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UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

DECEMBER 5, 2001

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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 488th MEETING

5 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

6 (ACRS)

7 MORNING SESSION

8 + + + + +

9 WEDNESDAY

10 DECEMBER 5, 2001

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12 ROCKVILLE, MARYLAND

13 + + + + +

14 The Advisory Committee met at the Nuclear

15 Regulatory Commission, Two White Flint North, Room

16 T2B3, 11545 Rockville Pike, at 8:30 a.m., Dr. George

17 E. Apostolakis, Chairman, presiding.

18 COMMITTEE MEMBERS:

19 GEORGE E. APOSTOLAKIS	Chairman
20 MARIO V. BONACA	Vice Chairman
21 F. PETER FORD	Member
22 THOMAS S. KRESS	Member-at-Large
23 DANA A. POWERS	Member
24 STEPHEN L. ROSEN	Member
25 WILLIAM J. SHACK	Member

1 COMMITTEE MEMBERS:

2 JOHN D. SIEBER Member

3 ROBERT E. UHRIG Member

4 GRAHAM B. WALLIS Member

5

6 ACRS STAFF PRESENT:

7 JOHN T. LARKINS

8 PAUL A. BOEHNERT

9 SAM DURAISWAMY

10 CAROL A. HARRIS

11 HOWARD J. LARSON

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I-N-D-E-X

AGENDA PAGE

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

2 (8:30 a.m.)

3 DR. APOSTOLAKIS: The meeting will now
4 come to order. This is the first day of the 488th
5 Meeting of the Advisory Committee on Reactor
6 Safeguards. During today's meeting, the Committee
7 will consider the following: Dresden and Quad Cities
8 core power uprate, discussion of topics for meeting
9 with the NRC commissioners, risk-informed 10 CFR Part
10 50 Pilot Program, Option 2, and proposed ACRS reports.
11 A portion of this meeting will be closed
12 to discuss General Electric nuclear energy proprietary
13 information applicable to Dresden and Quad Cities core
14 power uprate.
15 In addition, the Committee will meet with
16 the NRC commissioners to discuss matters of mutual
17 interest. This meeting is being conducted in
18 accordance with the provisions of the Federal Advisory
19 Committee Act. Dr. John T. Larkins is a designated
20 federal official for the initial portion of the
21 meeting.
22 We have received no written comments or
23 requests for time to make oral statements from members
24 of the public regarding today's sessions. A
25 transcript of portions of the meeting is being kept,

1 and it is requested that the speakers use one of the
2 microphones, identify themselves, and speak with
3 sufficient clarity and volume so that they can be
4 readily heard.
5 I bring the members' attention to the
6 items of interest handout, which contains four
7 speeches by the commissioners, two on nuclear security
8 issues by Chairman Meserve, one on the future of
9 radiation protection by Commissioner Dicus and one by
10 Commissioner Diaz on predictability and balance.
11 Our first item is the Dresden and Quad
12 Cities core power uprate, and Dr. Wallis will lead us
13 through this.
14 DR. BERG: Mr. Chairman, I think Dr. Ford
15 would like to make a comment first.
16 DR. APOSTOLAKIS: Dr. Ford.
17 DR. FORD: Since I have a --
18 DR. APOSTOLAKIS: Microphone.
19 DR. FORD: Since I'm a GE retiree, I have
20 a conflict of interest on this topic.
21 DR. APOSTOLAKIS: So noted.
22 DR. WALLIS: Well, the Committee will
23 remember that we discussed this matter at our last
24 meeting, and the Committee had a few questions that
25 remained unanswered. And we also wanted to hear the

1 resolution of the outstanding issue regarding large-
2 scale tests. And we hope to be satisfied with what we
3 hear today regarding those matters. So I think we're
4 going to start with the staff, then we'll move on to
5 Exelon.
6 MR. MARSH: Good morning. My name is Tad
7 Marsh, and I'm the Deputy Director of the Division of
8 Licensing Project Management at NRR. We're here today
9 to brief you on the open item on the draft safety
10 evaluation, the extended power uprate for Dresden and
11 Quad Cities. The issue specifically before us is the
12 large transient tests and the recirc runback test.
13 These items were discussed with you previously at the
14 last full Committee meeting, and we have reached
15 resolution on them.
16 Specifically, the issue was a proposal by
17 the Licensee to not conduct the generator load reject
18 test and the main steam isolation valve closure test
19 as described in ELTR1. In addition, per your request,
20 we are also here to discuss with the recirc runback
21 test.
22 Now, if you recall, during the last
23 meeting, we had indicated that we were not able to
24 discuss these open items with you, because it was
25 still being evaluated by the NRR staff and by senior

1 management. This decision that we were pondering at
2 that point we have now made, and it was a significant
3 decision with both pros and cons. And we wanted to
4 make sure that we had a solid basis for our
5 conclusion.
6 We've completed our evaluation of the
7 Licensee's proposal to not conduct the large transient
8 tests, and we've concluded that it is an acceptable
9 proposal. Our conclusion is based on the scope and
10 the extent of the modifications that are being made to
11 support the power uprate, the numerous tests that the
12 Licensee is proposing to perform at the system and
13 component level, evaluations of the systems and
14 components that are important to the tests under
15 consideration and the safety benefit, or lack thereof,
16 from these large transient tests.
17 I'd like to emphasize that the decision
18 that we're making is associated only with Dresden and
19 Quad Cities. It's not a generic decision that we're
20 making. We will be considering other power uprate
21 applications on a case-by-case basis with respect to
22 these tests.
23 DR. POWERS: Tad, are you laying out
24 something so that an applicant can reasonable
25 anticipate what he should have to do in order to avoid

1 having to do the integral tests or is it really a case
2 by case sort of thing?
3 MR. MARSH: Dr. Powers, I think the safety
4 evaluation lays out the staff's considerations for
5 both the pros and for the cons, and I believe the
6 Licensee, in reading the safety evaluation, will see
7 the elements that we used in coming to that conclusion
8 so that they would know how to apply or what to do.
9 DR. POWERS: I guess maybe licensees are
10 more prescient than I am, because I think I would have
11 a hard time saying, "Okay, if I do this, this and
12 this, I have high confidence that I will not have to
13 do this test." I think I'd have a hard time doing
14 that.
15 MR. MARSH: Okay. Let's go through the
16 presentation. You hear the considerations, and I
17 believe you'll hear a lot of the elements that we did
18 that we evaluated that I think would guide licensees.
19 You're going to hear agreement, to a large extent,
20 with the specific proposals that were made. And
21 you're going to hear what these tests do and don't do,
22 okay? So to that extent, the plant-specific
23 evaluation may be broader than just this particular
24 Plant; it may be. But we wanted to leave ourselves
25 some room in case systems, structures, components,

1 trips were added to the Plant, which would guide us in
2 another way.
3 We've also evaluated the Licensee's
4 proposal to not conduct the recirc runback test, and
5 we'll be discussing that with you today.
6 Let me now introduce the presenters.
7 Mohammed Shuaibi on my far right will be -- he was the
8 Lead Project Manager for Power Uprate -- will be
9 talking about the tests, the large transient tests.
10 Also, Stew Bailey, who is to my immediate right here,
11 who is the Project Manager for Quad Cities, will be
12 presenting the staff's evaluation for the recirc
13 runback tests.
14 If no further questions, we'll start with
15 the presentation. Mohammed?
16 MR. SHUAIBI: Good morning. My name is
17 Mohammed Shuaibi, and I'm going to cover the large
18 transient testing, as Tad said. The tests under
19 consideration are those included in ELTR1. These are
20 the load rejection tests and the MSIV closure test.
21 As you know, the load rejection test is included in
22 ELTR1 for power uprates greater than 15 percent. The
23 MSIV closure test is included for power uprates
24 greater than ten percent.
25 As I'm sure you're aware, the Licensee

1 referenced ELTR1 in their application; however, they
2 proposed to not do these tests, which are included in
3 ELTR1. So, in effect, what we have is a proposed
4 deviation from an approved topical report.
5 The Licensee provided a justification for
6 this deviation. Since the Licensee covered its
7 justification in detail during the last few meetings
8 with the ACRS, I'm only going to summarize what they
9 said. First, the power uprate is being achieved while
10 maintaining a constant steam dome pressure. This is
11 called the constant pressure power uprate -- I'm sure
12 you've heard that term before. Because the steam dome
13 pressure is not changing, the effect of the power
14 uprate on the Plant is significantly reduced. This
15 also led GE to conclude that these tests are not
16 necessary for constant pressure power uprates.
17 DR. POWERS: When GE put together ELT
18 whatever 1, they thought they were necessary.
19 MR. SHUAIBI: That's true.
20 DR. POWERS: What caused them to change
21 their mind?
22 MR. SHUAIBI: Basically, ELTR1 covers
23 different ways that you could achieve the power
24 uprate.
25 DR. POWERS: That's right.

1 MR. SHUAIBI: It allows plants to increase
2 pressure. It's not limited to constant pressure power
3 uprates. Also, at the time -- this was back in 1995
4 and 1996. At that time, they had no experience with
5 these major power uprates. And I'm not here to tell
6 you that they have significant experience now --
7 DR. POWERS: They don't have much
8 experience now either.
9 MR. SHUAIBI: Right. But they do have a
10 couple of data points.
11 DR. POWERS: Which --
12 MR. SHUAIBI: Which I'll be covering a
13 little bit later in terms of how we evaluated that.
14 That's not the basis for our conclusion.
15 DR. POWERS: You mean GE just said, "Gee,
16 we were wrong, we don't need these things anymore"?
17 MR. SHUAIBI: I think they looked at the
18 effects of the power uprate, of a constant pressure
19 power uprates on the Plant. And, basically, they were
20 convinced that they were able to model the Plant
21 without having to do these tests for confirmation.
22 They were convinced that they can do that.
23 MR. MARSH: I want to point out there's
24 also a proposal before the staff, a modification to
25 the licensing topical report to not do these tests,

1 which is under staff consideration too. So I believe
2 their thinking has evolved --
3 DR. POWERS: What I'm trying to understand
4 is why their thinking evolved. I mean somebody said,
5 "Gee, GE, this costs us a fortune to do these tests.
6 Change your mind"?
7 MR. SHUAIBI: I guess, maybe if I could go
8 through our presentation, we could tell you why we
9 came to our conclusion.
10 DR. POWERS: Right now I'm trying to
11 understand -- I mean if we don't understand why GE
12 changed its mind, just say so.
13 MR. SHUAIBI: We have asked several times
14 GE for why it was proposed and what changed that would
15 -- you know, what changed since then. And, basically,
16 it is that it is a constant pressure power uprate and
17 that the effect of the constant pressure power uprate
18 is not that significant on the Plant. I believe GE is
19 here, and they want to talk to this.
20 MR. KLAPPROTH: Yes. This is Jim
21 Klappworth from GE. Let me just reiterate, I think,
22 Mohammed's statements. I think that's exactly the
23 situation we're in. When we first came in with the
24 ELTR, that approach allowed a pressure increase or no
25 pressure increase, and at the time we did not have a

1 lot of experience with the extended power uprates, so
2 we proposed the large transient testing at that point
3 in time. Since that time, we have evolved in our
4 power uprate process and evolved to the CPPU, the
5 constant pressure power uprate process.
6 In addition, there's been several plants
7 that have done testing -- KKM, KKL -- and we have some
8 transient test results from Hatch. So we have some
9 actual plant data that we've been able to actually
10 model after the fact and also predict before the tests
11 are run. So we have high confidence that there is no
12 need to do the large transient testing. We don't
13 really gain that much from these testings under a
14 constant pressure power uprate scenario.
15 DR. POWERS: What was the rationale for
16 having the proposal -- I mean when -- I can never
17 remember the acronym -- ELTR1 came in, it considered
18 both pressure increases and no pressure increases, but
19 the testing was for both. And there must have been
20 some reason for lacking the confidence.
21 MR. KLAPPROTH: Again, at that time, we
22 had no direct experimental test results or predictions
23 at that point in time. We had just started the
24 extended power uprates. And we did not differentiate
25 in the ELTR1 between a no pressure and a pressure

1 increase power uprate.

2 DR. POWERS: Trust me, I know that's true.

3 A mystery.

4 MR. SHUAIBI: Well, maybe -- again, maybe

5 we could cover what we evaluated when we through the

6 Licensee's proposal, and maybe that will explain, at

7 least, how we came up with our conclusion for Quad

8 Cities and Dresden again. We'll be evaluating this on

9 a case-by-case basis for the other plants.

10 Okay. Moving on, the Licensee also stated

11 that these tests will not provide new information

12 about transient model --

13 DR. WALLIS: That's a strange conclusion.

14 I mean every time you run a test you might find

15 something happens that you were surprised by. So you

16 can never say that a test will never give you any new

17 information.

18 MR. SHUAIBI: That is true, Dr. Wallis.

19 I think what I did here is I'm trying to present --

20 summarize what the Licensee presented, but I totally

21 agree with you. Any time you run a test, you will

22 gain some information, even if it's confirmation that

23 you did things correctly. So there's additional data

24 that gets collected, and that is some new information.

25 And if surprises occur, then, yes, you're right.

1 DR. WALLIS: Then you'd have to use a
2 different argument, saying that the expected small
3 amount of information to be gained is not worth the
4 risk or some task --
5 MR. MARSH: We're going to get there.
6 We're going to get there.
7 MR. SHUAIBI: And that is in our
8 evaluation. I'm just summarizing what was presented
9 to you before.
10 DR. WALLIS: But if they made statements
11 like that, they're very suspicious statements.
12 MR. SHUAIBI: Again, once I get to our
13 evaluation, you'll see those statements a little
14 differently.
15 DR. WALLIS: Okay.
16 MR. SHUAIBI: Okay. Also, they stated
17 that experience with power uprate shows that GE is
18 able to predict Plant response following power uprate
19 in an acceptable manner, and they provided some
20 information related to that.
21 DR. WALLIS: That means acceptable
22 prediction of previous similar tests; is that what it
23 means?
24 MR. SHUAIBI: In some cases, it's previous
25 similar tests; in other cases, although it was not GE

1 that analyzed the transients, they were plant
2 transients at Plant Hatch in which no significant
3 surprises or no surprises related to power uprates
4 were identified.
5 In addition, predictions were made for the
6 Dresden and Quad Cities Plants, and the predictions
7 showed that no significant change will result from the
8 power uprate.
9 And, lastly, the Licensee evaluated
10 components important to the transient tests under
11 consideration, again, the load rejection test and the
12 MSIV closure test, and they concluded that testing is
13 not necessary based on the effect of the power uprate
14 on those components.
15 And to summarize the Licensee's
16 conclusion, based on its evaluation, the Licensee
17 concluded that no significant information is expected
18 to be gained by performing these tests, and that from
19 a risk and safety perspective, unnecessary Plant
20 transients should not be induced without a
21 commensurate benefit.
22 DR. WALLIS: They didn't actually make
23 some evaluation of the risk and benefit, did they?
24 They made a qualitative argument.
25 MR. SHUAIBI: They did provide some risk

1 information related to performing the task; however,
2 it's, I believe, hard to quantify the benefits of the
3 test. But they did provide risk information -- you
4 know, the risk associated with performing the test.
5 And we looked at that.
6 Okay. Moving on to our evaluation of what
7 was presented. The staff evaluated the Licensee's
8 request and justification for not doing these tests.
9 First, we considered the scope and extent of
10 modification made to the Plant. We found that the
11 major modifications are basically on the secondary
12 systems, not on safety systems.
13 Next, we examined the effect of the power
14 uprate on the Plant. Basically, the power uprate will
15 result in an increase in power level, obviously, and
16 decay heat; increase in steam flow and feed flow, I
17 think those numbers were presented as about 20
18 percent; decrease in pressure and temperature at the
19 turbine inlet, that's a small decrease, I think it's
20 less than five percent; and an increase in loading on
21 some of the electrical equipment.
22 We then considered the testing that the
23 Licensee is planning to perform. The Licensee's power
24 ascension and test plan includes hold points at 50
25 percent of the pre-EPU power level, at 75 percent, at

1 90 percent and at 100 percent. The Licensee will
2 conduct testing and collect data related to steady-
3 state Plant response.
4 In addition, after reaching 100 percent of
5 the pre-EPU power level, the Licensee will increase
6 power in increments of less than or equal to five
7 percent, as recommended in ELTR. I believe they
8 stated at the last meeting that they'll be doing that
9 in three percent increments.
10 They will perform additional testing and
11 collect more data at each increment, at each increase
12 in power to ensure that the Plant is behaving the way
13 that they expect it to. What they'll be doing, too,
14 is they'll be projecting new values for some of these
15 parameters for the next increment in power level and
16 making sure that they're able to predict that.
17 The kind of testing and data collection
18 includes vibration, system equipment performance,
19 feedwater pump run-out, fuel delta P, and these are
20 just examples of the kinds of things that they're
21 going to be doing.
22 In addition, the Licensee's performing a
23 significant amount of system and component level
24 testing. In addition to post-modification testing,
25 the Licensee is testing systems and equipment whose

1 performance requirements have changed as a result of
2 the power uprate.
3 DR. BONACA: I need to ask a question.
4 Are these tests part of start-up testing when the
5 Plants were being built, so they were standard start-
6 up tests?
7 MR. SHUAIBI: Yes. So are the load
8 rejection tests and MSIV closure tests, though.
9 DR. BONACA: I mean the question seems to
10 be there should be, on the part of GE, some objectives
11 that they had regionally that they wanted to achieve.
12 And whether or not the power uprate is so significant
13 that it is almost like a new plant that you have to
14 do, because I think if it is almost as a new plant,
15 then you would say you want to have one. If it isn't,
16 understand the reasons why. But I just was wondering
17 again if we could get more insights from GE regarding
18 the original objectives of those tests as part of this
19 sort of testing.
20 MR. MARSH: Care to comment?
21 MR. KLAPPROTH: I guess at this point --
22 this is Jim Klapproth again from GE -- just to
23 reiterate the original thinking at the ELTR stage,
24 and, again, that was back eight, ten years ago, our
25 thinking has evolved, and I guess I really can't

1 comment any further as to this issue, other than the
2 fact that we have learned, we've been able to model
3 these events, we've been able to predict these events
4 very well.
5 In fact, back when we were here with the,
6 I guess the Subcommittee in June of this year, we
7 presented the results of the KKM test. I'm not sure
8 if it was KKM or KKL. It was a KKL test, and we
9 showed that we were able to model these events very
10 well. So based on that predictive capability and the
11 additional Hatch test and the fact, again, that the
12 Dresden/Quad Cities power uprate is a zero pressure
13 increase power uprate, we feel there's no need for
14 testing.
15 DR. BONACA: I understand.
16 MR. MARSH: Well, from the standpoint of
17 the original purposes of the test, and that is why the
18 staff wants these tests to be done originally, it is
19 as you say. This is part of the start-up testing
20 program. When there is a new plant that's been
21 constructed with new systems, new structures, new
22 components, new electronics, new trips, new integrated
23 operations that you want to verify, it is important to
24 run these tests up to a certain point, which is
25 normally the full power point.

1 The question is when you increase power by
2 a certain point, does it raise questions about those
3 system structures and components, trip set points to
4 the extent that you need to run an integrated system
5 test? In our judgement, it does not.
6 And that's the -- we looked at the safety
7 benefit that you would achieve from doing this test,
8 whether there's enough questions that would be raised
9 and answered by this power uprate, and we've come to
10 the conclusion that there is not. There's enough
11 testing that's done reaching going up to the new full
12 power level to flush any types of weaknesses that
13 would occur.
14 DR. BONACA: I understand. I was asking
15 the question because if in fact we had some memory of
16 what the original objectives were, regarding the very
17 points that you made -- instrumentation --
18 MR. MARSH: Exactly.
19 DR. BONACA: -- then one could, you know,
20 pretty well evaluate why a power uprate of 20 percent
21 or 30 percent, or whatever it's going to be, is really
22 necessary, because -- but, I guess, we don't have now
23 a detailed --
24 MR. MARSH: If the Plant were modifying
25 itself in some fundamental way, that is adding new

1 trip features, if it were challenging limits in some
2 fundamental way or if there were code prediction
3 questions, such that we were unsure that ODYN's
4 capability to predict how the Plant would perform, I
5 think we'd be at a different place.
6 DR. BONACA: Okay.
7 MR. ROSEN: Well, using that exact logic,
8 Tad, I would conclude that the recirc runback test
9 fits that, that you ought to run them, because it's
10 new systems and new equipment. I mean it fits exactly
11 to use that logic. So help me through why even if
12 that logic applies to the large transient test, but if
13 applied to the recirc test, it would seem to lead you
14 to a different conclusion than I anticipate you'll
15 tell us in a minute.
16 MR. MARSH: Can I leave us to that point
17 to lead us through that logic, rather than diverting
18 at this point?
19 MR. ROSEN: But just park that thought.
20 MR. MARSH: Okay.
21 MR. ROSEN: I mean I think you just made
22 an argument for the recirc runback test.
23 MR. MARSH: Okay.
24 MR. SHUAIBI: Okay. We also evaluated the
25 effect of the power uprate on mechanical and

electrical components important to the tests under consideration. We looked at the effect on MSIVs, we looked at the effect on control rod insertion, relief and safety relief valve performance, turbine stop valves, turbine control valves, scram signal timing, turbine bypass systems, main generator, an on-class 1-E switch gear, unit aux transformer, reserve aux transformer. We looked at all that to convince ourselves that in fact these tests are not needed and that the Licensee can justify and that we could accept this proposal.

Based on this evaluation, we concluded that the effects of the power uprate on these components are small. Components are covered by other tests. In cases, for example, of the MSIV, we have tech spec requirements that say that the valve must close no faster than three seconds, no later than five seconds, things like that. Components are covered by other tests, and/or the effects are adequately covered in models used for the analyses. In certain areas where there's no testing, we look to see, well, what do we normally expect in that area? And we found that it's adequately covered in the modeling.

We also considered the need for performing these tests for code validation. We do not need these

1 tests for code validation. As you know, analytical
2 codes are validated using data from numerous test
3 facilities and operational experience at other BWRs or
4 at BWRs, in general, that bound proposed operation of
5 Dresden and Quad Cities.
6 We then examined the applicability of the
7 tests to safety analyses. Obviously, these are real
8 Plant transients that would happen. Non-safety
9 related equipment would be there to mitigate these
10 events. Anticipatory trips, which were discussed
11 before, will be there to trip the Plant. And all
12 those reasons together, you know, these tests are
13 going to be much more benign than the actual safety
14 analyses. So although, as Dr. Wallis said before, you
15 would get some information, that information doesn't
16 necessarily confirm that the safety analyses are done
17 correctly. We do those by other means.
18 We also considered power uprate experience
19 presented by the Licensee. The Licensee presented
20 information related to Hatch, which was uprated to 113
21 percent of the original rated thermal power, and the
22 KKL Plant, which uprated to 117 percent of original
23 rated thermal power. I'd like to note, and I think we
24 said this before, that we do not consider the
25 experience at Hatch and KKL to be directly applicable

1 to Dresden and Quad Cities. Obviously, these Plants
2 are not identical and the tests may have been done for
3 different reasons. For example, KKL, I believe, was
4 a scram avoidance test, because they have different
5 runback capabilities.
6 In addition, this experience alone would
7 not be sufficient to approve the Licensee's request if
8 all that they presented was the Hatch and KKL data.
9 We do not believe that we would be here today telling
10 you that we accept this. However, because of the
11 implementation of similar modifications at those
12 Plants to those that were done at Quad Cities and
13 Dresden, we do believe that to some extent GE's
14 ability to predict the effect of the power uprate on
15 component performance is validated. Again, it
16 wouldn't by itself be sufficient, but we do believe
17 that it's another data point that we could rely on.
18 To summarize our evaluation, we believe
19 that the combination of system and component
20 evaluation proposed and proposed testing at Quad
21 Cities and Dresden is sufficient to satisfactorily
22 demonstrate successful Plant modification without
23 performing these large transient tests. We believe
24 that the benefits of large transient tests are not
25 sufficient to justify the challenges to the Plant and

its equipment, the potential risk associated with these tests and the burden.

We did not identify any safety concerns that would warrant the performance of these tests. In addition, the Licensee's application meets all regulatory requirements without performing these tests.

So based on our evaluation, we concluded that the value added of these tests at Dresden and Quad Cities is minimal, and therefore we accept the Licensee's proposal to not perform these tests. And, again, I'll reiterate what Tad said earlier: This is for Dresden and Quad Cities. We'll be looking at other plants when they come in, or as we're reviewing them.

And that concludes my presentation on large transient testing. I'll take any questions now.

MR. MARSH: Dr. Powers, you asked a question whether licensees would know what the staff would find acceptable or not in terms --

DR. POWERS: I think I'm still kind of at sea on this, because there's not a number, there's not a quantification. This is a sense sort of thing.

MR. MARSH: Yes. Our safety evaluation has in it a table, and the table talks about the

1 components, the features of the Plant that are
2 affected by or that would affect the test itself. And
3 it talks about the tests that are already on those
4 structures and components, technical specifications or
5 surveillances or how they're covered by the existing
6 requirements.
7 That really forms, I think, the guidance
8 to licensees about how we judged structures and
9 equipment and its relevance to these tests. And if
10 plants had changed those structures and systems or if
11 they were not tests, as we described in that table,
12 then they would have to justify deviations from -- or
13 justify not doing a test in that context.
14 DR. BONACA: Why did you have to develop
15 a table? Why didn't the Licensee have to develop a
16 table referring to the original tests explaining the
17 basis so that you could support it or not? I don't
18 understand. I don't understand. The Licensee comes
19 and says, "We don't want to do the test," and gives
20 some words. And now you are here developing a basis
21 for it in your SER.
22 MR. MARSH: Right. And is your question
23 why are we doing that?
24 DR. BONACA: No, I'm saying why shouldn't
25 it be part of the application? I mean I don't have

1 anything against not running the tests, but there is
2 a lot of information licensees -- that GE developed
3 originally to justify the tests, what the objectives
4 were.
5 MR. MARSH: Right.
6 DR. BONACA: And if you take those
7 objectives, you could probably, easily demonstrate
8 that you don't need these tests by doing certain
9 things. Now, we haven't seen that. All I hear is
10 that the SER has a table -- and we haven't seen that
11 either -- that explains these details that Dr. Powers
12 is asking for and other licensees would want to know.
13 It seems like a reversal of roles.
14 MR. MARSH: Well, the Licensee did provide
15 information that -- you want to answer?
16 MR. HAEGER: Well, in some sense -- my
17 name's Al Haeger, I'm with Exelon. We did provide a
18 table in our submittal of the analysis of the
19 components and how they're tested and why we believe
20 that that covers the points that were made by the NRC.
21 So we did provide a table to them. Now, we did not
22 specifically talk about the original purpose of these
23 tests. We hadn't thought of that at the time. Since
24 then we have seen some other licensees start to do
25 that. But our submittal did provide a table of the

1 components and how they're tested and why we believe
2 the effects of EPU were minimal.
3 MR. SHUAIBI: That was actually provided
4 in response to an RAI, but, yes, they did provide a
5 table. I don't know if it's the same table that
6 you're talking about, but they did provide a table of
7 these components and what effect the power uprate has
8 on these components and their evaluation of the
9 effects and why it's not necessary to do these tests
10 in order to confirm that.
11 DR. POWERS: And the components in that
12 table do get tested as we make these incremental three
13 --
14 MR. SHUAIBI: Several ways that things get
15 tested. For example, the MSIVs know they're not going
16 to be --
17 DR. POWERS: Well, yes, but --
18 MR. SHUAIBI: Yes. There are several ways
19 that components are getting tested. Some have tech
20 spec requirements, some are -- some data is being
21 taken as they're going up in power. And if you have
22 one in mind, I could probably go through that with
23 you.
24 MR. MARSH: The table has in it, for
25 example, safety relief valves. Those aren't tested

1 during this power ascension. The point that's made in
2 the table is that there's no change in set point to
3 the safety relief valves, but there is a change in
4 capacity. We rely on more safety relief valves to
5 open as a result of the increased power. Turbine stop
6 valves, the control valves are in that table. There
7 is some testing of that, but I don't believe it's done
8 in increments on the way up. There's some testing
9 that's described in the table that you would do
10 normally, and it's still contained in the
11 requirements. Can you remember the features that's in
12 the table?
13 DR. POWERS: I can assure you I do not
14 remember the table.
15 MR. MARSH: Okay. The point we're trying
16 to convey is staff looked at the safety benefit from
17 these tests and found it was not sufficient safety
18 benefit. I don't want you leave with the impression
19 that there's no benefit to tests. There would be
20 benefit to tests. You'd get information, you could
21 confirm. There are reasons why these tests may be
22 good to do. And what the staff was faced with was
23 trying to make a judgment about the merit, the
24 usefulness of the tests compared to the safety benefit
25 of the tests. And the difficulty in the decision was

1 there are some good arguments for doing these tests.
2 We had to look carefully at the safety benefit and the
3 impact that you would be -- what you use these tests
4 fundamentally for and how can you come to a
5 conclusion.
6 So we -- we're conveying to you the basis
7 for making the decision, but I don't want to leave you
8 with the impression that it was all that clear, that
9 we ran to the decision because it was overwhelmingly
10 so. We had to very carefully consider the pros and
11 the cons. And the staff -- there are still members of
12 the staff who think we should be doing these tests.
13 So I don't want to leave you with the impression that
14 --
15 DR. POWERS: What is their argument?
16 MR. MARSH: Well, let me give you some of
17 the arguments. First, it's consistent with the
18 topical report. Staff approved the topical report,
19 and GE proposed doing these tests, so that formed an
20 Agency opinion. Okay? Now, we can argue why it was
21 proposed, the bases for it, why we're deviating, but
22 it still formed an Agency opinion. So that's the
23 reason why.
24 It is a demonstration of integral Plant
25 performance, which from a safety perspective you'd

1 think that would be a proper direction to go. But
2 from the standpoint of what do you fundamentally
3 challenge in this test, are you fundamentally
4 challenging safety set points, are you challenging
5 safety equipment? You're not.
6 But you can see your conservative thinking
7 leads you towards we should be doing a test. And then
8 we had to weigh carefully the impact, the benefit, the
9 purpose, what you gain from it. And we came to the
10 conclusion that it was not necessary. But we want to
11 leave ourselves the thought that if something does
12 change, if there's a system or a structure or if
13 there's a code issue, we may have to.
14 DR. KRESS: In making this judgment, did
15 you run the analysis through the standard back fit
16 regulatory analysis? Is that the kind of judgment you
17 made?
18 MR. MARSH: Probably not, though some of
19 the thinking may be there, but in the rigorous way.
20 It's a topical report, so you don't have to do that in
21 that regulatory process.
22 DR. KRESS: No, but it's a place where
23 there are real criteria and real limits and
24 cost/benefit levels that you can make judgments on.
25 And I just wondered if you actually went to a

1 quantification of those things.

2 MR. MARSH: We did not do that. We did

3 not.

4 DR. KRESS: It's a judgement call.

5 MR. MARSH: It's a judgment. We did ask

6 ourselves in terms of the four performance goals, our

7 pillars, what are the merits and demerits of these

8 tests from the standpoint of our four performance

9 goals? Does it increase safety? Is it an increased

10 regulatory burden? Does it improve public confidence?

11 We asked ourselves those questions too.

12 DR. KRESS: Trouble is the answer to those

13 are qualitative.

14 MR. MARSH: They are qualitative. If they

15 all aligned in a particular direction, that would

16 guide you in a certain decision, but they don't. They

17 don't. Some of them conflict. And from the

18 standpoint of safety, which is fundamental, we could

19 not disagree with the Licensee's proposal from that

20 standpoint.

21 MR. ROSEN: The two tests we're talking

22 about are the generator load reject and the main steam

23 isolation valve closure.

24 MR. MARSH: Right.

25 MR. ROSEN: You would agree, would you

1 not, that those two occurrences are anticipated
2 operational occurrences within the life of the Plant?
3 MR. MARSH: True. Yes, sir; they are.
4 MR. ROSEN: So that in fact the Plant is
5 going to run these tests one day.
6 MR. MARSH: At Hatch.
7 MR. ROSEN: And the only difference
8 between doing it now and doing it then is that the
9 Licensee and the staff get to choose the time of the
10 test, rather than letting the Plant choose the time of
11 the test.
12 DR. KRESS: And you can set the boundary
13 conditions a little better, I think.
14 MR. ROSEN: Yes, and the Licensee could
15 have additional staff available, additional monitoring
16 equipment, management awareness --
17 MR. MARSH: True.
18 MR. ROSEN: -- could assure that no other
19 activities are going on in the Plant at the time that
20 could distract operators from their -- so we're going
21 to have a tests, we just don't know when it's going to
22 be.
23 MR. MARSH: That's probably true. Hatch
24 had one, and in fact that's a part of the staff's
25 observations, that the test was not required for

1 Hatch, yet they had one. And the Plant performed as
2 it was projected to perform. There weren't any
3 surprises. So you're probably right. These are AOOs.
4 It's not a Condition 2 or a Condition 3 or Condition
5 4 event, which are the big challenges to safety. The
6 issue is do you have to mandate when it's going to
7 occur with all the bells and whistles that go with
8 that and to what end?
9 MR. SHUAIBI: To clarify that, we're not
10 saying that Hatch did the test. Hatch had an event.
11 They had several load rejection events. And we went
12 back and we looked at those, and there was really
13 nothing of significance there that would tell us, you
14 know, that these Plants ought to do the --
15 DR. KRESS: What code was used to predict
16 the results of these tests? Is that a ODYN --
17 MR. SHUAIBI: ODYN code, yes.
18 DR. KRESS: And you look at ODYN code and
19 say, "We know the parameters in there within a certain
20 level of confidence, and if we run this test, it won't
21 increase that confidence enough to say that the
22 predictions would give me better confidence." That's
23 kind of the judgment type call you make.
24 MR. SHUAIBI: Well, validation of the
25 codes is done, like we said earlier, through --

1 DR. KRESS: It's already done other ways
2 --
3 MR. SHUAIBI: -- many, yes, other ways.
4 DR. KRESS: -- so that gives you a certain
5 level of confidence.
6 MR. SHUAIBI: Right.
7 DR. KRESS: And the only reason to run
8 these other tests is to see if the code's missing
9 something or to improve its confidence level. And
10 you're saying that the test just doesn't --
11 MR. SHUAIBI: I want to add something on
12 this issue. I think we discussed this in detail in
13 coming up with our conclusion here. We do not
14 believe, although it's been stated before by others,
15 we do not believe that theses tests are necessary for
16 the codes, and we did not ask that these tests be done
17 for validation of the codes. We have other ways of
18 validating codes. And we have a draft SRP and Reg
19 Guide on all the kinds of things that you need to do
20 to validate codes and how you would run plants within
21 the boundaries established on those codes and
22 correlations, et cetera.
23 These tests are really component response
24 tests to ensure that these components that you're
25 relying on are going to respond in a way that you

1 expect them to. So it's not a code issue; it's a
2 component issue. It's how you model the components
3 when you run the codes. Are you modeling them
4 correctly? Is the valve going to shut the way that
5 you expect it to?
6 DR. KRESS: I have trouble with separating
7 that out as not being a code issue, but I guess --
8 MR. SHUAIBI: Well, I guess, it's -- you
9 know, there's the code issue of correlations and
10 things like that, and then there is the modeling of
11 the components that go into the decks that run the
12 codes.
13 DR. KRESS: Well, I consider that's part
14 of the code.
15 MR. SHUAIBI: Okay.
16 MR. MARSH: Jerry Wermiel is here from the
17 Reactor Systems Branch. Jerry, do you want to add
18 anything to that?
19 MR. WERMIEL: No. I thought Mohammed did
20 a -- this is Jerry Wermiel, Chief of Reactor Systems
21 Branch. I thought Mohammed's response was right on
22 the mark.
23 MR. MARSH: Okay.
24 DR. WALLIS: The arguments for not doing
25 the tests are that it challenges the Plant in some way

1 so there's some risk involved? Is there a risk of the
2 equipment won't work so well the next time around
3 because it's been through the test or something? And
4 then there's the burden. Is that that they have to --
5 they don't produce power for a period of time?
6 There's a cost? How big are these things?
7 MR. SHUAIBI: We didn't actually -- as we
8 said earlier, we didn't actually go through the back
9 fit process. First, I think it would be very hard to
10 quantify the benefits of this test.
11 DR. KRESS: Yes, I don't know how you --
12 MR. SHUAIBI: I mean regardless of whether
13 it's code validation or anything else. I mean you
14 could probably get some estimates on cost, but what is
15 -- that's the burden of this test. But what is the
16 benefit of this test?
17 DR. WALLIS: No, look at the burden. I
18 mean there is some benefit and it's in public
19 confidence, and here's a test which would suggest --
20 which they propose to do, and if they had done it,
21 they could say, "Well, we've gone out of our way to do
22 the test, and we've got more confidence, which is good
23 for public relations."
24 MR. SHUAIBI: True, true. But in doing a
25 cost/benefit, you would need to look at both sides.

1 DR. WALLIS: So what's the cost to them?
2 Is it that they don't produce power for some period of
3 time? Is that the big thing that makes them reluctant
4 to do the test?
5 MR. SHUAIBI: Well, I think in terms of
6 burden -- and maybe they'd want to talk about this a
7 little bit -- but what we looked at as being a burden,
8 it's not just the fact that they're going to be down
9 when they trip the Plant; it's they're going to be
10 down, they're going to have additional staff that's
11 going to be at the Plant, there's going to be a lot of
12 evaluation of the data. You don't run the test and
13 come right back up. We looked at all that in terms of
14 burden, but that's only one aspect of it. I mean I'm
15 not here to say that because of burden we're not doing
16 these tests.
17 There's a lot of stuff that we looked at
18 that's convinced us that these tests are not
19 necessary. We looked at the equipment and how that's
20 going to be affected by the power uprate. We looked
21 at -- and that's what we looked at to convince
22 ourselves that it's not necessary. And then we also
23 looked at the burden, and we also looked at the risk
24 associated with it.
25 I mean the risk argument is -- it's kind

1 of -- it's pretty balanced on the risk side, because
2 you could say that there's risk associated with it,
3 but you can't come up with a definitive number that
4 says, "But here's the benefit from it," so that you
5 could compare it to. I mean it's really qualitative
6 in that. So you have a number on the risk associated
7 with it, nothing on the benefit.
8 So I think what we're here to say is we
9 looked at the components and how they are affected by
10 the power uprate.
11 DR. KRESS: Have these tests been run at
12 these Plants at the previous power level?
13 MR. MARSH: I believe they have. I mean
14 I believe that's part of the start-up testing program.
15 Please refute that if that's wrong, but I believe
16 that's part of the start-up testing program, the
17 initial start-up testing program.
18 DR. KRESS: So you have the equivalent of
19 these tests at the old power level.
20 MR. KLAPPROTH: We do have tests, and we
21 do have transients. I believe within the last two
22 years we've had one of each of these at Dresden and
23 Quad units.
24 DR. KRESS: So you do have a lot of
25 information.

1 MR. KLAPPROTH: We do have a lot of
2 information at the current power level.
3 DR. KRESS: And so all you're doing is
4 extrapolating to a new power level.
5 MR. KLAPPROTH: Right.
6 MR. MARSH: It leaves you with a question,
7 though, and the question -- one of the questions, what
8 is the original purpose of the test? I think we've
9 answered that. But it leaves you with the question
10 of, well, I've increased power by about 20 percent.
11 Suppose they increase the power by 30 percent or 40
12 percent? At what point would the staff say, "You know
13 that's enough of a challenge to a system or enough
14 questions about the code or enough issues about plant
15 modifications that I want to run the test." It leaves
16 us with that question that's not answered.
17 DR. BONACA: Well, that's exactly why I
18 was going back to the original tests. They were not
19 done superficially, okay? They were plants. I
20 remember the detail. There were justifications,
21 specific reasons why you're running the test. And I
22 just am surprised that that information hasn't been
23 developed to justify why it's not being right now if
24 the information is available. Now, clearly, it's a
25 long time since the last plant was started up, and

1 maybe information has been lost, I don't know. But
2 something -- I mean that would have kept us from being
3 here for a long time discussing it among ourselves
4 what may be in the mind of the people who recommend
5 that we don't perform the test.
6 MR. MARSH: I agree.
7 MR. ROSEN: Specifically, with respect to
8 the main steam isolation valve test, the steam flow
9 rates through those lines will be 20 percent higher.
10 MR. MARSH: Right.
11 MR. ROSEN: So those valves will never
12 have closed against that much more steam flow. Now,
13 my recollection of those valves is that they are
14 assisted by flow. The closure is assisted by the
15 flow. So more flow may actually be better.
16 MR. MARSH: You still have a restriction
17 of timing.
18 MR. ROSEN: Right. You can't go too fast,
19 and you can't go too slow.
20 MR. MARSH: It can't be less than three;
21 it can't be more than five, right.
22 MR. ROSEN: But it is a complex system,
23 that valve, and it's a huge valve which may be
24 assisted by increased flow in terms of its closing,
25 but it may be assisted too much in the sense it may

1 close too quickly.

2 DR. KRESS: What's the downside of closing

3 too quickly? Are you getting water --

4 MR. MARSH: Too fast of a transient on the

5 reactor.

6 DR. KRESS: Too fast.

7 MR. MARSH: Too much of a power feedback

8 into the reactor. The pressure increases too fast,

9 and it causes too much fuel feedback. But they're

10 testing the MSIVs.

11 MR. SHUAIBI: They do MSIV testing in

12 accordance with the tech spec surveillance

13 requirements. Now, they're not testing the MSIVs with

14 20 percent additional flow.

15 MR. ROSEN: But the point is that -- that

16 was exactly the point.

17 MR. SHUAIBI: Yes. But they do test the

18 MSIVs. It's part of the IST Program. They test

19 MSIVs, and they have limits on both sides in the tech

20 specs. They have a limit for how fast they can close

21 and how slow they would close. And looking at that

22 from -- you know, there's a three-second limit and a

23 five-second limit. On the five-second limit, these

24 valves are supposed to shut against steam line breaks

25 and areas which remain the same for this case. On the

other side, we looked at what exists today to require the Plant to go back and do testing to make sure that it will close. There's not a 20 percent additional flow test that release from 100 percent power.

DR. WALLIS: I wonder if it's time to move on to the other question.

MR. MARSH: Yes. Can we do that? Move on to the other -- the recirc runback test? Okay. Stewart?

MR. BAILEY: Okay. This is Stewart Bailey. I'm the Project Manager for Quad Cities, and as you requested, I will give you a brief overview of the recirc runback system and the testing that the Licensee has proposed to do that. First, to make sure that we're on the same page, the recirc runback system that the Licensee is adding is really for trip avoidance only. That is its function.

Currently, the Licensee, in operating the feedwater system, runs three of four condensate pumps and two of three feedwater pumps. As a result, they have installed spare of each pump. The way their system operates right now is if one of these pumps should fail for any reason, there is an auto-stop at the standby pump, and that will recover the feedwater flow and prevent the reactor scram, okay?

1 If you look at the way the Plant will be
2 operating following EPU, when they're greater than the
3 current power level, they need to run these installed
4 spare pumps. They'll be running four out of four
5 condensate, three out of three feedwater pumps. And,
6 therefore, they've lost the ability to auto-start an
7 installed spare to prevent the scram. What the
8 Licensee has done is they've added a recirc runback
9 system that will recover, essentially, some of the
10 ability that they're losing to prevent that scram.
11 Basically, what they're doing, I think we
12 know some of the details of it, is the flow will be
13 reduced to about 70 percent. And if you look at the
14 flow control line, that corresponds to roughly the
15 current full power level. So the runback system
16 brings them back into the -- basically, back into
17 their current operating conditions and allows the
18 feedwater system to recover reactor vessel level.
19 The system that they put in place is very
20 similar to the runback system that's used at other
21 plants. I believe it's very similar to the system
22 that's been into -- that's already in service at Peach
23 Bottom. There is some additional logic to it, because
24 it's only required at high steam flow rates, when
25 you're at the point where you cannot install -- just

1 rely on the installed spare or rely on the reduced
2 number of pumps.
3 Now, the Licensee has proposed and is
4 going to be conducting a significant amount of testing
5 on the recirc runback system, okay? This testing is
6 being done essentially in accordance with their post-
7 modification testing procedures. On the feedwater
8 system, they're doing a number of instrument
9 calibrations, they're taking a look at the logic for
10 the staggered pump trips, they'll be tuning the level
11 control. They have a series of tests where they
12 adjust feedwater position and/or reactor vessel water
13 level input and check for the stability of the
14 feedwater system. And they'll be doing tests on the
15 feed reg valve position changes and what not.
16 On the recirc system that they're
17 installing, they will be doing tests on its circuitry
18 and its alarms. They have calibrations of the recirc
19 pump runback speed limiters of the scoop tube final
20 position, and they will be doing full logic functional
21 tests on that. A series of overlapping tests so that
22 there is some overlap between the systems that are
23 being tested, and this gives them the confidence that
24 this system will perform as intended.
25 The Licensee does not intend to conduct an

1 integral test of the system. They do not intend to,
2 for example, trip a pump and exercise the runback
3 system and see whether or not it actually avoids
4 scram.
5 MR. ROSEN: But you'd agree that the Plant
6 will conduct that test some day.
7 MR. BAILEY: I think it's highly probable
8 that they will lose one of their condensator feedwater
9 pumps, and the system --
10 MR. ROSEN: And the runback system will
11 come into play.
12 MR. BAILEY: That is correct. Whether I
13 would characterize it as a test, I might stop short of
14 that, but, yes, I think they will exercising this
15 feature.
16 MR. MARSH: I agree.
17 MR. BAILEY: When the staff took a look at
18 this and the need for the testing, as you mentioned,
19 the fact that this is a new system would lend some
20 weight to the Licensee performing an integrated test
21 of this. Similar to the logic we used for not doing
22 the large transient testing where they haven't done
23 significant new mods or trips, here they have done
24 what could be considered a significant mod and added
25 logic into it, okay?

1 But the staff's fundamental consideration
2 when looking at this is that the recirc runback does
3 not perform a safety function, okay? The recirc
4 runback is really there for trip avoidance only, to
5 recover some of the ability that the plant used to
6 have in responding to a loss of a pump in the
7 feedwater system.
8 MR. ROSEN: But you'd agree that
9 preventing initiating events, for example, a reactor
10 scram, is a worthy goal.
11 MR. BAILEY: I believe that it is a worthy
12 goal. The staff has considered, though, that they can
13 approve the extended power uprate without this feature
14 installed, okay? The licensing topical report, ELTR1,
15 acknowledges the fact that some plants will be running
16 their installed spares, and therefore they will no
17 longer have this capability.
18 MR. ROSEN: So the staff would be willing
19 to accept --
20 MR. BAILEY: That's correct.
21 MR. ROSEN: -- without the recirc runback
22 system and let the Plant trip for a condensate pump or
23 a feedwater pump.
24 MR. BAILEY: That is correct. And when we
25 were looking at the risk evaluations associated with

1 the power uprate, the Licensee did not credit this
2 feature. The increase in scram initiation off the
3 feedwater transient just looked at the additional
4 probability of failing these pumps, and we didn't
5 credit any recovery from the recirc runback.
6 So these are some of the considerations.
7 In additional ELTR1 didn't require an integral test of
8 the runback system on plants that already have it,
9 okay? So these are decisions that have been made by
10 the staff, and due to the limitations on what this
11 system actually does, the result, if this system
12 should fail to perform its function, is that you get
13 a reactor trip, and you end up in a stable condition.
14 MR. ROSEN: ELTR1 is a GE document.
15 MR. BAILEY: ELTR1 is a GE document, yes.
16 MR. ROSEN: It's not a staff document.
17 We're getting a little confused here by saying ELTR1
18 doesn't require, as if it were some sort of regulatory
19 requirement. It isn't; it's simply a GE document.
20 MR. BAILEY: The staff has approved ELTR1.
21 MR. MARSH: You're right, though. It's
22 not a regulatory document; it's a proposal which the
23 staff has accepted.
24 MR. ROSEN: Right.
25 MR. BAILEY: Okay. So I guess the bottom

1 line is since this does not perform a safety function,
2 does not prevent anything from reaching any safety
3 limits, okay, that was one of the staff's primary
4 considerations in whether or not a test of the system
5 would be needed. In contrast --
6 MR. ROSEN: And here again you're using
7 the word "requirement" in this final slide -- there is
8 no requirement for an integral test.
9 MR. BAILEY: Correct.
10 MR. ROSEN: One could read that with a
11 bold heading, "NRC Staff Conclusions." I can almost
12 read like there is no regulatory requirement. Really,
13 I think what you're saying is you don't feel that on
14 balance it's needed.
15 MR. MARSH: Exactly.
16 MR. BAILEY: I don't think it's needed on
17 balance. I think there are several people who believe
18 it would be prudent to run this test to verify. What
19 they have done is they've run the ODYN codes to
20 predict reactor vessel water level and to see whether
21 or not they've lowered the reactor vessel water level
22 sufficiently to prevent the scram, or whether the
23 runback goes back sufficiently to prevent the scram.
24 Running this test, of course, would verify that, and
25 it would give them information that they could use to

1 tune their feedwater system response, tune the recirc
2 runback system or perhaps initiate a further reduction
3 in reactor vessel water level. But I think it stops
4 at the level of prudence, and as you've noted, the
5 probability is high that they will be exercising this
6 system sometime in the future.
7 MR. MARSH: Okay. Mr. Chairman, that
8 completes our presentation on these testing issues.
9 I hope you've gotten a sense of the staff trying to
10 weigh the pros and the cons for each of these, and
11 there are pros and cons associated with each of these
12 tests. And we've constructed for you, I believe, our
13 bases for coming to where we are. So thank you very
14 much.
15 DR. WALLIS: Does this change the SER?
16 Are we going to get a final SER?
17 MR. MARSH: Yes. You will be getting a
18 final safety evaluation for the large transient tests.
19 I believe that's true for the recirc runback tests or
20 is it --
21 MR. BAILEY: No, the recirc runback tests
22 we did not go into detail, because it did not perform
23 a safety function.
24 MR. MARSH: Okay.
25 DR. BONACA: That's right. Same

1 difference there.

2 DR. WALLIS: So we're going to be asked to

3 make an evaluation without seeing this final SER

4 version of the --

5 MR. MARSH: You will certainly see the

6 large transient test safety evaluation change. It's

7 a new section.

8 DR. WALLIS: When will we see it?

9 MR. MARSH: We're ready. I thought that

10 was already here. Did we not send that to you yet?

11 DR. WALLIS: No.

12 MR. MARSH: Okay. It will be here today.

13 MR. ROSEN: And it discusses the recirc

14 runback as well?

15 MR. BAILEY: No, it doesn't, because there

16 is not the safety function associated with the recirc

17 runback system.

18 MR. ROSEN: So we will get not further

19 information than that on the whole question of recirc

20 runback, will we? The information we have is what

21 you've provided today.

22 MR. MARSH: Right. Right. Exactly.

23 We'll get you the safety evaluation for the large

24 transient.

25 DR. WALLIS: Are there any other changes

1 to the SER?

2 MR. MARSH: I don't believe so. Singh,

3 any changes to the safety evaluation? Okay. I don't

4 believe so.

5 MR. ROSSBACH: Larry Rossbach, Project

6 Manager. We have resolved a number of small or open

7 items that were in the report, and we've done a lot of

8 editing in response to your comments on the Dwayne

9 Arnold report. So, yes, there are a number of

10 changes.

11 MR. MARSH: But wasn't that set down

12 before, Larry? Wasn't that before the last full

13 Committee report?

14 MR. ROSSBACH: No, it wasn't.

15 MR. MARSH: Okay.

16 MR. ROSSBACH: Just the original draft.

17 MR. MARSH: Okay.

18 DR. WALLIS: So we may be being asked to

19 write a letter without seeing the final SER. If there

20 have been changes as a result of our previous comments

21 on Dwayne Arnold, then they might be significant.

22 MR. MARSH: Okay. Singh, do you want to

23 say something?

24 MR. BAJWA: No. I was just going to say

25 that the final safety evaluation becomes final when it

is issued, so the only way we can provide you is once we actually issue the document.

MR. MARSH: How can we help? We'll give you the draft updated, the latest draft that we have?

DR. WALLIS: I think that would be useful.

MR. MARSH: Okay. We can do that. Which includes the large transient parts too, the large transient sections?

DR. POWERS: I'll remind you that our Senior Fellow has given us a comparison of before and after.

MR. MARSH: Okay.

DR. BONACA: Okay. Any further --

DR. WALLIS: Any further questions for the staff at this time? Let's move on then.

MR. MARSH: Thank you.

DR. WALLIS: Thank you very much. We're ready when you are.

MR. NOSKO: Thank you very much, Mr. Chairman, and once again, thank you for allowing us to come to the Committee.

We have been asked to provide a statement of concurrence with the staff review. My name is John Nosko. I'm the Project Manager for the Extended Power Uprate project for Exelon Nuclear. And I am here to

1 do that.

2 Specifically, first, for the subject of

3 large transient testing, we, of course, do concur with

4 the presentation, as you heard from the staff. I

5 believe we've clearly laid out our position in

6 previous submittals. I would, however, like to make

7 sure that we clear up the apparent misunderstanding

8 that was laying there on the table about the no new

9 information. We did provide a letter the 18th of May

10 on this very subject, and we did note in there that it

11 was our conclusion that conducting large transient

12 tests will not provide significant new information

13 regarding transient modeling or the performance of

14 Plant components. And I would like to make sure that

15 -- I don't believe we have gone through the absolute

16 of saying "no new information," so just to clarify

17 this.

18 And as a final point of note, that last

19 bullet on this slide, of course, we would, with any

20 flat transient, we will be collecting data if and when

21 any of these transient events occur at the Stations,

22 and we will be making a very thorough and careful

23 evaluation of those results against the predicted

24 Plant performances. So, yes our conclusion to the

25 Committee members is that large transient tests are

1 not warranted.

2 MR. HAEGER: This is Al Haeger. There was

3 some question on the burdens, Dr. Wallis. The primary

4 burden is the thermal cycle on the Plant and its

5 components, and some of our components are sensitive

6 to that and require -- may require repair after that.

7 And so inducing two of these transients within a short

8 time, of course, would be an extra cost. And a

9 secondary cost, of course, is the down time, which is

10 about two days for each of them.

11 MR. NOSKO: Okay. Moving on then to the

12 recirc runback test and the should we or should we not

13 trip a feed pump as part of a performance test for

14 that new operating feature, I believe Mr. Bailey

15 summarized it very well, that the modification has

16 been designed to provide us with operating margin

17 only, help us ride out a low-level scram. We believe

18 that the scope of our plan testing does provide

19 adequate demonstration of the capability of this

20 modification to perform its intended function. And

21 our conclusion is, as the staff has concluded, that

22 the feed pump trip at power is not warranted.

23 And with that, the Committee also had, I

24 believe, three additional questions that they would

25 like Exelon to address, and we will be bringing people

1 forward to answer those three questions at this point
2 in time. The first speaker will be Dr. Jens Andersen
3 from Global Nuclear Fuels.
4 MR. HAEGER: Let me summarize the
5 question, as I understand -- as we understood it from
6 last time. It's regarding fuel energy deposition
7 limits and it was to justify the use of the 170
8 calorie per gram energy deposition limit that was used
9 for determining that the potential instability during
10 an ATWS event was acceptable in the light of the data
11 that some of the members, or one of the members had
12 seen regarding fuel failures at different exposures.
13 We have provided these in writing. I
14 would hope that you had seen those answers in writing.
15 Is that correct?
16 MR. SIEBER: Yes.
17 MR. HAEGER: Did you get those?
18 MR. SIEBER: Yes.
19 MR. HAEGER: Okay. Thank you.
20 DR. POWERS: I certainly have not seen
21 them, but I've been off in Europe looking at high
22 burn-up fuel assemblies getting exposed to power
23 insertions and blowing apart.
24 DR. ANDERSEN: This is Jens Andersen from
25 Global Nuclear Fuel. Al Haeger just reiterated the

1 question, and the issue that for the EPU we really --
2 we are not extending the burn-up limits. The burn-up
3 limits are the same as they have always been. We are
4 not increasing the duty on the fuel and really no new
5 phenomena introduced.
6 What we have seen in previous analysis for
7 the -- typically, when we looked at the ATWS
8 instabilities and the duties that could be imposed on
9 the fuel, we have seen enthalpy energy depositions in
10 the fuel that are significantly lower than the current
11 limit. As discussed in the report, NEDO-32047, that
12 was submitted a long time ago on the ATWS
13 instabilities, what we saw was maximum energy
14 depositions that was in the range of about 30 to 80
15 calories per gram. Eighty calories per gram was
16 typically off fresh fuel, high-power bundles. Highly
17 exposed fuel out in its third cycle were down in the
18 30 calories per gram. That is significantly below the
19 current failure limit.
20 DR. POWERS: Well, what -- I mean you keep
21 saying "current failure limit." The current failure
22 limit, I think, for BWR fuel is like 170 calories per
23 gram. And I haven't seen a fuel assembly -- or fuel
24 rod survive 170 calories per gram for burn-ups above
25 25, 30 gigawatt days for ton. I mean it's just not a

1 meaningful limit anymore. I mean you're telling me
2 something that's of no impact whatsoever.
3 MR. HAEGER: Well, we need to finish the
4 answer to the question, okay?
5 DR. ANDERSEN: What we are seeing is that
6 -- clearly, the point I'm making is that we are not
7 extending the burn-up limit as part of the EPRI
8 analysis. And the Robust Fuel Working Group, they're
9 looking at what the burn-up limit should be. And I
10 understand that they may want to change those burn-up
11 limits for high-exposure fuel.
12 What we are seeing is that the energy
13 depositions we are getting for fresh fuel in the order
14 of 70 to 80 calories per gram, which is less than half
15 of the current failure limit. And I believe it's less
16 than what EPRI is thinking about reducing the failure
17 limit to for high-exposure fuel. For high-exposure
18 fuel, what we typically see are energy depositions
19 that are in the order of 30 calories per gram, which
20 is about a factor of five less than the current
21 failure limit.
22 DR. POWERS: Now compare it to where fuel
23 rods are failing in reactivity insertion events.
24 DR. ANDERSEN: What our accidents for
25 activity insertion events are, we did an extensive

1 analysis of that following the complete event. And
2 what we do is with the rod bank withdrawal sequence we
3 are limited to the maximum rod thrust of less than one
4 percent delta K over K. For a rod drop accident of
5 one percent delta K over K for fresh fuel, we get
6 roughly 70 calories per gram. Forty gigawatt days per
7 ton, we are down in the order of 25 to 30 calories per
8 gram.
9 Again, high-exposure fuel, the energy
10 deposition is almost an order of magnitude less than
11 the current failure limits. Therefore, we believe
12 that there is no safety issue, even in light of the
13 fact that if we're considering to lowering the current
14 failure limits.
15 DR. POWERS: Well, since you're not going
16 to quote the levels at which fuel rods are coming
17 apart, maybe I'll just quote some numbers to compare
18 against. We have fuel rods disassembling at 80
19 calories per gram, 50 calories per gram and one
20 remarkable rod at, depending on how you count, either
21 36 or 18 calories per gram. I mean to say -- quoting
22 against this 170 calories per gram is of historical
23 interest only.
24 DR. ANDERSEN: Yes, I understand that.
25 And I also understand that that particular test -- I

1 presume that you are referring to the CABRI test -- is
2 really not representative of BWR and the way BWR fuels
3 operate and the power that BWR fuel could be exposed
4 to.
5 DR. POWERS: I think that's a very fair
6 statement, because, admittedly, a PWR rod, what not,
7 and, quite frankly, I'm not absolute positive any BWR
8 rods have been tested, which itself says something.
9 MR. HAEGER: Well, our point, in
10 conclusion, is simply that adoption of more
11 restrictive limits for an EPU, in which no other
12 effects are changing, is not warranted at this time.
13 DR. POWERS: I think what you're saying --
14 and I think I agree with you -- is that right now
15 you're in compliance with what the staff's required.
16 It's just not an issue here.
17 MR. HAEGER: And we do feel that it's low
18 potential safety significance based on the data that
19 we have. We understand --
20 DR. POWERS: Well, I don't know about that
21 one. That's kind of -- that one I think we could
22 argue over, maybe over a beer sometime. The next
23 statement that you make is there's no -- the EPU puts
24 no additional load on the fuel. That's one that's a
25 bit of a mystery to me. Could you explain that a

1 little more? Why isn't there a 20 percent more load
2 on the fuel here?
3 DR. ANDERSEN: The peak power level of the
4 fuel doesn't really change.
5 DR. POWERS: Change.
6 DR. ANDERSEN: The rod lines -- the
7 maximum rod line does not change. So peak power of
8 the fuel is really the dominant effect of --
9 DR. POWERS: That's what you're saying.
10 DR. ANDERSEN: -- what controls the load.
11 DR. POWERS: It definitely puts more load
12 on the fuel, but it's not changing the peaks is what
13 you're saying.
14 DR. ANDERSEN: Right.
15 DR. KRESS: Unless the instability
16 magnitudes change because of increased burn-up.
17 MR. HAEGER: Yes, and we discussed that
18 last time, and I believe --
19 DR. KRESS: And they did change some, but
20 best I remember, they --
21 MR. HAEGER: I believe that GE last time
22 presented a sensitivity study that said that the
23 generic ATWS analysis applied -- it looked like it
24 applied to the EPU condition, in fact, the MELLA Plus,
25 in fact, testing that they've been doing.

1 DR. KRESS: Yes. Okay. So you get the
2 same sort of --
3 MR. HAEGER: That's correct.
4 DR. ANDERSEN: The rod line doesn't
5 change.
6 DR. KRESS: Yes.
7 MR. HAEGER: Okay. We'll go on then. We
8 have the next group of two questions Keith Moser is
9 going to respond to. Keith is our Reactor Internals
10 Program Manager for Exelon. As I understand, the
11 second question was referring to the dryer lug
12 attachment inspection frequency, and we came back with
13 that last time but really didn't address the
14 significance of that frequency. Keith is here to do
15 that first.
16 MR. MOSER: Yes. First of all, what I
17 want to do is say we just got out of the Dresden 2
18 outage, we went back and we looked at the dryer before
19 we installed the mod, and then we went and looked at
20 the lugs. And then after we got the mod done, put the
21 dryer back in, we looked at all the four set points to
22 make sure we had contact.
23 Now, after 32 years, these were holding up
24 really well. We saw no degradation. So with that and
25 the fact that when we did the modeling and the

1 endurance limit was 10,000 psi, code limit of 13,600
2 psi, so you already have like a 36 -- I'm sorry --
3 yes, 36 percent safety factor inherent in that, and we
4 met the 10,000 psi endurance limit.
5 We have a pretty good basis for saying
6 that the ten-year interval established by Section 11
7 is appropriate. But because we know that there's BWR-
8 4s, BWR-6s that have this problem, we've made the
9 determination that after one cycle we're going to go
10 back and take another look for all four units and make
11 sure that we don't have a problem and then we'll go
12 back and reassess if the ten-year interval is an
13 appropriate length for us to go. Does that answer
14 your question?
15 DR. FORD: Yes. The reason for the whole
16 topic to start with was that during one of the
17 presentations that were made you said that there would
18 be an increased vibratory stress transferred to the
19 lug, which originally made we think of the fact that
20 the failure mode is not necessarily fatigue on which
21 the core is based, just stress corrosion cracking of
22 the lug. And it is generally the incidence of stress
23 corrosion cracking will increase with a small
24 vibration load regardless of fatigue as being the
25 phenomena of failure.

1 And I wondered how your inspection
2 periodicity might be changed because of that
3 particular phenomena, that is stress corrosion
4 cracking accelerated by a small superimposed and
5 increased vibration load? And that was the physical
6 origin of the question. The fact that you are going
7 to maintain your inspection periodicities, as I
8 understand it from your reply, less than ten years, it
9 should mitigate that problem.
10 MR. MOSER: I believe it will. Also, I
11 talked to Sam Ranganath about this and Dave Randall,
12 and in these cases, for the BWR-4 and BWR-6, it was
13 fatigue.
14 DR. FORD: Okay. It was transgranulas?
15 MR. MOSER: Well, they didn't take a vote
16 sample, per se, but it was classic. It may have had
17 a small starter point with IGSCC, but it's pretty
18 clear that it was fatigue in this case.
19 MR. HAEGER: The final question was on
20 flow accelerated corrosion. We had a predictive model
21 that showed an increase in wear rate in some portions
22 of the feedwater system, from a projected 19 mils per
23 year to 21 mils per year. And we didn't have at our
24 fingertips what the thickness of the pipe was at that
25 time and then some replacement frequency information,

1 so we've provided that here.

2 MR. MOSER: Yes. And once again, we're

3 talking about some fairly significant pipe -- 120 for

4 the schedule, 18-inch diameter and 24-inch diameter.

5 And what we're looking at with the CHECWORKS model,

6 we're looking at a place where 2010 is where we're

7 saying we think we may want to be thinking about

8 replacement, not necessarily replacing. But we're

9 going to inspect in 2008.

10 Now, prior to the EPU, we were saying we

11 could go all the way out to 2010 and then thinking

12 about replacing in 2012, but, you know, we're talking

13 about something that's fairly thick, fairly

14 significant. The projected wear rates are actually

15 overestimated, if you will, and we feel like we're

16 very conservative in this manner.

17 MR. HAEGER: We should emphasize these are

18 localized components. These are things like reducers

19 or elbows, not entire pipe sections, obviously.

20 MR. MOSER: Actually, the component was --

21 DR. POWERS: Actually a hole in any part

22 of the pipe is a hole.

23 MR. MOSER: Well, yes, but we --

24 DR. POWERS: It doesn't matter whether

25 it's local or --

1 MR. MOSER: We thought you may be
2 envisioning entire pipe replacements or something, I
3 guess.
4 MR. HAEGER: And the component that was
5 most susceptible was the concentric reducer.
6 DR. WALLIS: What are the actual wear
7 rates? You have had inspections of those components.
8 MR. MOSER: Yes. They're --
9 MR. HAEGER: Thirteen to 16. I think the
10 pre-EPU actual rate was 13.
11 DR. WALLIS: So they're comparable but
12 lower.
13 MR. HAEGER: Yes. Right.
14 MR. MOSER: And then the thing you have to
15 do with -- we have two inspection data points and with
16 CHECWORKS you want to do the predictive module rather
17 than just count on two data points. So we're being
18 somewhat conservative. Any other questions?
19 MR. HAEGER: Okay. Well, again, we want
20 to thank the Committee for allowing us to come back,
21 and we'll look forward to your deliberations. Thank
22 you.
23 DR. WALLIS: Are there any other questions
24 for the staff or Exelon or GE?
25 DR. POWERS: Well, let me ask a question.

1 The answer may be it's covered by a different part.
2 And that is we're going into a combination of power
3 uprate and inevitably using our fuel to hire burn-ups,
4 and we have a concern in this power uprate about the
5 possibility of getting into an oscillatory regime.
6 And we have a process -- a procedure for recovering
7 should we ever get into that oscillatory regime that
8 is -- it's not trivial.
9 I mean it does involve dropping the level
10 of water, injecting some boron and bringing the water
11 up. Do we understand what kinds of stresses, lateral
12 stresses that puts the fuel under, and are we
13 confident that that fuel survives those lateral
14 stresses?
15 MR. HAEGER: Dr. Andersen, I don't know if
16 you can help with that. That's something I wouldn't
17 be prepared to discuss.
18 DR. ANDERSEN: I'm not prepared to discuss
19 the stresses on the fuel.
20 MR. HAEGER: I guess the only response we
21 can give is that the ATWS instability study that --
22 and help me out if this is not right -- but that study
23 was a generic study that since GE has confirmed that
24 they believe applies to power uprate. Now, I don't
25 know if that covers lateral stresses on the fuel or

1 not.

2 DR. ANDERSEN: What the study showed was,
3 as I discussed earlier, that the energy depositions
4 that you had in the fuel was substantially lower than
5 what the current failure limits are. As I said
6 earlier, the energy depositions, the max energy
7 deposition we saw on fresh fuel was in the order of 70
8 to 80 calories per gram. For highly-exposed fuel, it
9 was down in more like 25 to 30 calories per gram.

10 What we did see that in the absence of an
11 mitigating event, that you could get translations on
12 the fuel and some fuel failures on a very small
13 fraction of the fuel in the core. Those failures were
14 oxidation failures, not stress failures.

15 DR. POWERS: Let me ask a question about
16 that and power input. Originally, you quoted power
17 inputs for a rod bank withdrawal. In the oscillation,
18 we're talking about a little bit different; that is,
19 a series of cycles that each -- which is putting power
20 into the fuel. Seems to me that the power and input
21 then depends on the number of oscillatory cycles you
22 go through.

23 DR. ANDERSEN: That is correct, but if you
24 look at the net energy deposition in the fuel, that is
25 equal to zero, because the heat removal rate to the

1 coolant is equal to the energy deposition into the
2 fuel.
3 DR. POWERS: Oh, yes? Temperature doesn't
4 go up at all?
5 DR. ANDERSEN: If you fail to relieve it,
6 then the temperature goes up, and that's correct. It
7 will go up and you will get a failure in a small
8 fraction of the fuel. If you look at the old report,
9 the NEDO-32047, we showed that that could happen to a
10 small fraction of the fuel that had the highest power
11 oscillations. When we analyzed how large a fraction
12 of the fuel that could be exposed to that failure
13 mechanism, it was less than half a percent of the
14 fuel. And that was deemed acceptable at that point.
15 DR. POWERS: And if we use a lower failure
16 criteria, what does that percentage go up?
17 DR. ANDERSEN: The failure rate was really
18 not associated with the energy deposition. The
19 failure rate was associated with the fuel during the
20 periodic oscillation exceeding the minimum fuel
21 burning temperature and failing to relieve it. And
22 then the failure was really an oxidation failure at
23 high temperature. So it was really not associated
24 with the energy deposition.
25 DR. POWERS: And I don't know if it's

1 appropriate in response to your question to comment on
2 operator mitigation, but, certainly, that's a
3 consideration.
4 MR. HAEGER: Yes. That's a question that
5 we continue to wrestle with. And I never know how to
6 come down on this. I mean you test the operators with
7 the current configuration in the Plant, and they do
8 very well.
9 DR. POWERS: That's right.
10 MR. HAEGER: And so now we're going to say
11 that the higher power, where they have a little less
12 time, they'll still be able to do very well.
13 MR. HAEGER: Tim, do you want to comment
14 on that?
15 MR. HANLEY: My name is Tim Hanley from
16 Quad Cities. The way we test and train the operators
17 really is that they can initiate it based on the
18 parameters they're monitoring, not a specific time
19 period. So their reaction to the ATWS event in a
20 uprated core versus a non-uprated core is not
21 significantly going to change, because it's based on
22 parameters that they're monitoring, not specific time
23 criteria.
24 DR. BONACA: I mean I understand what
25 you're saying, but if the parameter reaches a certain

1 point at which he has to take action in ten seconds,
2 right, it would make a difference --
3 MR. HANLEY: It certainly would if it was
4 making changes in that time period, but we're talking
5 on the order of minutes, not in the order of seconds
6 here.
7 DR. BONACA: But this argument has been
8 made many times that way. I think there is still a
9 sensitivity to the timing.
10 MR. HANLEY: Well, certainly, certainly.
11 If it was changing it to a matter of seconds or from
12 ten seconds to five seconds, that would make a
13 difference, but we're talking in the order of minutes
14 where the operators have an opportunity to assess the
15 situation, monitor the parameters and take the correct
16 actions.
17 DR. WALLIS: These extreme oscillations
18 that you gathered in ATWS, your understanding of that
19 is based on codes and theory or are there some sort of
20 experiments?
21 DR. POWERS: Well, a couple of events. A
22 full-scale event at La Salle.
23 DR. WALLIS: Okay. So does that give
24 confidence that you really understand what would
25 happen with these power uprates with the ATWS

1 oscillations?

2 MR. HAEGER: Again, we have covered this

3 in the past, but Dr. Andersen?

4 DR. ANDERSEN: Well, these are complicated

5 coupled thermal-hydraulic neutronics oscillations. We

6 do have full-scale reactor test data for thermal-

7 hydraulic coupled neutronics oscillations. We also

8 have some unplanned event. We have full-scale testing

9 that has been conducted on several European plants.

10 Particular tests were conducted at the

11 Leibstadt, the KKL Plant. We also have the event that

12 happened in 1988 at La Salle. We have used those

13 events to qualify our codes, and we actually predict

14 those events very well.

15 DR. WALLIS: Anything else? Then I would

16 thank you very much. And I will hand the meeting back

17 to the Chairman.

18 DR. APOSTOLAKIS: Thank you, Dr. Wallis.

19 We're 11 minutes early. Very good.

20 DR. WALLIS: Well, with thermal-hydraulics

21 things go quickly.

22 DR. APOSTOLAKIS: They go very quickly,

23 yes.

24 (Laughter.)

25 DR. POWERS: Because a momentum equation

1 doesn't come up.

2 DR. APOSTOLAKIS: Okay. We'll recess

3 until 10:30.

4 (Whereupon, at 9:58 a.m., the ACRS

5 Advisory Committee Meeting was recessed until 10:30

6 a.m.)

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CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: ACRS 488th Meeting
Morning Session

Docket Number: (Not Applicable)

Location: Rockville, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Rebecca Davis

Rebecca Davis
Official Reporter
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