Okay. But I would think as
8 part of planning this that there would need to be a
9 plan for how V&V those models for the specific
10 application that you're planning to use it for.

11 MR. TAYLOR: Right.

12 MS. VOELSING: And you need to know what
13 that looks like so that you collect the right data to
14 support that. So I'm just saying V&V has got to be
15 considered on the front end.

16 MR. MELLY: Yes, absolutely. And this is
17 actually an item that came up during the working
18 group. We wanted to make sure that we did have a V&V
19 approach in there.

20 And, Chris, I don't know if you're -- you
21 want to elaborate a little bit on this as to the V&V
22 that is publicly available on the models that we were
23 discussing using.

24 MS. LAFLEUR: Yes, this is Chris. Yes,
25 our Aria programmer has told me that he'll be sending

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1 me publicly available V&V documentation. And I'll
2 forward that to the working group and put it on that
3 Box so that it's available to everyone.

4 MR. SALLEY: There's also another data
5 point, too, as an alternative to this. We've talked
6 with NIST. If you remember Kevin McGrattan and the
7 Carroll Fire Program created the THIEF model that we
8 use for cable fragility for the standard fire
9 dynamics. We've met with Kevin and we've asked him to
10 look at the process that he developed THIEF with, if
11 there's something he could do similar to HEAF -- for
12 HEAF. So again, NIST as an alternative is also
13 looking at this.

14 MR. RANDELOVIC: So the overall outline on
15 how we are using -- going to use the data to what the
16 codes should do and how they would perform as I said
17 is reasonable. Now the work has to be done and we
18 have to see how these codes are working, how they are
19 benchmarked, and that is an important step and that
20 would be under the purview of the working group who
21 would be following each step as the process goes.

22 The next comment was regarding the
23 extrapolation of the low-voltage test results to
24 medium-voltage switchgear testing. Our comment was
25 that because the energy levels are different between

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1 medium-voltage and high-voltage. The geometry. The
2 load center is in the switchgears are not exactly the
3 same and we were just -- we want more discussion and
4 details on how -- what this approach looks like and so
5 that we can judge if it's feasible or not.

6 Nick and the NRC provided a high-level approach.

7 Nick, if you want to explain a little bit?

8 MR. MELLY: Yes, we just kind of just at
9 the working group meeting discussed how we were
10 planning on using the eight-second low-voltage test to
11 -- as a data point to inform the medium-voltage
12 longer duration test because KEMA doesn't have the
13 ability to test at longer duration for medium-
14 voltage. It's not something that we can do as a one-
15 to-one evaluation because there are a lot of things to
16 take into consideration: the differences in power
17 levels, the differences in the arc voltage itself.

18 So this isn't a simple approach and it's
19 something that we're going to be relying on the
20 working group to evaluate the data to see if this is
21 even feasible or possible once we have the data.

22 So we do understand the hesitation with
23 saying that this longer-duration, low-voltage test]KC
24 be directly comparable to a medium-voltage test and
25 we're not recommending that that's how we look at

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1 things. We're going to be getting the data from this
2 test and making the decision can this be used at all
3 in an extrapolation method?

4 Some of the other interesting things that
5 came out of the working group was that we had a lot of
6 discussion that these low-duration -- or I'm sorry,
7 these low-voltage, longer-duration events are
8 relatively rare or not feasible, but from looking at
9 the operating experience we actually did find several
10 events. The Fort Calhoun event lasted 42 seconds.
11 And there was also a -- I believe it was
12 -- was it Robinson? No, it wasn't Robinson. The
13 River Bend event we identified a low-voltage event
14 that had been previously missed, classified as a
15 medium-voltage event that actually did last for 12
16 seconds.

17 So we are seeing that this eight seconds
18 for low-voltage may be appropriate. And one of the
19 other action items we were taking into account is
20 let's look at the realistic current value that we can
21 expect if we have a stuck-in, low-voltage event. So
22 we're trying to take that into account when performing
23 the testing. It may be at a lower current and it
24 could be based on the set points of the breaker
25 themselves. So that actually gets to the next point.

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1 MR. RANDELOVIC: That does get to the next
2 point.

3 MR. MELLY: Yes.

4 MR. RANDELOVIC: So that we are investing
5 currently those events and if the current is low, we
6 agree that the next round of tests we'll basically
7 replicate what we are seeing in the OE. So it should
8 be fairly prototypical.

9 MR. MELLY: Yes.

10 MR. RANDELOVIC: Next slide.

11 MR. MELLY: And so those are the easy
12 comments. Those the ones that were previously --

13 (Simultaneous speaking.)

14 MR. RANDELOVIC: Those are the previous
15 ones.

16 MR. MELLY: Now there's a whole new set of
17 new ones that we'll address. This was a very
18 productive meeting. It was four full days of
19 discussion.

20 MR. RANDELOVIC: As I said, as we -- EPRI
21 was investigating and digging deeper into the
22 operating experience and the HEAF events in the U.S.,
23 we actually learned a lot and formed the technical
24 basis for some recommendations regarding the test
25 changes and regarding the use of the additional

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1 instrumentation. So we -- during the workshop we
2 brought the technical basis with us and we discussed
3 with the team the proposed changes for the medium-
4 voltage test configuration and fault location; and I
5 have a slide on this, and the low-voltage load center
6 test design.

7 And as I said, the conductivity probes, we
8 have low state of knowledge on how they perform and
9 what kind of data we can gather from them. So EPRI
10 took a lead on designing the representative energized
11 mock switchgear that would be used for the measurement
12 of the conductivity in the combustion cloud. So we
13 are providing the support for design and for the
14 technical specification. And as I said, the working
15 group acknowledge the need and the value for such a
16 device.

17 Next slide, please. So research on the
18 medium-voltage switchgear suggests that the majority
19 of the medium-voltage switchgear events occurred in
20 the supply switchgear configuration and the majority
21 of the faults occurred at the supply breaker stabs and
22 the main bus bars. So you can see on the figure --
23 I'm sorry for those on the phone. So we have the
24 arrows where it shows that the -- where the majority
25 of the faults occurred.

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1 So our recommendations to the Testing Team
2 is to perform at least one test with the arc wire on
3 the main bus bars in order to replicate the majority
4 of those events and to be able to understand the
5 difference in geometry in the arc itself and the
6 importance of the cubicle where the arc is located
7 because currently we have the tests with the arc wire
8 and the main bus bars on the -- the bus bars over
9 here. What we're suggesting is to raise the arc wire
10 over here to perform a test and to see the
11 differences. Is there any difference in the zone of
12 influence or the arc behaviors, arc dynamics?

13 MR. MELLY: Yes, so this one is kind of on
14 the cutting room floor. We identified this at this
15 workshop and we put some more work into looking into
16 this. And the NRC is looking right now at the
17 feasibility of doing a confirmatory test to see is
18 this a primary impact driver for what the zone of
19 influence or the resultant energy release could be?

20 So we are looking into how we can
21 reconfigure one of the cabinets that we tested in
22 September. In a future test in a confirmatory manner
23 see is this really going to drive a difference in the
24 energy release? It's kind of flipping where we put
25 the power from our test facility into the cabinet

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1 itself and then switching the arc location. So we are
2 going to look into is this possible in terms of how
3 much money we have to do testing, timeline of testing,
4 availability, knowing that there's a limited number of
5 tests we can do. There's limited budget. And what
6 are our primary interests in testings?

7 One thing we're not talking about here is
8 we also have already said that our spare tests and the
9 test matrix were going to be used to evaluate the
10 decrement curve approach. So right now we're looking
11 into that decrement curve and the additional tests
12 that we've already budgeted for is do we need four
13 decrement curve tests? Can we do two decrement curve
14 tests and maybe do two confirmatory tests? Or what
15 other tests in our current budget can be used in a
16 confirmatory nature when issues like this come up?

17 MR. RANDELOVIC: At the end we will have
18 to do the tests that satisfy and then remove any
19 uncertainties in how the data could be used in the
20 actual replication.

21 MR. MELLY: Yes.

22 MR. RANDELOVIC: If we can justify
23 technically that not doing a test -- not to do the
24 test because we have a strong technical justification,
25 then the working group will decide and we can proceed.

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1 But if we feel that we don't have enough knowledge to
2 explain the differences, then again we will have to
3 evaluate at the working group level and how to
4 proceed.

5 MR. CHEOK: So, Marko, thank you for that.
6 I think when you heard Nick say confirmatory test,
7 that's kind of what I was alluding to. I don't think
8 we can afford money-wise or time-wise to replicate all
9 our previous tests moving the location of the arc. I
10 think we -- let's do one confirmatory test, too --

11 MR. MELLY: Yes.

12 MR. CHEOK: -- to see if this is going to
13 have an effect before we move forward. For now the
14 working group suggests only one confirmatory test on
15 the main bus bar location. And then I think from
16 there we can look at the differences between these two
17 locations and we can determine if there is a big
18 difference. If there is no big difference, then it's
19 -- could be okay.

20 MR. TAYLOR: Do we know how common it is
21 for those main buses to be aluminum versus copper?
22 Because that might also influence whether we test with
23 the OECD Program or the ones we're sponsoring.

24 MS. ANDERSON: I thought it was pretty
25 uncommon.

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1 MR. RANDELOVIC: So you have two. So you
2 have the aluminum and you have copper. I just can't
3 tell you how --

4 MR. TAYLOR: That's -- I just --

5 MR. RANDELOVIC: -- how many plants have
6 the bus bars, aluminum or copper. I don't have that
7 information yet.

8 MR. TAYLOR: I mean, if we could get that
9 information, I think --

10 PARTICIPANT: We didn't do a study?

11 MS. ANDERSON: Yes, I thought it wasn't
12 that many.

13 PARTICIPANT: It wasn't that many.

14 MR. REYNOLDS: No, there should be no
15 copper on a main bus bar.

16 MS. VOELSING: Yes, on the supply side it
17 was mostly all copper and some on the right side had
18 aluminum bus bars. There are a few but copper is
19 still predominant. But that doesn't mean --

20 MR. TAYLOR: I mean, it would help us just
21 to determine what tests we should do that, one with
22 the copper and one versus -- sorry, one with the
23 aluminum, because when we were looking at procuring
24 the low-voltage stuff, we had a piece of gear that --
25 it was a split. It was half copper and half aluminum.

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1 And from the vendor they said that's a pretty common
2 design. Now this was low-volt. It was not medium-
3 volt. So I mean, it would help us out if we could --

4 MR. RANDELOVIC: We can bring this at the
5 working group level and we would investigate.

6 MR. MELLY: Yes, it could also help our
7 understanding of is this an issue that we want to
8 handle in testing configuration space or is this
9 something that we think we can handle in the modeling
10 space? So can we account for the fact that will I
11 have copper in -- on the supply side or look at a
12 cabinet configuration-wise and I will only have copper
13 on my breaker? So maybe the aluminum --

14 MS. VOELSING: But aren't you tuning the
15 model for accurate testing?

16 MR. MELLY: No, because if we tune the
17 model to say that I have only copper in the breaker
18 stabs -- so the data that's -- I'm gathering from
19 aluminum, if I look at my cabinet in a different
20 aspect, I don't want to apply aluminum-type zone of
21 influence to my breaker cubicle itself if I know I
22 don't have aluminum there.

23 MS. VOELSING: You're going to need a
24 copper zone of influence, too.

25 MR. MELLY: And we think that we have data

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1 from the Test Series 1 to inform the model for copper-
2 initiated arcs.

3 MS. VOELSING: Then why haven't we already
4 validated the model and verified that this all work
5 before we move forward with testing?

6 MR. MELLY: It's being done as we speak.

7 MS. VOELSING: But you don't have a V&V
8 test plan.

9 MR. MELLY: All of it is -- this is ally
10 running in parallel right now.

11 MR. SALLEY: I'll caution you, too, to
12 mixing the different materials up and go back and look
13 at Test 26 from the first phase, the Zion bus duct,
14 because that was one that caught us looking where we
15 had copper conductors, if we had the aluminum
16 enclosure, and we saw the interaction between the
17 copper and the aluminum. So the answer may not be
18 obvious.

19 MR. REYNOLDS: What's the weight of actual
20 location of the arc as opposed -- like you're showing?
21 What weight is put on that in respect to testing?

22 MR. MELLY: As a parameter of interest
23 when we look at this the aspect of the PIRT it wasn't
24 a very important factor. The breakers locked in in
25 testing, so whether we come in from the rear or the

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1 front of a cabinet, in my opinion I don't think it
2 will have a very large impact. It will affect the
3 directionality of the arc itself, however, until it's
4 tested there's no way to say it's going to be a one to
5 one ratio versus a -- or if it has a bigger impact
6 that I'm not anticipating.

7 MR. REYNOLDS: Is that the intent of the
8 testing for that is --

9 MR. MELLY: Yes.

10 MR. REYNOLDS: -- also to determine where
11 that --

12 MR. MELLY: Right.

13 MR. REYNOLDS: -- impact of the location
14 is?

15 MR. MELLY: Yes.

16 MR. RANDELOVIC: Right, so if you look at
17 the bus bars here, the arc -- these are the horizontal
18 bus bars, so the arc is horizontal. When you look at
19 this one, so those are the three bus bars, because you
20 see the arc. There is a difference in geometry in the
21 arc. Cubicle itself is not the same. Space, the
22 location of the arc. The other side, you have the
23 differences in geometry in the arc itself and the
24 cubicles where the arc is. So how -- what is the
25 difference between those two, I don't know and I don't

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1 think that anyone can say with 95 percent confidence
2 level they are the same.

3 MR. REYNOLDS: Without testing.

4 MR. RANDELOVIC: Without testing. So that
5 is why we were suggesting if we performed this one
6 test with the arc location there and the previous OECD
7 tests I think you guys had placed the arc wire, the
8 breaker stabs. And we are looking to -- gathering the
9 data from the first round of tests, if feasible.

10 MR. TAYLOR; So this is just me personally
11 speaking. I think there's a valid and reasonable
12 comment in the feedback on the material types that
13 would probably help us better inform what we want to
14 do moving forward. So I don't think we can say, yes,
15 we're going to do it, but we're definitely considering
16 how we can adjust the test plan to move forward.

17 The other thing I just want to point out
18 on this is that those main bus configuration is a
19 little different from like other vendors, most of the
20 other vendors for medium-voltage. Now these are out
21 in the field, but a lot of the other vendors have
22 three in the same plane, three phases in the same
23 plane.

24 MR. RANDELOVIC: But I mean, so you still
25 have --

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1 MR. TAYLOR: Well, these are kind of --
2 you got two in one plane and then --

3 MR. RANDELOVIC: Right, right.

4 MR. TAYLOR: -- two in the other plane.
5 So it's a triangle. So there's just some
6 configurations, I think, and in the end it does
7 probably impact on the severity of the hazard. Yes,
8 we'll look into that.

9 MR. RANDELOVIC: Next slide. For the low-
10 voltage events our research shows that all low-voltage
11 events occurred in the load center supply cubicle and
12 the all faults were initiated at supply breaker stabs.
13 So our recommendation for the Testing Team is to
14 supply -- to procure actually the load center supply
15 cubicles to maintain the prototypical geometry and to
16 place the arc at the same location. That's what we
17 are seeing in the operating experience. And I think
18 NRC Research is working on the procurement activities
19 right now and is considering EPRI's comment.

20 MR. MELLY: Yes, we're currently working
21 through procurement for -- of the equipment and we're
22 working closely to make sure that we'll have a
23 realistic set of equipment to test.

24 MR. SALLEY: If industry has anything
25 they'd to donate as far as equipment, we'll always

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1 welcome that.

2 MR. RANDELOVIC: And the last suggestion
3 was the use of the mock switchgear test unit because
4 as we already discussed the conductivity probes, the
5 issues with performance and the test data. So we have
6 designed a mock switchgear unit and the purpose is to
7 see if there is a certain amount of particle
8 -- fine particles that could actually create a
9 secondary fault in the medium-voltage switchgear.

10 So this is still in preliminary design of
11 the device. It's a small box: 36 by 30 by 10. You
12 have five different ventilation panels. This is the
13 bus bar, 8 kilovolts, that will be maintained with two
14 insulators. And so as the dust cloud moves in through
15 the ventilation panels, the idea is to see if the
16 cloud itself could actually provoke a Phase II ground
17 fault. Or you have -- you collected sufficient
18 material on this -- on the insulator to create a low-
19 resistance path for the Phase II ground fault.

20 MR. SALLEY: Will that be natural
21 ventilation or forced?

22 MR. RANDELOVIC: Natural. We will just
23 place -- the placement is going to be a point of
24 discussion. We may need to look at some videos from
25 the previous round of tests and located the device

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1 somewhere where it's far from the molten ejecta
2 because we don't -- that's not the purpose of the
3 test. We were just looking at what's in the cloud
4 itself. But we are going to have the screens here
5 anyway on these ventilation panels to prevent any
6 entrance of the molten ejecta. And so this -- the bus
7 bar is going to be located a little bit further up, so
8 you actually get a cloud going in. And then we will
9 see if the cloud is conducting or you have the
10 sufficient material collecting on the internal lean
11 surface.

12 MR. MELLY: Yes, so the initial discussion
13 that we had at the working group -- this -- place this
14 at the -- behind the six-foot instrumentation rack in
15 the path of the ejecta.

16 MR. SALLEY: Okay. But did you have
17 screens or louvers up? Would it be more common or
18 more representative to have louvers?

19 MR. MELLY: It would be. And like we said
20 this is a -- this came -- yesterday this came
21 together.

22 MR. RANDELOVIC: It's a big room, so
23 having small louvers you may actually not be able to
24 get any cloud inside. So we are trying to get the
25 cloud inside the box. So we think we can actually

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1 measure it. If we have the small louvers, then -- in
2 a sort of big space where you actually -- with the
3 device, you may not collect --

4 MR. MILLER: Not going to simulate the
5 actual equipment as opposed to actually exposing the
6 cloud to the voltage to see if that produces a fault?

7 MR. RANDELOVIC: Yes.

8 MR. MILLER: Okay. So said that's going
9 to be eight kV?

10 MR. RANDELOVIC: Eight, yes. Which was
11 calculated because in the plans the most typical
12 faults are phase to phase and with 13.8 kV, if you
13 divide by the square root of three --

14 MR. MILLER: Right.

15 MR. RANDELOVIC: -- you actually get 8,000
16 kilovolt for Phase II ground fault. So that's --
17 8,000 is equivalent to 13.8 in the plan. The currents
18 that we have is -- there are about 30 milliamps, so
19 very small. If you have a fault -- we have a -- I
20 think the spec requires like 5,000 kilohertz
21 frequency, so you're going to be able to get probably
22 5,000 data points in a second. And if you have a
23 flashover, then we would be able to see the current
24 going from 0 to 30 milliamps, which is the maximum
25 current for this transfer.

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1 MR. MILLER: So you're just doing like an
2 accelerograph measurement of leakage current?

3 MR. RANDELOVIC: Right. Yes.

4 MR. MELLY: Yes, and this is -- we will
5 have discussions on this at the working group as to
6 criteria, how we're going to measure, whether we want
7 it fused or things like that. So it's still on the
8 table right now, but this is the idea, to get another
9 data point as to the potential impact of the cloud
10 itself.

11 MR. MILLER: In parallel with the dynamic
12 conductivity measurements, of that's possible?

13 MR. MELLY: Yes, we also plan on putting
14 black carbon tape or Aerogel inside of this
15 measurement device, non -- hopefully not affecting
16 anything that we're of primary interest to, any of the
17 spacing or distance to the ground to see if we can get
18 a comparison data point, if we do see faulting or if
19 we don't see faulting.

20 MR. RANDELOVIC: That is basically all I
21 have for now.

22 MR. HAMBURGER: Okay. Any questions for
23 Marko or Nick on some of these items that were
24 discussed in the current status of 150?

25 (No audible response.)

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1 MR. HAMBURGER: So we are now going to open
2 up the meeting. The rest of the afternoon is reserved
3 to solicit input and feedback from those in
4 attendance. And I think NEI sent us a list of flagged
5 comments that they wanted to discuss. Would you like
6 me to pull up the flagged comments and --

7 MS. ANDERSON: I mean, I think they
8 essentially boil down to two specific concerns, if you
9 look at them. I mean, so the first concern is that
10 the testing is realistic in the sense that all the
11 inputs match up with each other with respect to the
12 OE. So we're not taking the worst case duration that
13 we've seen in OE and the worst case voltages we've
14 seen in OE and the worst case material that we've seen
15 in OE, because they don't all necessarily go together.
16 So, and it sounds like the working group has worked on
17 looking at the OE more carefully and matching it up a
18 little bit better.

19 So like one of the comments we flagged was
20 with respect to the Robinson event. I think that was
21 our comment No. 20. And so it sounded like there was
22 some overstatement of the zone of influence that was
23 attributed there and that event is being -- was being
24 used to justify some of the testing parameters, but it
25 seems like there's some insight that maybe should be

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1 considered with that specific event that would lead
2 you to not really support those test parameters. So
3 I think that's -- some of the work that the working
4 group has done really alleviates a lot of our
5 comments.

6 The other aspect, the other sort of flavor
7 of our comments is this testing plan is supposed to be
8 supporting the pre-generic issue on the impact of
9 aluminum, and sometimes it's not clear how we're
10 specifically teasing out that impact. And we talked
11 earlier about needing to do material characterization,
12 but I think it seems like maybe we can work on getting
13 some more input to you via the working group on
14 specifically where we see aluminum and what kind of
15 configurations we see it in.

16 And maybe the tests can be better
17 configured to help tease out those effects versus just
18 doing HEAF experiments and make sure that if we do see
19 any impact on the zone of influence, that it's
20 uniquely attributed to aluminum if that's what the
21 true purpose of the pre-generic issue is. We
22 definitely want to see realism in our PRAs and fully
23 account for all the potential hazards, but that being
24 said, we need to make sure that if we're saying that
25 there's an -- if we do decide there's a potential

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1 increase in zone of influence due to aluminum, that
2 that's based on sound testing that teases out the
3 individual effects of aluminum. It is not just due to
4 testing factors. We need to make sure that we're
5 really carefully looking at what the unique of
6 aluminum is.

7 So it sounds like both of those are going
8 to be -- have been or are going to be addressed in
9 future tests via the working group.

10 MR. MELLY: Hopefully, yes. On the
11 Robinson event which parameters specifically were we
12 overestimating --

13 (Simultaneous speaking.)

14 MS. ANDERSON: So if you look at that
15 comment in the resolution, I think there was a comment
16 that the damage and the sort of the zone of influence
17 that was being assumed there were not actually
18 reflective of the OE. It sounded like perhaps the
19 vertical distance between the cabinet assumed in 6850
20 doesn't really correspond with the actual OE. So I
21 think they're saying that they noted that some of the
22 cable just three inches from the cabinet were
23 undamaged, yet we're relying on data that -- or we're
24 relying on a model from 6850 that assumes a larger
25 zone of influence.

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1 MR. MELLY: Yes. And I think the comment
2 resolution that I provided there was more so to say
3 that we did do a comparison -- we did get cables from
4 Robinson and were able to look at those for damage
5 states, however, the cables that we received, there
6 was no way to actually map those cables to the
7 location in the plant where the cables were received.
8 So it made it a little bit murky in saying that --
9 there was nothing we could do to make a determination
10 that, yes, the 6850 model was correct or, no, the 6850
11 model overestimated the risk without having that
12 mapping ability.

13 So and I think that was in the report that
14 we issued on the Robinson event.

15 PARTICIPANT: I think -- I mean, we can
16 get that information.

17 MS. ANDERSON: Yes, so I mean, I think
18 -- I understand why you did what you did because you
19 didn't have specific information, but we can work with
20 the licensee to get that information and improve the
21 realism there. We're happy to -- through the working
22 group or if you need to go through NEI, we can do
23 that. But --

24 MR. MELLY: Well, we also wanted to make
25 sure that we're not -- we're trying to be better than

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1 the SONGS event in saying that all HEAFs are this
2 model.

3 MS. ANDERSON: Right.

4 MR. MELLY: So there is some benefit of
5 looking at the operating experience, however, what
6 we're seeing from the high energy arcing fault event
7 testing is if I direct my energy, I know that I'm
8 going to direct it all horizontally away from the
9 cabinet based on the configuration of where the arc is
10 initiated and based on where the energy is going. I
11 can run 15 tests in that orientation and I'll never
12 damage potentially cables in a vertical orientation,
13 however, if I just move the arc initiation point or
14 move the configuration of the cabinet, I will.

15 So we can gain insights from OpE, but the
16 testing is trying to get a generic approach for the
17 potential of an arc occurring in all locations within
18 the cabinet so we can try and take that into account.

19 So while we do have some anecdotal
20 information from the OpE from the Robinson event,
21 there's very little we can do to say this happened at
22 the Robinson event, therefore all potential HEAFs are
23 going to be this.

24 MS. ANDERSON: Right. And that's what we
25 just cautioned against before.

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1 MR. MELLY: Yes.

2 MS. VOELSING: But I guess could you
3 elaborate on how -- I understand you want testing to
4 represent all possible --

5 MR. MELLY: Yes.

6 MS. VOELSING: -- configurations. How
7 would you propose putting that distribution into the
8 PRA, because assuming the worst is not the right
9 answer either.

10 MR. MELLY: So we don't plan on assuming
11 the worst. That's definitely not what the working
12 group is trying to establish when we're creating this
13 model. We have a skeleton outline that's on our
14 working group agenda to describe how we plan on
15 bringing the OpE data that we have, bringing the test
16 data together in a format that can facilitate a more
17 dynamic zone of influence. So we can take into
18 account things like your plant design, your circuit
19 protection design, where your arc would be occurring
20 in the plant to try and inform potentially how many
21 layers of circuit protection I have, how long the arc
22 duration will last, and then how we link that with an
23 energy release that can tie to a zone of influence.
24 That's the current thought.

25 We're also going to try and take things

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1 into account like where the arc is initiated in your
2 cabinet, the configuration of your cabinet. It's
3 lofty goals, but that's what the working group is
4 striving towards accomplishing.

5 MR. RANDELOVIC: So if the plant doesn't
6 have the aluminum, then you are going to have a zone
7 of influence without the aluminum.

8 MS. VOELSING: Right, but I guess there's
9 still multiple places that an arc could be initiated
10 --

11 MR. MELLY: Right.

12 MS. VOELSING: -- in a configuration.

13 MR. MELLY: Yes.

14 MS. VOELSING: So how are you going to
15 represent that?

16 MR. MELLY: Through the evaluation of how
17 much energy is potentially released timed back to
18 duration hopefully. And it may not be a three-foot,
19 five-foot zone of influence. It's going to try and
20 look probabilistically of what the energy release is
21 in your cabinet to more of a -- I don't want to assume
22 anything, but a spherical zone of influence based on
23 energy release, and then trying to use engineering
24 judgment to take into account things like where in the
25 cubicle -- or where in the cabinet itself the arc is

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1 being initiated to potentially putting factors on
2 that.

3 MR. RANDELOVIC: I think this is where the
4 confirmatory test is crucial because now you're going
5 to relocate the wire --

6 MR. MELLY: Right.

7 MR. RANDELOVIC: -- on the main bus bars
8 and then you can compare the energy levels and
9 behaviors and zone of influence and other variables.

10 MR. CHEOK: So let me kind of restate what
11 you just said, I think, so that I understand it
12 better, right?

13 We will have enough tests hopefully to
14 replicate different cabinet and plant configurations.
15 We will not take the worst case and apply it to
16 everybody. We will -- we understand that HEAFs and
17 the risks from HEAFs is really plant and
18 configuration-specific. We will -- given the
19 different configurations that we are testing under we
20 will only apply the test for a certain configuration
21 to the plant if that configuration is applicable to
22 that plant.

23 MR. MELLY: Yes, and for instance, that's
24 the reason we're trying to isolate single parameters.
25 So that's the reason why I'm testing at two seconds

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1 and four seconds. I'm not going to -- the goal is not
2 to link every single plant's zone of influence to the
3 most bounding test case of this is what I saw from my
4 four-second duration testing, so now this is the zone
5 of influence. The plan is to say this is the data
6 that I've obtained at two seconds, four seconds and
7 here's what it potentially could look like at eight
8 seconds, and then trying to link that with in my plant
9 configuration I will most likely have a 3.5, 4-second,
10 5-second arc. And then I can tie that energy release
11 to a more realistic energy output from the event
12 itself.

13 MR. SALLEY: You know one of the things I
14 guess is direction that I gave to our side on the
15 working group was that 6850, Appendix M, that
16 information is almost 20 years old now and that three-
17 foot, five-foot box was a nice convenient screening
18 tool for PRA that they came up with back in the 2000
19 time frame to not limit themselves to a square three-
20 foot, five-foot box. But I know Gabe has done some
21 looking at some IEEE standards and what they're
22 showing is more of a sphere or a different geometric
23 configuration that more accurately realistically
24 represents the HEAF. So again, that's some of the
25 stuff that I've asked them to look at.

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1 Gabe, what was the standard you were
2 looking at?

3 MR. TAYLOR: So it's our calculation it's
4 1584. But I think the point is whether it's a sphere
5 or some other shape. It's geometry-dependent. It's
6 cabinet configuration-dependent. So I think what we
7 saw from the fall test as well as Phase I of the OECD
8 Program that they're getting these directional energy
9 output and they do breach the enclosure. And I think
10 the model that we develop moving forward needs to
11 capture that directionality in some form to
12 realistically represent the energy release.

13 MR. MELLY: Yes, and one of the things
14 that we have identified from looking at the OpE is we
15 see a lot of these longer-duration high energy arcing
16 fault events that make us the frequency either being
17 generated or fed where they have no certain protection
18 to limit the fault energy or places where you have
19 circuit protection failures.

20 So our goal is to try and take into plant
21 configuration where these faults can happen in your
22 lineup at your specific plant into account very
23 heavily to try and link that with what is the
24 probability of having an extended-duration event
25 versus having a very quick fault that will only last

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1 potentially on the milliseconds or half-a-second-type
2 approach.

3 So we're going to try and rely more
4 heavily on plant configuration in terms of
5 establishing the zone of influence as we move forward.

6 MR. CHEOK: And you're going to marry that
7 with the potential frequency of those HEAFs on an OpE
8 --

9 MR. MELLY: That's the plan.

10 MR. CHEOK: -- splitting fractions.

11 MR. MELLY: We'll see what we can do.

12 MS. ANDERSON: And the future test plans
13 are still going to be used for public comment,
14 correct?

15 MR. MELLY: Yes. The hesitation with --
16 so we've -- a lot of these have been incorporated into
17 the test plan as it lives right now. The shift there
18 is that the test plan in the format that it was in a
19 few months ago was linked to the OECD Agreement, so we
20 didn't want to have multiple versions of a test plan
21 out there; one on agreement; one on non-agreement
22 while we were in the signature process with our
23 international members. Once that program is
24 officially kicked off, we will again release the
25 comments that we discussed with EPRI through the

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1 working group as well as any insights from this
2 meeting and an officially updated test plan as we move
3 forward.

4 MR. HAMBURGER: Victoria, did you want to
5 go through any of the comments since --

6 MS. ANDERSON: No.

7 MR. HAMBURGER: No? Okay. Can you --
8 would you mind just -- I'm trying to succinctly
9 summarize everyone's concerns so that we have it on
10 record and NRC can ask questions if they have any.
11 Did I accurately capture your two comments in No. 3
12 and 4?

13 MS. ANDERSON: Well, it's the pre-GI.
14 Yes, I think No. 3 is essentially more or less what
15 I'm saying.

16 MS. VOELSING: Maybe If I could --

17 MR. HAMBURGER: Certainly.

18 MS. VOELSING: -- add one more based on
19 what I'm hearing. I understand the intent and the
20 marrying of right frequencies within appropriate zone
21 of influence, but I also am hearing about this -- the
22 Sandia model being utilized to develop those zones of
23 influence. And so in order to accurately comment on
24 the test plan I think it's really important for our
25 stakeholders to be able to understand what feeds the

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1 Sandia model, how is that Sandia model actually
2 validated for this specific application and what
3 outputs are expected from the Sandia model, because
4 those things drive what we -- what data we need to get
5 out of the testing. And so to move forward with
6 testing without understanding that limits our ability
7 to comment on that.

8 And I'm sorry for the voice.

9 MR. HAMBURGER: You want to get Chris to
10 give an overview?

11 MR. TAYLOR: I can give high-level and
12 then Chris jump in, if she wants to.

13 MS. VOELSING: And I'm just saying I don't
14 know that this meeting is the right format, but --

15 MR. MELLY: No, I think --

16 MS. VOELSING: -- it needs to be published
17 and it needs to be put out for public comment.

18 MR. MELLY: I think we anticipated doing
19 all that and then holding an additional public meeting
20 that was requested at the --

21 MR. TAYLOR: So from the meeting we had in
22 January we committed; and I think it was Jennifer's
23 comment, that we need more engagement with the
24 stakeholders on what we're doing. So once we get
25 everything ironed out in our proposal with the work

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1 with Sandia, we're going to have that interface and
2 interaction. And the things that you bring up we
3 hopefully will be able to communicate at that time.

4 MS. VOELSING: But I was just saying that
5 what we learn from that may influence --

6 MR. TAYLOR: Right.

7 MS. VOELSING: -- more comments that we
8 need to provide on the test plan.

9 MR. TAYLOR: Understood.

10 MS. VOELSING: We kind of got to have that
11 discussion first.

12 MR. TAYLOR: I agree.

13 MS. VOELSING: Okay.

14 MR. TAYLOR: And as I think talking to
15 Chris a lot of the stuff that they need they're doing
16 on a small scale basis. They're running a few
17 preliminary small scale tests to look at how Aria is
18 going to model the arc and a few other pieces. So
19 they should have that --

20 MS. VOELSING: And I know you said they're
21 already using it to model copper. It would be really
22 helpful to lay out how they're doing that, how it's
23 validated so that we understand the basis for the
24 model.

25 MR. TAYLOR: Chris, did you get all of

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1 that?

2 MS. LAFLEUR: Yes, absolutely.

3 MR. TAYLOR: Okay.

4 MS. LAFLEUR: I did send some documents
5 that I was able to find that were -- one around the
6 verification of the Aria model and it's like basic
7 equations and the user manual that goes through in
8 detail like how it calculates everything.

9 So I definitely hear we're definitely
10 going to look at how it compares to this specific
11 application, so that will be part of the whole model
12 plan.

13 MR. TAYLOR: Okay. Sounds like a good
14 starting point and we'll work towards what's being
15 asked for. Thanks, Chris.

16 MS. LAFLEUR: Thank you.

17 MR. HAMBURGER: Kelli, would you mind just
18 making sure I've captured the comment here in No. 5?

19 MS. VOELSING: I could be wrong, but I
20 think it -- I thought it was more than just the Aria
21 model. It was putting a couple of pieces together.

22 MR. TAYLOR: Just put modeling because
23 there's a number of models.

24 MR. MELLY: Okay. Yes, our model will see
25 a different model.

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1 MS. VOELSING: And that's an appropriately
2 validated tool.

3 MS. LAFLEUR: Yes, so the Aria model has
4 confirmation of mass, species, momentum, energy. It
5 also calculates current and voltage. And that will be
6 used to model the arc itself, but then what we see
7 happening is the arc then feeds this more sooty fire
8 plume. And so that is more appropriately modeled with
9 our Fuego model which isn't a mass and heat transport
10 model. And so those will -- coupled together where
11 the model of the arc will feed the development of this
12 plume, sooty plume which radiates the energy
13 completely differently than the arc, which is just --
14 it's just a different energy release.

15 MR. SALLEY: And, Chris, for those base
16 models Sandia has done a lot of V&V work on those.
17 It's correct, isn't it?

18 MS. LAFLEUR: Absolutely, yes. They are
19 used and they were developed for modeling harsh
20 environments that nuclear weapons are exposed to, the
21 fires and lightning strikes and all types of things.
22 And so I mean, our thermal test facility here was
23 built specifically to validate all those models. And
24 so, there's a lot of documentation I just have to get
25 for the Fuego and I have to find the unlimited release

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1 document, but that -- it's tested in minutiae detail
2 for the NMSA.

3 MR. SALLEY: That would be great, Chris.
4 If you could kind of put a literature thing together
5 on what's publicly available for that to support the
6 V&V --

7 MS. LAFLEUR: Yes.

8 MR. SALLEY: -- that would be good. Thank
9 you.

10 MR. HAMBURGER: Do we have any other
11 comments on any of the previously dispositioned test
12 plan comments?

13 (No audible response.)

14 MR. CHEOK: Maybe go around the room for
15 comments.

16 MR. HAMBURGER: Sure. If anybody in the
17 room has comments on any of the previously
18 dispositioned comments that were made available
19 through the public meeting notice and that have been
20 publicly available for some time now or if anyone on
21 the phone has any comments on those, we'd be happy to
22 take that input. And if anyone has any new comments?

23 (No audible response.)

24 MR. HAMBURGER: Okay. Well, I'll give
25 everyone a minute to think about it. And just to

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1 summarize what we have here for our action items and
2 comments, the first was a request from EPRI that we
3 list all the types of data collected from our fall
4 series of testing and come up with a timeline for when
5 it will be made available either in its preliminary or
6 final forms. And there was a specific interest in the
7 material characterization of that ejecta that we
8 collected.

9 MR. MELLY: We gave an action item for
10 them to potentially look at the Small Scale Test
11 Program and determine which specific type of analysis
12 --

13 MR. TAYLOR: Yes, we can probably work
14 that through to the working group.

15 MR. MELLY: We could do that.

16 MS. ANDERSON: You want to do that,
17 because I wasn't sure if you wanted to do that through
18 the working group. I was going to ask if you wanted
19 to do it through the working group or --

20 MR. MELLY: Let's put it on there.

21 MR. SALLEY: Well, we got a working group.
22 Let's make it work.

23 MR. MELLY: And they can add it to the
24 working group agenda.

25 We have an action item, and this hasn't

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1 been assigned to anyone in particular, but to
2 determine the prevalence or even the existence of the
3 aluminum main bus bar where we're proposing the
4 confirmatory test be parked. So --

5 MR. TAYLOR: You want to make it medium-
6 voltage. I think we know those combinations for low-
7 voltage.

8 MR. HAMBURGER: Okay. So determine the
9 prevalence of main bus bar aluminum versus copper
10 material in medium-voltage enclosures for our
11 confirmatory test configuration.

12 And then we have NEI's two overarching
13 comments.

14 MR. SALLEY: So No. 2; backing up, who has
15 the action on that one, Kenny?

16 MR. HAMBURGER: We can -- want to work
17 that through the working group as well?

18 MR. SALLEY: Or is that something you
19 could do a survey, Victoria, and help us on like
20 you've done in the past before when we were looking
21 for aluminum?

22 MS. ANDERSON: It's not as easy as it
23 sounds, but I think we've -- I think we have some of
24 that data sitting around. So we -- yes.

25 MR. RANDELOVIC: Yes, 50 plants and I

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1 don't know the level of details for the main bus bars.
2 I'd have to look.

3 MS. ANDERSON: Yes. I'm not sure how --

4 MR. RANDELOVIC: We can just --

5 MR. MELLY: I know from the surveys that
6 we at least saw I wouldn't be able to pull that type
7 of information out of them, but you may have more that
8 I don't know about.

9 MS. ANDERSON: Yes. Well, we know which
10 -- who -- which each of the plants are, so we can
11 query them --

12 MR. MELLY: Right.

13 MS. ANDERSON: -- more deeply.

14 MR. MELLY: So think this would be an --
15 I don't know if it's really appropriate for the
16 working group because we wouldn't -- the NRC side
17 wouldn't be able to help with this action item.

18 MR. SALLEY: No, this I think has to come
19 on your side.

20 MR. HAMBURGER: I can -- how about we put
21 this down as something that NRC will work with NEI to
22 see if we can query the fleet for.

23 MR. MELLY: I think it would just be an
24 NEI action item.

25 MR. SALLEY: You could, Victoria, because

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1 I mean, we want to get into 5054(f) letters and that
2 kind of thing.

3 MS. ANDERSON: Yes.

4 MR. SALLEY: Yes. No.

5 MS. ANDERSON: NEI won't be able to get
6 you the full fleet.

7 MR. SALLEY: Could you get something
8 representative like you did last time?

9 MS. ANDERSON: I can do best we can,
10 but --

11 MR. SALLEY: Okay. Yes, I think that's
12 kind of what we're -- Gabe, that's what we're looking
13 for as far as details?

14 MR. TAYLOR: Yes, I mean, it's -- we don't
15 have to know the exact number, but if there's aluminum
16 out there, then it would probably make sense to test
17 aluminum. If there's only copper, then it makes sense
18 only to test copper. That's kind of what I need to --
19 I don't need to know 48 percent as this versus the
20 other half.

21 MR. SALLEY: Nick, is it worth reaching
22 out to our international folks to see if we can get
23 data from them on that?

24 MR. CHEOK: Again, how important is this
25 information, because if you were going to be doing it

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1 as -- going to be --it only applies to a certain
2 configuration. If you have data for both
3 configurations, you're only apply the pertinent data
4 to the correct configuration.

5 MS. VOELSING: But it also needs to be
6 -- what we're trying to understand, does it matter?
7 Right? And so as long as you do apples to apples, it
8 doesn't really matter what you do. If you're
9 comparing -- if you test aluminum, compare it to the
10 aluminum. And the other like just --

11 MR. TAYLOR: Right. I think we need to
12 understand whether there are even any little amount
13 there on the main buses. If there are, then it makes
14 sense to do it like you said and do the comparison,
15 but if there aren't, then we're testing something
16 that's not out there. So that's kind of what -- at
17 least I'm --

18 MR. HAMBURGER: I think what Gabe is
19 saying is that the apples to apples would best be done
20 with copper if the aluminum configuration doesn't even
21 exist.

22 MR. LEJA: So copper on the main bus bars
23 and the aluminum on that? Okay.

24 MR. TAYLOR: Or the aluminum on the main
25 and aluminum on the secondary.

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1 MR. LEJA: Yes, I don't think you want to
2 separate much on medium-voltage. Aluminum wears a lot
3 faster than copper. Just to -- putting the breaker in
4 and out, that would wear it out. And also the --

5 MS. VOELSING: I thought it was pretty
6 clear that the looping side was mostly all copper.

7 MR. LEJA: It is mostly all copper.

8 MR. RANDELOVIC: Yes, but I also talked to
9 Kenn and he was saying that he knows the existence of
10 the main bus bars are aluminum. So what I am saying,
11 that you just need to --

12 (Simultaneous speaking.)

13 MS. VOELSING: I think it gets impossible,
14 but predominantly it's copper.

15 (Simultaneous speaking.)

16 MR. LEJA: The other thing is aluminum
17 contracts and expands, so that it's also not a good
18 application for it. In fact, you wear it out even
19 faster. So you guys can verify. I'm pretty sure
20 you're not going to find very many applications.

21 MR. HAMBURGER: Okay. We have NEI's two
22 more general comments, and I think the first one we've
23 -- the NRC has committed not to doing this and the
24 working group is proceeding to everyone's
25 satisfaction.

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1 No. 2 is the -- I guess just the idea that
2 these tests need to be designed to isolate the impact
3 of aluminum if that is the goal of the pre-GI. Do you
4 have anything to add or change?

5 (No audible response.)

6 MR. HAMBURGER: And then the last comment
7 was regarding the modeling effort that it's important
8 that we understand and that we make sure that the
9 working group has access to the modeling approach and
10 the fragility determination for targets. Is that what
11 you meant by fragility determination? Targets?
12 Potential targets?

13 MS. VOELSING: The zone of influence is
14 where the fragility is going to be affected, too,
15 so --

16 MR. HAMBURGER: Okay. I want to make sure
17 I'm understanding what you mean there. And the
18 model's validation inputs and outputs to make sure
19 that they are appropriate tools and that they're
20 properly validated for what we intend to apply it to
21 in terms of zone of influence calculations. And EPRI
22 has reserved the right to submit further comments
23 after looking at the details of the modeling approach.

24 Any other comments from anyone in the room
25 or on the phone?

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1 MS. VOELSING: I guess I'll just say
2 briefly obviously I've learned way more on this than
3 I wanted to and it -- I give credit to the team and
4 the working group. This is really -- this is not
5 simple and it's really new science. It's not stuff
6 that's out there. So I think they've done an
7 admirable job and identified a lot of issues that need
8 to be investigated, I think doing a great job working
9 together and working through the issues. I just want
10 to make sure that we don't get ahead of answering some
11 questions we need to answer in the interest of moving
12 forward on testing if we're not ready for it.

13 MR. HAMBURGER: Okay. Hand it back over
14 to our division director. Do you have any --

15 MR. CHEOK: Actually just thank you for
16 coming. Thank you for your interest. And I think
17 Mark wants to say something.

18 MR. THAGGARD: Well, I just wanted to say
19 we don't want to try to set a time frame for when we
20 want to have the next meeting. Are we going to just
21 figure out what works best?

22 MR. MELLY: So that's something I can
23 touch on at least in terms of the working group at our
24 level. Like we said, we discussed here a lot of the
25 discussions that we held at the last in-person

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1 meeting. We did discuss and think that it would be
2 very valuable to hold another possibly shorter in-
3 person meeting prior to the low-voltage and bus stop
4 testing that will be done in the late summer months.

5 So we do plan on meeting again once the
6 equipment for low-voltage has been procured, once the
7 instrumentation has been developed, once these devices
8 have been built and just so we can have everyone's
9 alignment on what we plan on doing, what we plan on
10 testing, what we plan on measuring, the new devices
11 that we've built and used. So we will be as a working
12 group meeting prior to testing. And there has even
13 been discussions of having it be in Pennsylvania to
14 actually see the equipment that we'll be tested.

15 The working group members will also be
16 invited to the testing itself. It's not easy testing;
17 there's a lot of setup that goes into it. So we do
18 foresee the NRC NIST Sandia Working Team potentially
19 spending a month at KEMA, so there will be plenty of
20 opportunities for interaction and visits.

21 MS. VOELSING: So do you think we can have
22 a public meeting on that No. 5 here sooner than later?

23 MR. TAYLOR: So that's what I was going to
24 say is I think once we get prepared for No. 5, we can
25 probably just have one public meeting that covers the

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1 modeling and the fragility and these other items as
2 well. That seems reasonable. I don't have a date yet
3 for when that will happen though.

4 MR. SALLEY: And to understand the timing
5 and how we're trying to schedule and bring this
6 together, remember we have timeliness for the pre-GI
7 to support that program. And we all agreed that the
8 more data, the more information we have, the more
9 realistic we can do the analysis for the pre-GI.

10 Scheduling that with the test lab, we're
11 trying to look at the what, August, September time
12 frame as when we want to be in there. And we kind of
13 got that blocked with KEMA. Again, they've got a lot
14 of clients. We need to kind of get in there and say
15 this is our time frame and we'll be ready. So that's
16 the target we're working to. There is a little time,
17 but there's not years. It's months. Okay? So that's
18 kind of what we're up against. And again, supporting
19 the Generic Issue Program.

20 MR. CHEOK: So we'll meet again. We will
21 discuss the follow-up discussion on several of these
22 items, notably No. 5. And I thank you for coming out
23 and thank you for your interest.

24 MR. SALLEY: Mike, it would probably be
25 good if had the model and any final comment resolution

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1 at the same meeting. We could do that, put it
2 together like that.

3 MS. VOELSING: I don't think we can do
4 that until we know about the model. I can then
5 provide some comments.

6 MR. SALLEY: We can get the model stuff.

7 (Whereupon, the above-entitled matter went
8 off the record at 2:22 p.m.)

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