



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION IV
1600 E LAMAR BLVD
ARLINGTON, TX 76011-4511

July 3, 2014

EA 14-008

Jeremy Browning, Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
1448 SR 333
Russellville, AR 72802-0967

**SUBJECT: SUPPLEMENT TO THE ARKANSAS NUCLEAR ONE UNIT 1 DROPPED STATOR
REGULATORY CONFERENCE MEETING SUMMARY**

Dear Mr. Browning:

On May 1, 2014, members of the U.S. Nuclear Regulatory Commission (NRC) staff met with representatives of the Arkansas Nuclear One facility to discuss the apparent violation affecting both units related to the drop of the Unit 1 main generator stator as documented in NRC Inspection Report 05000313/2013012 and 05000368/2013012 (ML14083A409), issued on March 24, 2014. The focus of the regulatory conference was a discussion on the safety significance of the finding. The discussion included Unit 1 mitigating actions focusing on the use of temporary power to recover the electrical buses and Unit 2 procedural electrical power recovery actions.

In a meeting summary (ML14128A512) issued on May 9, 2014, it was noted that the regulatory conference was transcribed and that a copy of the transcription would be made available and placed into the NRC's Agencywide Documents Access and Management System (ADAMS). A copy of this transcript is provided as an enclosure to this letter.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in the NRC's Public Document

Room or from the Publicly Available Records (PARS) component of the NRC's ADAMS. ADAMS is accessible from the NRC web site at <http://www.nrc.gov/reading-rm/adams.html> (The Public Electronic Reading Room).

Sincerely,

/RA Cale Young for Greg Werner/

Gregory E. Werner, Chief
Project Branch E
Division of Reactor Projects

Docket Nos.: 50-313, 50-368
License Nos.: DPR-51, NPF-6

Enclosure: ANO Unit 1 Stator Drop
Regulatory Conference
Transcript

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Letter to Jeremy Browning from Gregory E. Werner dated July 3, 2014

SUBJECT: SUPPLEMENT TO THE ARKANSAS NUCLEAR ONE UNIT 1 DROPPED STATOR
REGULATORY CONFERENCE MEETING SUMMARY

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Cause No: (None)

Nuclear Regulatory Conference with Entergy Operations, Inc.

Transcript of Proceedings

May 1, 2014



Job No. 18996

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IN ATTENDANCE CONT'D

Jeremy Browning - Site Vice President ANO

Joseph Kowaleski - Senior Vice President, Entergy

David McKenney - Supervising Engineering

John Hathcoat - Assistant Operations Manager, ANO

Gary Sullins - Assistant Operations Manager, ANO

Richard Harris - Manager, Emergency Planning

Dale James - Director, Regulatory and Performance
Improvement Department, ANO

John McCann - Vice President, Regulatory Assurance,
Entergy

Bryan Ford - Senior Manager, Fleet Regulatory Assurance,
Entergy

Stephanie Pyle - Manager, Regulatory Assurance, ANO

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<p>1 PROCEEDINGS</p> <p>2 OPERATOR SYLVIA: Good afternoon</p> <p>3 everyone. Welcome and thank you for standing by. At</p> <p>4 this time participant lines are in listen only mode.</p> <p>5 Following today's presentation we will have an</p> <p>6 opportunity for question and answer session. At that</p> <p>7 time please press star-one on your phone to ask a</p> <p>8 question. Now I'll turn the call over to our host,</p> <p>9 Mr. Greg Werner. You may begin.</p> <p>10 MR. WERNER: Thank you Sylvia. Good</p> <p>11 afternoon, I'm Gregory Werner with the Nuclear</p> <p>12 Regulatory Commission. I'm the Branch Chief,</p> <p>13 responsibility for Arkansas Nuclear One and Waterford</p> <p>14 Nuclear Power Plants.</p> <p>15 Welcome to the regulatory conference</p> <p>16 between the Nuclear Regulatory Commission and Entergy</p> <p>17 Operations. Today we'll be discussing the event that</p> <p>18 occurred on March 31st of last year involving a drop</p> <p>19 Unit 1 stator at the Arkansas Nuclear One facility.</p> <p>20 The event resulted in identification of</p> <p>21 two preliminarily greater than green findings associated</p> <p>22 the with violations of 10CFR, Part 50, Appendix B,</p> <p>23 Criterion V for Instructions, Procedures, and Drawings,</p> <p>24 associated with the failure to insure that the overhead</p> <p>25 temporary hoisting assembly was designed and tested in</p>	<p>1 Feedback forms are also available on the</p> <p>2 side table, and they will also be available online with</p> <p>3 the public meeting notice for this meeting. We would</p> <p>4 appreciate and request that you fill out the feedback</p> <p>5 forms.</p> <p>6 So quickly, if you look at the screen,</p> <p>7 the agenda, we're going to do an introduction of</p> <p>8 participants and I would just like to have the main</p> <p>9 table introduce themselves. We'll do some NRC opening</p> <p>10 remarks, summary of the violation, additional NRC</p> <p>11 opening remarks by Marc Dapas, Regional Administrator,</p> <p>12 the licensee Entergy presentation, we'll have some</p> <p>13 question and answers during that time from the NRC.</p> <p>14 Once y'all's presentation is done, the</p> <p>15 NRC will leave the room, we'll caucus and determine if</p> <p>16 we have any other additional questions or need</p> <p>17 additional information, we'll come back in at that time.</p> <p>18 We'll ask those questions. Marc Dapas will then do a</p> <p>19 closing remarks, we'll adjourn the conference, and then</p> <p>20 we'll take questions and comments from members of the</p> <p>21 public.</p> <p>22 So just so start out with introductions,</p> <p>23 again, as I said, I'm Gregory Werner, Branch Chief.</p> <p>24 MR. KENNEDY: I'm Kriss Kennedy, Director</p> <p>25 of Division of Reactor Projects, NRC Region IV.</p>
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<p>1 accordance with approved standards.</p> <p>2 A couple of administrative items; first,</p> <p>3 the closest restrooms are located out the door to your</p> <p>4 left past the guard station. In the event of an</p> <p>5 emergency, listen to the announcement over the intercom,</p> <p>6 if an evacuation of the building is necessary the</p> <p>7 nearest exists are out the front. Go out the doors to</p> <p>8 your left, or you can go out the doors to your right to</p> <p>9 the side of the building, and then our assembly area</p> <p>10 would be to the north towards the roads, we will proceed</p> <p>11 out in that direction.</p> <p>12 The agenda is what's up on the screen.</p> <p>13 We also have an agenda that was printed and distributed.</p> <p>14 If you'd like to get one, it's located over there on the</p> <p>15 side counter, so feel free to get up and get an agenda.</p> <p>16 This conference is being transcribed and will be</p> <p>17 available publicly online.</p> <p>18 As a reminder, when we speak, if we will</p> <p>19 introduce ourselves so the transcription lady can go</p> <p>20 ahead and get our names on the record. As a reminder to</p> <p>21 both NRC and Entergy personnel, if you wish to make a</p> <p>22 comment or question, please move to the microphone or</p> <p>23 move the microphone in front of you or go to the podium</p> <p>24 so the people on the phone bridge will be able to hear</p> <p>25 your the question or comments.</p>	<p>1 MR. DAPAS: I'm Marc Dapas, Regional</p> <p>2 Administrator of NRC Region IV office.</p> <p>3 MR. CLARK: I'm Jeff Clark. I'm the</p> <p>4 Acting Director for Division of Reactor Safety, Region</p> <p>5 IV.</p> <p>6 MR. CIRCLE: I'm Jeff Circle, a Team</p> <p>7 Leader of the Division of Risk Assessment NRR</p> <p>8 headquarters.</p> <p>9 MR. MITMAN: Jeff Mitman, I'm a Risk</p> <p>10 Analyst with NRR Risk Assessment and headquarters.</p> <p>11 MR. LOVELESS: I'm David Loveless, I'm</p> <p>12 the Senior Reactor Analyst for Region IV.</p> <p>13 MR. WILLOUGHBY: I'm Leonard Willoughby,</p> <p>14 Senior Reactor Inspector, Region IV.</p> <p>15 MR. WERNER: Thank you. Entergy?</p> <p>16 MR. BROWNING: Jeremy Browning, Site Vice</p> <p>17 President, Arkansas Nuclear One.</p> <p>18 MR. KOWALESKI: Joe Kowaleski, Chief</p> <p>19 Operating Officer for the southern plants.</p> <p>20 MR. MCKENNEY: My name's David McKenney</p> <p>21 and I'm Engineering Supervisor at ANO.</p> <p>22 MR. SULLINS: I'm Gary Sullins, I'm the</p> <p>23 Manager of Shift Operations for ANO Unit 1.</p> <p>24 MR. HATHCOAT: I'm John Hathcoat, Unit 2</p> <p>25 Manager Shift Operations.</p>

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<p>1 MR. HARRIS: Richard Harris, Emergency 2 Planning Manager, Arkansas Nuclear One. 3 MR. JAMES: I'm Dale James, Director of 4 Regulatory and Performance Improvement, Arkansas Nuclear 5 One. 6 MR. WERNER: Thank you. Again this is 7 Gregory Werner. I'm going to have some opening remarks. 8 In accordance with the NRC's regulatory 9 process after potentially risk significant findings 10 identified and characterized by the significance 11 determination processes as greater than Green, we offer 12 licensees an opportunity for a regulatory conference. 13 In this case, Entergy has requested that 14 a conference be held to discuss the issues and their 15 significance. This conference is open to the public for 16 observation. Members of both the public -- both those 17 ins attendance here and via the phone bridge should be 18 aware that this is a meeting between the Nuclear 19 Regulatory Commission and Entergy. 20 During the meeting comments and questions 21 will not be taken from members of the public. Following 22 the conference, the NRC staff will be available to 23 answer questions and receive comments from members of 24 the public concerning matters discussed at this 25 conference.</p>	<p>1 identified 10 unresolved items. Subsequently, a 2 follow-up team was conducted July 15th through February 3 10th, 2014, to review those unresolved items. During 4 the inspection the inspectors identified two findings of 5 potentially greater than Green significance that were a 6 violation of regulatory requirements. 7 The NRC assessed the risk significance of 8 this event and preliminarily determined that there was a 9 high safety significance, or the color Red, for Unit 1; 10 a substantial safety significance, or Yellow color, for 11 Unit 2. The NRC uses colors to classify the risk 12 significance of each event. Green finding; green, 13 white, yellow, red. With Green being the least risk 14 significance and Red being the most risk significance. 15 Following the inspection on site, the NRC 16 preliminarily determined that the finding constituted 17 apparent violation of 10CFR, Part 50, Appendix Bravo, 18 Criterion V, Instructions, Procedures, and Drawings. 19 The violation was determined to be a failure of the 20 licensees to insure that the overhead temporary hoisting 21 assembly was adequately designed and tested. 22 Specifically, licensee failed to identify deficiencies 23 in the vendor calculation titled Heavy Lift Gantry 24 Calculation, and the incorrectly sized component in the 25 north tower structure of the temporary hoisting</p>
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<p>1 On March 31st 2013, during the movement 2 of the Unit 1 stator, the overhead temporary hoisting 3 assembly transporting the stator collapsed, causing the 4 525-ton stator to fall on and extensively damage 5 portions of the Unit 1 turbine deck and subsequently 6 fall over 30 feet into the train bay. 7 The stator drop resulted in a Unit 1 loss 8 of offsite power for approximately 6 days and a Unit 2 9 reactor trip. The drop stator ruptured a common fire 10 main header in the train bay which caused flooding in 11 Unit 1 and water damage to the electrical switchgear for 12 unit 2, a small explosion resulting in a loss of offsite 13 power to one vital bus. 14 As a result, one of the Unit 2 emergency 15 diesel generators started and restored power to the 16 associated safety-related vital bus. In response to 17 the small explosion inside the Unit 2 electrical 18 cabinet, the operators declared a notification of an 19 unusual event. 20 On April 5th 2013, an augmented 21 inspection team was chartered to assess the facts and 22 circumstances surrounding the temporary hoisting 23 assembly collapse. 24 The augmented inspection team completed 25 the fact-finding inspection on May 9th 2013, and</p>	<p>1 assembly. 2 In addition, ANO personnel failed to 3 perform a load test of the temporary hoisting assembly. 4 These preliminary results along with an 5 option for regulatory conference were communicated to 6 you during an exit onsite that was conducted on 7 February 10th, 2014, and is documented in NRC Inspection 8 Report 2013 12, dated March 24, 2014. 9 This regulatory conference is the last 10 step of the inspection process before the NRC makes its 11 final determination on the significance of the 12 inspection findings. 13 This event led to a unique situation 14 where the NRC identified one performance deficiency and 15 one violation alleging different risk significance 16 determination for each unit. The differences in the 17 risk significance related to a couple of factors; 18 different operational modes, Unit 1 was shut down with 19 reactor head off, fuel in the vessel, ready to be 20 refueled as compared to Unit 2 there was 100 percent 21 power. The other differences are they are completely 22 different reactor designs. One is a Babcock & Wilcox 23 the other one is a combustion engineering design. They 24 have different systems and components that impact the 25 risk significance of the findings.</p>

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1 The purpose of this conference today is
2 to allow you to provide your position in part or all
3 with the facts and assumptions used by the NRC to make
4 our preliminary significance determination, and to allow
5 you to present new information that may assist us in
6 arriving at the most appropriate final significance
7 determination.

8 We also appreciate your views as to
9 whether there's any information that may be relevant to
10 the application of the significance determination in
11 this case, including your position on the content and
12 accuracy of the inspection report findings.

13 In particular, as discussed in the cover
14 letter of the augmented inspection team follow-up
15 report, please discuss actions that could be taken to
16 mitigate the severity of this event and what range of
17 credit should be applied and the basis for that.

18 If you have any additional information
19 that is under development and is not currently available
20 to be presented at this conference, please inform us of
21 the nature and the date when the NRC would expect to
22 receive that information. The NRC must receive that
23 information in a timely manner so that we can review it
24 and they can assess wit that information.

25 Please note that the primary purpose of

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1 evaluation.

2 Following the event and prior to
3 subsequent return to power, NRC inspectors observed
4 repair activities including the removal of the drop
5 stator, observed the subsequent Unit 1 replacement
6 stator lift, reviewed the corrective actions associated
7 with repairing the damaged Unit 1 turbine structure, the
8 fire main system, and both the Unit 1 and Unit 2
9 electrical systems, review the modifications and
10 procedures related to heavy load lifts and we also
11 observe training of your staff that they received on the
12 advised requirements for heavy load lifting

13 Now, I'd like to turn it over to Marc for
14 his opening remarks.

15 MR. DAPAS: Thank you, Greg. This is
16 Marc Depas, Regional Administrator. The stator drop was
17 certainly an unprecedented event that was significant
18 from both the reactor and personnel safety standpoint.
19 So it's in that context and is particularly important
20 that at the conclusion of this conference we at least
21 have a shared understanding of the facts and assumptions
22 regarding our preliminary significance determination,
23 and that we also have afforded you the full opportunity
24 to communicate any new information to ensure that our
25 final risk determination is as accurate as it can be.

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1 this meeting is to discuss issues related, again, to the
2 safety significance of the findings, which informs the
3 outcome of the apparent violation. It is important to
4 note that the decision to conduct this conference does
5 not mean that the NRC has determined that a violation
6 has occurred. The violation related to these findings
7 being discussed today will be assessed in accordance
8 with the commissions enforcement policy.

9 As a reminder, any statements, views, or
10 expressions of opinions made by NRC employees of this
11 conference do not represent final agency determinations
12 or beliefs relative to the matter before us today.

13 Following this conference, the regional
14 and NRC headquarter staff will reach significance
15 determination and enforcement decision. Our goal is to
16 issue the final significance determination letter by
17 June 10th of this year.

18 Just to kind of give you a little
19 background on our inspection activities, we determined
20 that ANO personnel conducted extensive reviews of the
21 event and the root cause evaluation and implemented
22 appropriate corrective actions that served the
23 subsequent lift of the drop stator and the Unit 1
24 replacement rotor of the stator were performed safely
25 considering the lessons learned from the root cause

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1 We communicated in the letter that I
2 signed that Greg referenced, the follow-up augmented
3 inspection team report dated March 24, we did clearly
4 communicate the basis for our preliminary risk
5 assessment. And as Greg indicated, there are different
6 designs between Unit 1 and Unit 2, and that results in
7 different systems and components that impact the risk
8 significance.

9 So in my view further underscores the
10 importance to ensure that we have the opportunity to
11 fully engage and the shared understanding of the facts
12 and assumptions. We ultimately may disagree with how
13 much significance should be accorded to the different
14 factors, but it's important that we have a shared
15 understanding, at least, from, you know, the premise
16 that we're operating from.

17 We acknowledge the corrective actions
18 that were performed to ensure the plant was properly
19 repaired and safe for restart. But I also wanted to
20 note, as I mentioned in the cover letter to the subject
21 inspection report that I just referenced, we had offered
22 the conclusion that your staff did not address Entergy's
23 oversight of the contractors involved with the stator
24 lift and we independently determined that you the
25 licensee did not ensure adequate supervisory and

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1 management oversight of the contractors and other
2 supplemental personnel involved with the stator lift and
3 that this contributed to the event.

4 So I'd like to, as part of the conference
5 today, hear your thoughts regarding the actions you've
6 taken to provide for oversight of contractors, how you
7 evaluate that in going forward, what actions you've
8 taken to ensure that in going forward approach you have
9 adequately addressed that performance deficiency that
10 was apparent from our independent review.

11 That concludes my opening remarks. I
12 look toward to the discussion, and at this point, I'll
13 turn it over to you, Mr. Kowaleski, to provide any
14 opening remarks you may have

15 Thank you.

16 MR. KOWALESKI: Yeah, Jeremy Browning is
17 going to do the opening remarks. And our presentation
18 is going to address all the points that you made. It is
19 constructive to first look at the Unit 1 risk
20 significance and the Unit 2 risk significance, and
21 discuss the evolutions.

22 MR. BROWNING: All right. This is Jeremy
23 Browning, Site Vice President Arkansas Nuclear One, I do
24 appreciate the opportunity, thank you for your time, to
25 share additional insights and information that we

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1 expanding further into possibly crediting some actions
2 that we believe could have mitigated the risk. We also
3 wanted to point out that following the event, the
4 operators at the station took appropriate actions to
5 place the plants in stable configurations, also
6 minimizing the risk to the health and safety of the
7 public.

8 We would also like to note that our
9 safety-related equipment performed as designed, further
10 reducing the risk to the health and safety of the
11 public.

12 If we could, if we could move onto the
13 agenda. As Joe spoke earlier, we're going to break the
14 presentation down into two separate areas, initially,
15 that's focusing on Unit 1 initially, and then we'll move
16 onto the discussion on Unit 2.

17 We've strategically put a break right
18 after the Unit 1 discussion, and again we'll take a
19 break whenever it's appropriate, but we thought that
20 would be a clean point to possibly allow ourselves to --
21 if there's additional follow-up questions because it is
22 a different set of the parameters that we will move into
23 when we talk about Unit 2. So we thought that might be
24 a good breaking point.

25 The agenda, we're going to kind of paint

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1 believe will help us achieve that objective of
2 determining the most accurate assessment of risk that
3 occurred following that event.

4 As we were preparing for this, I wanted
5 to make sure it's crystal clear that in no way, shape,
6 or form are we intending to challenge the significance
7 of the consequences of that event. We are simply trying
8 to establish the most accurate picture of the nuclear
9 safety risk following that event.

10 We take this commitment very seriously.
11 The seriousness of this event, the people that are
12 sitting on the Entergy panel were present on the day of
13 the event, myself included. The most impactful piece of
14 that is obviously the loss of one young man's life and
15 the injury of several other employees. That will have a
16 lasting impact on me personally, and the station,
17 personally we take it very seriously.

18 And as a result, we will share with you
19 the corrective actions that we took that were derived
20 out of a very thorough and rigorous causal analysis
21 which we broadened to extent of cause and condition. So
22 we will share that.

23 We do appreciate the insights you
24 provided to us in the augmented inspection team report
25 and your risk analysis. We use that as a basis for our

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1 the backdrop of the plant's immediate response, you
2 know, what happened immediately just so we have a clear
3 picture. It will be a very brief discussion, but I
4 think it's important for us to understand what actually
5 happened, the configuration of the plant, and the
6 actions that we actually took following the event.

7 Following that, we will discuss a couple
8 of areas on Unit 2, recovery of 4160 volt power and
9 inventory makeup, and some success paths that we were
10 developing as contingencies in the event the power
11 continued to degrade, that being our offsite power which
12 was always available to us and our safety buses that
13 were always available to us. The conduit between the
14 two has discussed earlier, had been severed.

15 So, really, that's the focus of our
16 recoveries. How do we connect the available offsite
17 power to the available safety, and we did have some
18 additional contingencies that we were working on.

19 After the break, we'll shift to Unit 2.
20 The discussion on Unit 2 is a little bit different in
21 that the recovery actions that we'll be talking about on
22 Unit 2 would be procedurally driven. The equipment was
23 available, we really aren't developing operator or
24 station-performed activities to implement those.

25 This is just simply walking you through

5 (Pages 17 to 20)

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1 the available resources that we had and our analysis as
2 in some cases, there may not have been the appropriate
3 credit applied to those areas. And then we will, at the
4 end of presentation, talk about the site actions, the
5 common cause, including fleet actions that were taken
6 and, obviously, closing comments.

7 So if we can move on to the Unit 1
8 section. Already painted a little bit of an overview,
9 this is what you're about to listen to. We're going to
10 focus on the NRC event tree. When we're talking about
11 4160 volt AC power recovery, there's actually four
12 sections if this.

13 The first section of it is what we
14 actually did to recover power. Just so you understand
15 what we -- it took to actually connect that available
16 offsite power source to the onsite power source.

17 Then we're going to discuss three success
18 paths that were being developed as contingencies in the
19 event that we lost offsite power, or we lost one of our
20 diesels, what would we do then? That's part of the way
21 we do business. We're thinking about what could happen
22 next.

23 So those recovery actions were already
24 under development in that we would possibly lose one of
25 our emergency diesels and what would it take to get that

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1 offsite power connected to our buses.

2 And the 4th item that we will talk about
3 is inventory. Making sure that we had available
4 inventory for our spent fuel pool which was flooded up,
5 had over 300,000 gallons of water on top of the fuel --
6 active fuel, but we did recognize the need to establish
7 inventory control.

8 As we go on through the Unit 1
9 discussion, we recognize that crediting those, there is
10 no approved process to credit actions that we were
11 proposing. So what we did is we used known tools that
12 are already out there for assessing risk, and we tried
13 to say how can we apply those known tools to the
14 methodologies that we would be implementing to give
15 credit to action and come up with a method for crediting
16 those.

17 I think that is all I had on the
18 overview, so I think we're ready to actually move into
19 the Unit 1 discussion.

20 MR. SULLINS: Mr. Browning, this is Gary
21 Sullins, you spoke to the spent fuel pool, I think you
22 meant the fuel transfer.

23 MR. BROWNING: Both. In our succession
24 on make up, our make up capability would have provided
25 make up both to the spent fuel pool and the reactor, but

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1 thank you.

2 MR. KOWALESKI: Good afternoon. This is
3 Joe Kowaleski. Just add one other item to that as we're
4 talking about the actual installation of the power
5 supply from the offsite startup one transformer to the
6 safety buses. That was actually installed and available
7 for service in 4.4 days. Gary is going to discuss the
8 time to full recovery is 4.8 days, so in the actual
9 event we have we had offsite power established prior to
10 and within the timeframe of core recovery.

11 MR. SULLINS: Good afternoon, I'm Gary
12 Sullins, Manager Shift Operations on ANO Unit 1. I
13 supervise the shift managers for Unit 1 and then the
14 senior license holder to that unit. I also serve in the
15 role of TFC manager in our emergency response
16 organization. In that role I report directly to the
17 emergency plan manager and coordinate development of
18 repair and recovery actions in the TFC working with our
19 operations, maintenance, and engineering coordinators.

20 On the day of the stator drop event, I
21 provided oversight for control room activities
22 throughout the day, and in the days and weeks following,
23 I served in the role of supporting the engineering and
24 how to support organizations in defining strategies for
25 our recovery.

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1 MR. MCKENNEY: My name is David McKenney
2 and I'm the -- right now I'm currently the Engineering
3 Fix It Now Supervisor at ENTARK (unclear) 1. I've got
4 going on 27 -- a little more than 27 years experience,
5 all of it in engineering, and before that 6 years of
6 construction experience. I was the engineering
7 coordinator and the TSE the evening after the event.
8 We'll talk about what the engineering activities were
9 going on associated with that.

10 The engineering fix it now team is -- one of
11 our normal businesses is to provide temporary power
12 during outages and for other -- like bus outages and
13 some of those kind of things. So we're very familiar
14 with the ability to get power to where we need it.

15 MR. SULLINS: To remind you of the
16 structure of our presentation, the success paths for
17 4160 volt power recovery are built upon what we actually
18 did to substantiate their viability and also recognize
19 that those success paths were in our contingency plans
20 in the event that power degraded.

21 So what we'll start with, initial
22 conditions that applied both on the day of the event
23 with the plant responding as it did, and these initial
24 conditions would also apply for certain of the sequences
25 in the risk assessment had equipment failed such as our

6 (Pages 21 to 24)

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1 emergency diesel generators.

2 We were on day 7 of our refuelling outage
3 with our fuel transfer canal flooded. That provided for
4 us a time to boil of 12 hours and a time to core
5 uncover of 115 hours or 4.8 days

6 MR. MITMAN: If I could ask a question of
7 clarification on that? This is Jeff Mitman from
8 headquarters. The 12 hours and the 115 hours are a
9 little bit longer than what I'd seen previously. Two
10 questions; first is, could you supply the basis for
11 those times? And the second question is, those are the
12 times that we currently understand were the conditions
13 that they were in. Also of extreme importance is what
14 the operators thought they had at the time of the event.
15 And so could you speak to how much time they thought
16 they had when the event happened?

17 MR. SULLINS: Yes I can, Jeff. We can
18 provide followup calculations from our insurance staff
19 for the times presented. I don't have with me, readily,
20 the times that we -- we calculate daily an estimate, a
21 bounding estimate for time to boil and time to core
22 uncover, and those times were short and I'll have to
23 get back with you for the exact times that were posted
24 in the control room and available previously.

25 MR. BROWNING: Gary, are the estimates

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1 non-vital sources to our vital switchgear. Those being
2 our startup one and startup two transformers and the
3 alternate AC diesel generator. Our vital switchgear
4 were unaffected and operated properly once re-powered
5 from the emergency diesel generators.

6 Also note is that we had available to us
7 480-volt power within our power block from local
8 distribution, we commonly refer to it as the London
9 Line. On the day of the stator drop event, that power
10 source was used for non-vital equipment. This supports
11 the spent fuel pool cooling function and in days that
12 followed, this power source was used to recover load
13 centers for our 480-volt distribution system. And
14 you'll see later in our presentation how this available
15 power provides options for us to respond.

16 On the day of the event we chose to staff
17 our emergency response organization, and for the
18 dominant cut set and the risk assessment we would
19 likewise be in an alert condition and have available to
20 us that support structure provided by our ERO.

21 We were in day seven of a fueling outage
22 and that provided for us substantial support of human
23 resources. We had 295 craft available, 45 electricians,
24 this is around the clock support, approximately 40
25 engineering personnel, and 60 operations personnel. And

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1 that are done are any of those recoverable, are they
2 documented?

3 MR. SULLINS: Yes they are.

4 MR. BROWNING: So we can provide the --
5 from that day with the estimate?

6 MR. SULLINS: Yes we can.

7 MR. DAPAS: Just an over arching
8 question. Our preliminary risk determination we had a
9 different subsequent regarding time to boil and time to
10 core uncover.

11 MR. MITMAN: The initial assessment's a
12 little bit shorter than those times, but not to the
13 point to -- the human reliability analysis isn't
14 sensitive enough to distinguish between what they have,
15 what's currently being estimated and what we used. So
16 it's not going to shift the results, but I'm not sure
17 where the numbers are coming from and I'd like to get a
18 look at those.

19 And likewise, what the operators thought
20 is probably more important than what the times actually
21 were because that's what everybody is going to be
22 working towards is what they think is the amount of time
23 that they have, not how much time they actually have.

24 MR. SULLINS: As a result of the stator
25 drop, we had a loss of availability of our three

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1 those are the operations personnel available to support
2 Unit 1. It does not include those that were involved in
3 Unit 2.

4 To ground our discussion, we've reviewed
5 your risk assessment and have focussed on key nodes in
6 sequence 19 which is called out in your report, which
7 involves the loss of both emergency diesel generators
8 and then other sequences where loss of one emergency
9 diesel generator can influence the probability of core
10 damage.

11 We'll be talking about, as Mr. Browning
12 mentioned, recovery paths that were available to us for
13 4160-volt power as well as inventory control recovery.

14 Our objective, just to summarize, is to
15 provide a technical basis for success paths for that
16 dominant cut set where both diesel generators or one
17 diesel generator is lost. Three of these involve
18 recovering 4160-volt AC power and the three success
19 paths were those contingency plans that were developed
20 in response to the event.

21 We also will talk about a 4th success
22 path involving use of 480-volt power to provide force
23 flow makeup to the reactor coolant system.

24 MR. KOWALESKI: This is Joe Kowaleski,
25 just wanted to point that out that of the three

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1 4160-volt success paths were on the board and being
2 evaluated in scope in response to this event as
3 contingencies in the event that something happened. So
4 in terms of determining what we could do, these were
5 already on the table.

6 MR. DAPAS: I think that's an important
7 distinction there. It's not that these alternative
8 success paths could have been pursued, you are
9 communicating to us that they actually were being
10 pursued or at least you were going through the thought
11 process and what would be involved to establish power
12 via those alternate routes. Is that correct?

13 MR. KOWALESKI: Yeah, that's correct. So
14 given the picture, we've got two diesel generators, a
15 very stable condition, and so evaluating how to restore
16 offsite power, the way we chose to do it, from start up
17 one to the safety buses was done in a way to provide
18 flexibility for the ultimate recovery. Lay down areas,
19 travel paths so it was well away from what we needed for
20 construction activities. And it provided operational
21 flexibility for future testing and activities to restore
22 the electrical part.

23 So it's more complex than these options.
24 These options were on the board, being evaluated by the
25 TSC as contingencies in the event that we had a problem

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1 with the diesel or some kind of a problem with
2 completing the offsite source that we ultimately did.

3 MR. BROWNING: And hopefully through our
4 presentation we're going to demonstrate to you that the
5 scope of what we actually did was very similar to the
6 scope that was in these contingency plans, so the
7 materials, the resources, and the people that we would
8 have needed to do this activity, we could have shifted
9 the plan from what we were actually doing, which was
10 based on actual planning not the ones proposed in risk
11 analysis, but they are so similar in nature that that
12 change in course could have happened pretty quickly.

13 MR. CIRCLE: This is Jeff Circle from
14 headquarters. Did these contingencies exist in any way,
15 shape, or form prior to the stator drop as standard
16 contingencies that you normally take? That would
17 require, you know, putting equipment in the warehouse,
18 getting it prepared, procedures or anything like that?

19 MR. BROWNING: The actual specific
20 contingency that we're talking about today would not
21 have been fully developed; however, the processes that
22 we would have used for temporary power for a normal
23 refueling, we do these kind of things to prepare
24 ourselves for a refueling outage. So the scope would
25 have been the same. We're going to take power through

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1 here and we're going to run a cable to there and all
2 the relaying and the metering that you might need to do
3 to do that would be on the table. The change would be
4 where is the source of power and where do I need it?

5 MR. CIRCLE: Was the equipment staged?

6 MR. BROWNING: Yes, sir. We will discuss
7 that as far as we were going to do some circ water pump
8 cables and some other work on some site where we had the
9 craft there, the resources there, the materials there
10 for similar work with similar components, we just
11 changed where those components would be connected.

12 MR. KOWALESKI: This is Joe Kowaleski,
13 just to be clear, so all the materials needed to execute
14 these options were on site? They were not staged for
15 this job, but they were immediately available on site?

16 MR. BROWNING: That includes the human
17 resource and the skills and the training to implement
18 them.

19 MR. CIRCLE: But no procedures?

20 MR. BROWNING: No procedures were
21 developed at that time. They were developed in order to
22 implement.

23 MR. DAPAS: I think it would probably be
24 appropriate that you were planning to go through and
25 explain to --

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1 MR. BROWNING: Yes, sir.

2 MR. DAPAS: I understand your question.
3 I think it's a valid question. I think we'll -- you
4 were going to give us the opportunity to engage, right?

5 MR. BROWNING: Yes, sir, if we don't hit
6 your expectations when we flip past the slide, ask a
7 question.

8 MR. CIRCLE: Well, we're not wallflowers.

9 MR. SULLINS: Thank you for the question.
10 Both for our actual response and for postulated
11 equipment failures, our priorities would be dictated by
12 the circumstances. And what we mean by that is we're
13 looking at our defense in depth for our five key safety
14 functions. What's our status of the plant? If the TSC
15 is activated as it was that day and in the event of
16 blackout condition, we're assessing those and
17 establishing priorities. On the day of the event the
18 plant was stabilized quickly and we had two trains of
19 decay heat removal on this support equipment in
20 operation.

21 The priorities align with those key
22 safety functions, protecting the electric power,
23 protecting decay heat removal, protecting the spent fuel
24 pool cooling. With the conditions that existed in our
25 plant it was also very important to us to protect our

8 (Pages 29 to 32)

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1 personnel with changing plant conditions, electrical
2 safety, structural safety were very important to us.

3 And as Mr. Kowaleski had mentioned, we
4 were factoring in -- given that we were stable with two
5 trains in operation, we're looking at taking a longer
6 term view of risk and how we recover and what we
7 ultimately chose to do with our recovery of offsite
8 power.

9 On the day of the event we recovered
10 promptly our decay heat removal function, our spent fuel
11 pool cooling. In the week that followed, we reliably
12 operated emergency diesel generators with no challenges,
13 and beyond that, we reliably operated our two trains of
14 decay heat removal.

15 As we've already discussed, we chose --
16 we developed and chose a recovery path for 4160-volt
17 power. In light of the stable conditions and the time
18 margin that was available for us with the condition,
19 too, of our shut down operations protection plan flooded
20 up to implement an optimum electrical recovery.

21 That recovery that was implemented was
22 made available to my staff and operations in 4.4 days.
23 And to be clear on what we mean by available, it was
24 tested energized up to the last breaker on which no
25 modifications were made and operating instructions and

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1 briefings have been provided to our operators in the
2 form of night orders. So in the event that we needed to
3 use this source on a emergency basis, it was available
4 to us at that time

5 MR. MITMAN: Could you speak to why you
6 waited, what the thinking was behind waiting another day
7 and a half, approximately, before you re-energized --

8 MR. KOWALESKI: -- refer to the process
9 diagram.

10 MR. SULLINS: I'll answer briefly. It
11 was to complete the review process to formally approve
12 the temporary modifications design reviews.

13 MR. MITMAN: Did you have to do any
14 further testing on the buses to see that they were okay
15 to take the power?

16 MR. SULLINS: No sir, we did not.

17 MR. BROWNING: If you look back at the
18 slide that talked about priorities. We were making
19 decisions based on actual plant conditions. One of our
20 priorities is we were not going to challenge one of
21 those emergency diesel generators. We were not going to
22 challenge a bus.

23 A different mindset would have come into
24 play if one of those diesel generators would have shut
25 down. That would now take that priority off the table.

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1 We don't have to protect that diesel anymore and that
2 breaker would have been closed by the operators just as
3 Gary's stating it. The subsequent days we've discovered
4 nothing that would have changed our approach and that
5 breaker would have powered that bus up without
6 challenge.

7 MR. SULLINS: The process -- I was
8 involved in that decision. That process that applies is
9 our temporary modification process, and I had
10 discussions with the lead for the recovery team, our
11 design engineering manager, about whether we met the
12 criteria for an emergency team mod and actually placing
13 it into service, and my position was that we did not.
14 So we waited for the formal approval to be completed to
15 place it into service.

16 MR. BROWNING: Again going back to the
17 other -- again, this is Jeremy Browning, Site Vice
18 President ANO -- we would have met the criteria for
19 emergency temp mod had one of those diesel generators
20 failed in some way because the safety function would not
21 have been met and that would allowed that process to
22 continue forward.

23 MR. CIRCLE: Right. And this is Jeff
24 Circle. The thing is that if the diesel had failed, one
25 of the reasons why it failed is the fault with the

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1 switchgear. So it wouldn't have been a 4.4-day
2 recovery, it would have been a little bit longer.
3 Because you would have to have measured the switchgear
4 to ensure that the fault, the condition had cleared.

5 MR. KOWALESKI: I would clarify that
6 slightly. The timeframe for the 4.8 days available to,
7 quote, uncover the start at the point that you lost both
8 diesels, not on the day that stator, but that point in
9 time that both diesels failed, you would have had 4.8
10 days to put that in service.

11 MR. CIRCLE: Right, but you would still
12 have a lot longer time then you had on that particular
13 event. So that event, the diesels were running, so you
14 had the temp mod right up to the last breaker. What
15 we're talking about -- we're skipping ahead a little bit
16 because this is part of the risk analysis, that you
17 failed two diesels, you're in the station blackout
18 condition and now the only power that you have is
19 through the temp mod, but you don't know what caused the
20 diesel's to fail.

21 So there would be some additional work
22 that you would have to do prior to restoring power.
23 That's all -- that's why we're asking that question.

24 MR. DAPAS: I think the importance of
25 discussion here is to try as realistically as we can to

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1 reconstruct, if you will, what conditions would have
2 existed had you needed to exercise these alternative
3 recovery paths here, since a lot are looking at those as
4 being available here to address the risk significance,
5 that we describes following an assumption of the failure
6 of the diesel.

7 So in my view that's why it's important
8 on timelines here, we need to be careful here when we're
9 saying on saying an extensive period of time, you know,
10 those are all subjective terms. Just try and refine,
11 you know, what is the actual time estimate if there
12 needed to be an understanding of the root cause -- the
13 cause for the diesel failure here, does that impact the
14 bus and would you have to do some degree of testing,
15 right, before you connected your alternative power
16 source to the affected bus.

17 Understanding that, just what would be a
18 realistic estimate of that time?

19 MR. BROWNING: And hopefully, through our
20 presentations we've discussed the contingencies, we will
21 show the margin that we would have had in the event that
22 we would have lost one of those diesels and decided to
23 implement one of our contingencies, as opposed to what
24 we actually did.

25 The only real discussion around actual is

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1 to paint the picture of scope and what it took to do it
2 and compare that to what we would have done in the event
3 that we had a failure. And, again, if we get to the
4 point where we're talking about the timelines and we
5 haven't met your expectations, we will clearly provide
6 the information that we need to meet those expectations.

7 MR. SULLINS: Regarding the question on
8 assessing the condition of the bus, we would well confer
9 the dialog on the indications available to the operator
10 and how we would access that if that's useful.

11 Okay. The next phase of our section is
12 David McKenney will describe what we actually did to
13 recover power from Startup No. One.

14 MR. MCKENNEY: First thing I wanted to do
15 was kind of go through our electrical distribution
16 system. So everybody has a baseline knowledge on this
17 before we start talking about options that we take. So
18 I'm going to point to the screen up here, so if you
19 follow along with me, it will help us with that.

20 We have, there's basically five sources
21 of power to our vital AC. There's a Startup 1
22 transformer, which is fed from offsite. There's a
23 Startup 2 transformer, which is shared with Unit 2.
24 There's the alternate AC diesel generator, which is --
25 it also shared with Unit 2, can provide power to either

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1 the non-vital on Unit 1 or the vital on Unit 1, the
2 non-vital on Unit 2 and the vital on Unit 2. So it has
3 lots of capabilities to go to different places.

4 And, of course, we have the emergency
5 diesel generators that feed the safety buses. So the
6 way the normal power comes into the plant, is it comes
7 in from one of the Start transformers to the non-vital.
8 You can see this line right here shows the difference
9 between the non-vital above this line and vital below
10 this line. And so, anyway, there's -- and then from
11 there it goes from --

12 (Noise from the bridge phone line)

13 MR. WERNER: This is Greg Werner,
14 somebody with the NRC doesn't have their phone muted.
15 Could you please mute your phone? Thank you.

16 MR. MCKENNEY: I think we got it. All
17 right, so this is the non-vital, which we call A1 and A2
18 and then from there it feeds through to vitals. This is
19 the red train, and the green train, 4160, and then it
20 cascades down through the 480-volt systems to provide
21 the power.

22 So this is the situation we were in
23 before the event and the lines that are colored red is
24 the lines that were energized. Any questions on that?
25 Okay.

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1 So what this figure is designed to show
2 you is what was actually damaged by the stator drop.
3 And that's inside this shaded box here. The little
4 figure on the thing doesn't have shaded, but it has a
5 red dotted line around it. And what you can see is, is
6 when the stator fell, it made unavailable the non-vital
7 link between offsite and the vital. So what we're faced
8 with was how to get power from the top, above the box,
9 down to the bottom, to get power back if the diesels
10 were to fail.

11 MR. MITMAN: At the time of the event did
12 you know the status of 2A9 and whether the 2A9 bus was
13 functional or not?

14 MR. MCKENNEY: There was no indication to
15 the operators it was nonfunctional. We -- so the damage
16 to the 2A9 bus is actually in the back where the
17 termination points to Unit 1. So the bus --

18 MR. MITMAN: Jeff Mitman again. Let me
19 rephrase it a different way. Did the operators think
20 that they could use 2A9 immediately after the stator
21 drop?

22 MR. HATHCOAT: This is John Hathcoat, the
23 Unit 2 Shift AO1, we had -- the report came from the
24 field about 1:30 in the afternoon that there was
25 potential damage to the back of 2A9. The feeds from the

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1 A1, A3 vital and non-vital Unit 1 back of 2A9 was
2 damaged, but at that point Unit 2 believed that we
3 needed to assess what we had.

4 Up to that point and even after that
5 point on the Unit 2 side it was fully available and the
6 operators would have used it if need be. It is a shared
7 load between Unit 1 and Unit 2, so the functionality is
8 really dependent on if there's anything damaged,
9 challenging the functionality, we would call it
10 unavailable or nonfunctional, but it was available.

11 MR. MITMAN: But there's visible damage
12 to the 2A9 bus, and so far you haven't talked about
13 testing the 2A9 bus to see whether it's capable of
14 performing its design function, and I'm surprised that
15 you would contemplate energizing a 4,000-volt bus
16 without doing at least a little bit of testing on it
17 unless you were at a point where it was your last
18 resource.

19 MR. HATHCOAT: Absolutely. And from a
20 Unit 2 perspective, you know, H B Robinson was mentioned
21 in the control room four or five times, I was in there.
22 And that question came up, and it was isolated -- what
23 we knew -- the report from the field was it was isolated
24 to the Unit 1 side.

25 And from the Unit 2 perspective, you

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1 know, I interviewed the controlling supervisor, the SDA,
2 I was there, and if we were in a blackout condition, and
3 I'll talk more about that in the Unit 2 section, but,
4 yes, it would have been pursued.

5 The question came up, you know, locally
6 going down there and looking at it. From a relay tech
7 standpoint we would have gone down, more than likely,
8 and opened up the back and inspected and make sure it
9 was just isolated to the Unit 1 side before we pursued
10 on Unit 2.

11 MR. KOWALESKI: To be clear, though, the
12 damage was on the connection points on the output of the
13 Unit 1 breakers, very visible and easily accessed and
14 assessed. So there was no damage to the actual bus, the
15 bus work supply from the alternate AC diesel, no damage
16 to any of the Unit 2 breakers or the feeder breaker to
17 the bus.

18 The damage was at the termination points
19 on the output side of the Unit 1 breakers, and the
20 breakers themselves were not damaged.

21 MR. MITMAN: You know that today, but the
22 people in the control room at the time of the event did
23 not know that, so it's not a question of what the bus
24 was capable of doing, it's a question of what the
25 operators in the control room thought they could do.

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1 And not only is there damage to the 2A9 bus, but there's
2 water on the floor in a room with 4,000 volts of
3 energized equipment.

4 It's a -- plant personnel have to be very
5 careful about what they're doing that the equipment that
6 is functioning and themselves, and I just want to draw
7 the distinction between what we know today and what was
8 known at the time of the event. And what we knew they
9 could have done at the time of the event today is not
10 what the control room knew at the time.

11 MR. BROWNING: So John has the direct
12 knowledge of what the control room would have known at
13 the time.

14 MR. HATHCOAT: I was in the control room
15 at the time. We were stable on the Unit 2 side, so we
16 did not have to pursue energizing 2A9, but, you know,
17 our procedures, station blackout procedures, loss of
18 offsite power procedures, standard tasks, we're trained
19 on that.

20 That's one of our major recovery
21 strategies, and I'll talk more about that, is to look at
22 your blackout condition for safety function. We're
23 going to follow our procedure and energize 2A9 using the
24 station blackout diesel.

25 Now is it a proven action, knowing that

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1 there's potential damage to the back side of the 2A9
2 bus? Absolutely. We don't have time, we would have had
3 time to engage the technicians, I sent them down there
4 looking at the back up 2A9, make sure that it was
5 isolated just to the back feed on the Unit 1 side, and
6 it shouldn't have been any issue at all moving forward
7 with energizing one of our vital buses.

8 MR. DAPAS: I think the key here is --
9 this is Marc Dapas -- I think the key there is what in
10 your view do you think the operators and staff would
11 have been able to assess and I understand now that your
12 view there was that the damage was isolated to what the
13 Unit 1 breaker output determination?

14 MR. HATHCOAT: There's two breakers --

15 MR. DAPAS: The question in my mind is,
16 is that readily apparent to the operators by going down
17 and looking at that and making that determination, or is
18 that a function of what you've been able to determine,
19 you know, after the fact there? What information was
20 available to the operators and what input was there for
21 their decision making, trying to understand that here
22 and looking back.

23 MR. HATHCOAT: You can easily discern
24 that the queues are kind of split out, that it was
25 isolated to the A1 and A3 feeds to Unit 1. With that in

11 (Pages 41 to 44)

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1 mind, you know, the operators would have, knowing what
2 they did that the cable was pulled across the train bay,
3 and at the time they had known that, hey, as isolated
4 Unit 1 we could have moved forward with Unit 2.

5 Now the information came from back from
6 the field about 1:30 in the afternoon. Now talking to
7 the shift manager at that point later he said, you know,
8 it might have been a good idea in a blackout condition
9 to send the relay techs down just to look in the back
10 just to confirm that it is, you know, isolated to A1-A3
11 before we pursued on it because we would have had time
12 in a blackout condition.

13 So, yes, they definitely would have
14 pursued it for our procedural direction to restore power
15 if needed.

16 MR. CIRCLE: This is Jeff Circle. How
17 was the accessibility at that time if they had to do a
18 detailed examination of the switchgear?

19 MR. HATHCOAT: Well, we couldn't get down
20 to it 'til around noon or after this, but at that time,
21 you know, we didn't know -- there was no knowledge that
22 the blackout diesel on 2A9 was damaged. It wasn't until
23 we got down there, until about 1 o'clock is when we
24 actually noticed.

25 MR. TINDELL: This is Brian Tindell the

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1 did there is we hooked a cable between the Startup 1
2 transformer and a temporary 4160-volt breaker that was
3 located in our transformer yard. Ran another capable
4 around the south side of the Unit 1 turbine building,
5 away from the damaged area and tied it to the A310-410,
6 which is the cross connect between the two vital buses.

7 We were actually able to install this in
8 4.4 days and had it energized to this point
9 here(indicating). All tested and energized up to that
10 point.

11 And where we spliced this cable, and this
12 portion of the circuit was not impacted by any damage or
13 any of those kind of things, so that portion of the
14 circuit was still intact.

15 MR. LOVELESS: Temporary breaker was
16 onsite for it, or was it brought in?

17 MR. MCKENNEY: No, we brought that in,
18 ENTARK, Entergy Arkansas had that, and it was here the
19 next morning, after the event.

20 MR. SULLINS: Very good question. We're
21 talking about what we actually did when we talk about
22 the success paths that are modeled in our risk
23 assessment the breaker is not a part of that strategy.

24 MR. MCKENNEY: This is just an overhead
25 view showing the layout of -- here's the Startup 1

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1 Senior Resident at Arkansas Nuclear One, I think we're
2 getting confused between availability for Unit 1 and
3 Unit 2. I think most of what you're talking about is
4 availability for Unit 2, but we're talking about the
5 Unit 1.

6 MR. HATHCOAT: Absolutely. And I'll talk
7 a lot more about the Unit 2 and hopefully clarify that.

8 MR. DAPAS: Just one overarching comment.
9 I think it's important here that we're understanding the
10 basis for your assumptions, so if our questions are
11 leaving you with the impression that we've already
12 reached a determination, it's really to understand the
13 basis here and how you considered the various factors
14 here, you know, IE: If the bus needs to be tested, did
15 you consider that? How did you factor that into your
16 timeline?

17 MR. FORD: I think we might answer those
18 questions better when we get into the strategies.

19 MR. MCKENNEY: First thing we're going to
20 talk about is what we actually installed, post event,
21 and that's just to show you the basic electrical layout
22 of that and a physical overhead view of that.

23 And so what we're going to do is go
24 through -- this is a picture of the Startup 1
25 transformer that was on the previous slide. And what we

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1 Transformer as it exists, it's normal location. We put
2 the temporary breaker about approximately 50 feet away,
3 then we ran the cable around the south side of the plant
4 and to our vital switchgear area.

5 This area here that's designated the
6 train bay, that is where the stator fell. And these two
7 boxes here, I know it's hard to see, that's our
8 non-vital A2 and A1 switchgear.

9 MR. WERNER: As a reminder, if you
10 wouldn't mind just saying what page number you're on, we
11 do have folks from headquarters listening in.

12 MR. MCKENNEY: I'm on slide 17. This is
13 slide 18, and this is a photograph of the temporary
14 breaker. You can see the general location right here
15 that we put in transformer yard. This is Startup
16 Transformer No. 1. And this is the stator where it
17 landed after the event. So you can see we have
18 temporary cables here you can see coming in and out of
19 the breaker from the transformer and then going down the
20 opposite end of plant, back around to the vital
21 switchgear.

22 This is slide 19. This is showing the
23 general scope of the actual installation that we
24 installed. And you can see that it might be a little
25 confusing. It's seven -- since we had to run parallel

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1 conductors per phase, there's seven cables and one
2 neutral, so the actual length was 50 feet and 500 feet,
3 so it's lot of, there's some parallel runs on that.
4 MR. CIRCLE: We did have that question.
5 MR. MCKENNEY: Yeah. There's 28 splices
6 or terminations, some of them were splices, some were
7 terminations, 4160-volt that we installed for that.
8 MR. MITMAN: So, this will come up a
9 little bit later, but you used about 4,000 foot of
10 cable as I understand it, right? How much additional
11 cable did you have on site?
12 MR. MCKENNEY: We had scheduled to
13 replace our circulating water pump cables, which is in
14 our intake structure, so we had quite a bit of cable on
15 site to do that particular job. We had not started that
16 job yet. So we had a lot of cable and the termination
17 kits associated with replacing that cable, this
18 4160-volt cable, so.
19 MR. KOWALESKI: We had more, but you
20 don't know an exact length?
21 MR. MCKENNEY: We had enough to do the
22 alternate, we did bring in cable to finish this
23 particular option, but the subsequent options, the
24 capable length is a lot shorter and if we'd gone into
25 that situation, we'd have done that.

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1 MR. MITMAN: So, again, I'm getting a
2 little bit ahead, but the concern is how many of these
3 options you could do? You obviously had enough to do
4 this one, but if you had to do one or two additional
5 ones, you might have run out of cable.
6 SPEAKER: This is headquarters. We're
7 having a hard time hearing you, Jeff, could you please
8 speak up a little?
9 MR. MITMAN: Okay.
10 MR. BROWNING: How much cable did we
11 actually have on site, how much did we use for this?
12 MR. MCKENNEY: I can get you those
13 numbers at break. I've got them in a book back here.
14 MR. DAPAS: I think the intent of the
15 question was to understand if you had to pursue more
16 than one contingency option there did you have
17 sufficient cable for that?
18 MR. MCKENNEY: One thing is, and it's not
19 listed in our presentation, if we really had to do this
20 we could have run this cable a lot shorter than what we
21 did. And that's what we're going to talk about in a
22 moment.
23 MR. CIRCLE: Jeff Circle, just to
24 clarify, and then I'll finish, had it not been for the
25 fact that you had already scheduled the circ water pump

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1 you would not have this much capable on site?
2 MR. MCKENNEY: That's correct.
3 MR. BROWNING: But to that point, we not
4 be lifting the stator if we weren't in a refueling
5 outage performing this work.
6 MR. CIRCLE: Right, but this particular
7 outage, it was fortuitous that you had cable on site
8 available.
9 MR. MCKENNEY: Cable is not terribly
10 difficult to come by in the timeframe we're talking
11 about. We were able to actually get the cable here in
12 the timeframe we're talking about. But we did have
13 enough cable to do multiple of these options on site.
14 I want to talk a little bit about the
15 implementation process because that's going to be
16 important as far as how do we get to the point that we
17 identified the need for one of these temporary
18 installations, to actual implementation of those
19 installations.
20 And so, we had -- I was in the TSC and we
21 were working on multiple options because of the
22 condition we were in with just running on diesel
23 generators from the engineering and a station
24 perspective that's not a very comfortable position to
25 be, so we were continuously looking at additional

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1 options, contingency plans because if we lose a diesel
2 generator, then we'd want to be able to respond in a
3 reasonable fashion.
4 And so the implementation would be under
5 our temporary modification process and our work
6 management process. I'll go through this flowchart a
7 little bit with you. This kind of describes our
8 processes.
9 So if you'll look at the top here you'll
10 see where they have the TSC or OCC or OPS where
11 engineering identifies a need. Engineering would define
12 the concept and scope and then at that point, once we
13 define the initial concept and scope, depending on the
14 urgency, we would provide those directions to planning,
15 in which case they would start the planning process and
16 get instructions to the field for the start of
17 installation.
18 A lot of the stuff that we actually
19 install, like pulling capable, it's pretty straight
20 forward, so you don't need a lot of detailed
21 instructions for that, but they were working under our
22 processes.
23 So as they're installing and testing the
24 configuration, they're providing feedback to engineering
25 as we are refining the scope. And then if there's any

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1 changes to what engineering needs we provide that back
2 to planning, which kind of completes the circle on -- to
3 make sure that we're linked up.

4 Because what we're doing here is we're
5 running in parallel paths, right? One is the
6 installation, one is the documentation and approvals
7 associated with the temporary modification.

8 So this right here, the available for
9 use, that's when the testing's done, the installation's
10 done, oftentimes the engineering will lag a little bit
11 behind that if you're in a parallel path environment.
12 And for the installation we actual installed, that
13 available for use, that's the 4.4 days we're talking
14 about. It was installed, it was tested, and it was
15 energized up to the point that all OPS had to do was
16 close the breaker to provide power to either of the
17 vital buses.

18 So if there was an immediate need or if
19 we were to lose a diesel generator or something, we
20 could have invoked an emergency team on and placed it in
21 service. But the path we used, since there was no
22 immediate need, we were stable with both diesel
23 generators, is it came through this way and we waited
24 the additional day and a half to get our paper completed
25 before we put it in service.

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1 Any questions on that?

2 MR. LOVELESS: This is David Loveless.
3 How would you authorize an emergency temporary
4 modification?

5 MR. MCKENNEY: Our process that is
6 involved in that involves -- it's considered an
7 immediate threat to the safety or reliability of the
8 plant or involves authorization from the shift manager
9 and the engineering director. So that's within our
10 existing processes.

11 MR. BROWNING: This is Jeremy Browning.
12 What we're trying to communicate in the prior slide and
13 this slide is the modeling that we did, is assuming that
14 this process that we actually used would be applied to
15 the process, or applied to the applications that we
16 would be talking to you.

17 So it's what we actually did and it's
18 what we would have done had we had to implement one of
19 those contingencies. That's what we're trying to
20 communicate in these two slides. Which means the
21 installation in the field would have been controlled to
22 the four quarters. There would have been engineering
23 support paperwork unless we declared that we had a
24 safety function that was challenged, which would be the
25 only gate to an emergency. We would invoke paths where

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1 it says available for use until the process was
2 complete.

3 MR. KENNEDY: How many other options did
4 you actually start down this path, this implementation
5 process path other options in parallel?

6 MR. BROWNING: Not in any great detail.

7 MR. MCKENNEY: We were in this step
8 block, right here, according to that and we had done
9 some of this (indicating).

10 MR. BROWNING: But what you're going to
11 hopefully see is the work order instructions for
12 installing a Raychem splice, for example. That Raychem
13 splice per order instructions can be translated over
14 into this option. The installation of this component
15 you just changed the nomenclature of where it's going,
16 and the fieldwork could have been done. If we were
17 halfway through option, the one we were doing, it's a
18 matter of cutting cable and redirecting that cable. The
19 work order instructions can come out in our process and
20 use by the craft just in a different locations.

21 MR. DAPAS: Marc Dapas, the salient point
22 here is that you actually implemented this process and
23 the manner in which it was provided to restored
24 4160-volt power. You would have used the same process
25 and you're assuming other three contingency success

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1 paths that you indicated that you could have received --
2 MR. BROWNING: When we get into the risk
3 -- that's correct.

4 MR. DAPAS: So I understand where you're
5 going next. I just wanted to make sure I understood
6 that part.

7 MR. CIRCLE: Just one last question.
8 This is Jeff Circle, again, did you retain those records
9 from the last, from the implementation process
10 considering the restoring power if you needed --
11 contingencies?

12 MR. KOWALESKI: Do we have any written
13 records of what we did?

14 MR. CIRCLE: TLC logs.

15 MR. MCKENNEY: I do not have that. I
16 have some personal documents for, basically, how we
17 transitioned off from one to the other because part of
18 this is, you know, we have to figure out how we're going
19 to transition from these different options back and
20 forth.

21 MR. KOWALESKI: The answer is, there's
22 some personal notes that people have, but we don't have
23 any formal --

24 MR. CIRCLE: Nothing formal.

25 MR. MCKENNEY: No formal. I'm going to

14 (Pages 53 to 56)

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1 circle back around, finish up the -- what we actually
2 installed, which is a demonstrated -- we're calling it a
3 demonstrated success was the Startup 1 source.

4 So restored power to vital switchgear,
5 the craft was qualified and to do the activities that
6 we're talking about it provided the option tied to
7 either of the vital buses and allowed the diesel
8 generators to be available to feed their respective
9 train while we're installing it.

10 And it was actually available -- if you
11 look at that block that we talked about in 4.4 days. It
12 was actually energized up to the last breaker. And that
13 was documented in station log for that was when it was
14 available.

15 The next thing I want to get into is the
16 3 4160 alternate success paths. And these are things
17 that we talked about were being scoped in parallel while
18 we're installing the demonstrated success.

19 And the estimated times, if we're going
20 to compare back to what we actually installed on how
21 long it would take to do it. We're going to show you
22 that these are considerably more simple and less
23 involved.

24 So this first success path would be a
25 simplification or an alternate to the actually installed

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1 success path. So what we've done here is eliminated the
2 temporary breaker. The temporary breaker provided some
3 additional flexibility, but if we were in a station
4 blackout or loss of an additional diesel -- and we're on
5 page - slide 24 -- it would, so it was basically, run
6 the cable from Startup 1 transformer to the cross tie
7 between the safety buses or the vital buses.

8 And what that looks like on slide 25 is
9 we have the Startup 1 transformer and we still would
10 have routed it around the area where the damage was, but
11 we would have taken a more direct route.

12 And so we would have used quite a bit
13 less cable, and we would have tied it to the exact same
14 spot that we used in the actual installed installation.

15 If you look at this table, this is a
16 comparison between the expedited or success path one and
17 the actual installed and you can see that it's half as
18 much cable, half as many terminations, and we do not
19 have to install temporary breaker, we do not have to do
20 the testing on temporary breaker, the DC supply for the
21 temporary breaker, so there's quite a bit of scope that
22 would have been eliminated by that particular option.

23 MR. KOWALESKI: This is Joe Kowaleski, to
24 that previous question on cable availability, if you
25 look at that total length of capable plus the next

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1 option, that total length for both of these two options
2 is 2500 feet cable, 2450 feet of cable. The actually
3 installed one was 3,500 feet of cable. So what we
4 actually did is a thousand feet more cable than if we
5 were doing this option and the next option in parallel.

6 MR. CLARK: This is Jeff Clark. I just
7 have a question. On the first demonstrated option we
8 had the breaker in here and I'm assuming that provided
9 some safety feature to the bus as well. So did you have
10 protective devices other than the (can't hear)
11 transformer to the bus?

12 MR. MCKENNEY: The expedited option, or
13 success path one we're calling it here, did not, but it
14 had the upstream protection on the transformer itself.

15 MR. CLARK: From the transformer --

16 MR. MCKENNEY: Yeah, on the high side.

17 MR. CLARK: I understand.

18 MR. MCKENNEY: The other reason why we
19 installed the breaker was to -- operating the breaker on
20 the high side of the transformer is an Entergy Arkansas
21 function. So by putting the breaker inside we were able
22 to allow operations to have control over that within
23 their own station. So that was one of the key functions
24 of that breaker.

25 MR. BROWNING: And what we actually did

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1 was positioning ourselves for a long-term recovery,
2 giving us the maximum operational flexibility. Had we
3 lost a piece of generator, that priority would have
4 completely shifted. We're no longer looking at
5 long-term recovery and operational flexibility, we're
6 looking at how do I connect to that bus in a safe,
7 efficient manner.

8 MR. DAPAS: This is Marc Dapas. Just a
9 question to make sure I understand. The difference,
10 then, between your success path one and what you
11 actually did to restore is connecting a cable directly
12 to the winding versus via temporary breaker --

13 MR. MCKENNEY: That's correct.

14 MR. DAPAS: -- Startup point transformer?

15 MR. BROWNING: And shorting the path.

16 MR. DAPAS: And the reason why it's a
17 shorter path, why would you have not exercised the same
18 path you did in the actual restoration? I may have
19 missed the --

20 MR. BROWNING: The real basis there was
21 that operational flexibility, the time we had and lay
22 down areas for recovery. Where we would have laid that
23 cable for a direct path, would not have afforded us the
24 opportunity to finish the recovery efforts that we knew
25 we needed to do. It would be outside of the area that

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1 was impacted, but because of where we needed to move
2 material inside our turbine building, we wanted that
3 outside the turbine building altogether for maximum
4 flexibility inside there.

5 But that's a different decision than I
6 don't have power on one of my safety buses. I'm not
7 thinking about long-term recovery. I'm thinking about
8 power to my safety-related bus.

9 MR. MITMAN: So, before we leave that
10 one, can we go back two slides, back to slide 24,
11 please. This is Jeff Mitman. The scenario where you'd
12 need immediately the offsite power would be some failure
13 of the vital AC power. Now the largest contributor to
14 that would be a failure of the diesel generators.

15 MR. MCKENNEY: Right.

16 MR. MITMAN: It seems like that's what
17 you're built your contingencies on, your success paths
18 on, is failures to the diesels. But we're in a
19 condition where the stator has been dropped, there's
20 extensive damage on 1A1 and 1A2 and I can easily
21 envision a situation where there's damage to the A3
22 and/or the A4. Not directly from the stator drop
23 itself, but because of problems in the electrical system
24 that has caused failures in the associated electrical
25 distribution system.

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1 Did you consider any contingencies to
2 reenergize loads that didn't rely on the A3 or the A4?

3 MR. KOWALESKI: Yeah. The third option,
4 or the fourth option that we'll talk about is one
5 directly, it's a 480-volt power directly, bypassing all
6 4160-volt switchgear.

7 MR. MITMAN: So that's the contingency if
8 the failure is other than on the diesel generator?

9 MR. KOWALESKI: In the event, although
10 the aux building is completely separate building, in
11 relaying protecting the safety buses from damage on the
12 non safety buses. If all that had failed, both diesel
13 generators had failed, and the safety buses were
14 completely unavailable on the 4160-volt, there is a
15 direct path to 480-volt power to the necessary makeup
16 pumps with multiple options that completely bypass the
17 4160-volt system.

18 MR. BROWNING: David, let's get you back
19 on track. Let's move to success path two if there's no
20 more questions on success path one.

21 MR. MCKENNEY: I want to give a little
22 overhead view on page 2, slide 27. This gives you a
23 physical layout and the general area of the train bay
24 where the stator fail. Here is the 2A9 switchgear,
25 which is located on the Unit 2 side. This is a wall

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1 between the train bay and Unit 2.

2 These were the route of the cables that
3 went to A1 and also to the vital switchgear. So when --
4 and also from -- A2 was actually de-energized at that
5 point in the outage. So there's a cable that runs from
6 A2 switchgear and that's what feeds to the A4 vital
7 switchgear.

8 And I'm going to show where we're going
9 to use this green cable here in a moment.

10 MR. KOWALESKI: And that end of the
11 switchgear was undamaged?

12 MR. MCKENNEY: Yeah, this end of the
13 switchgear was undamaged, which is the west side, or to
14 the left. And on the right this side right is where the
15 stator, the main impact was to the switchgear. This
16 side here was not damaged.

17 MR. MITMAN: Before we leave this slide,
18 what's the source of control power for the 2A9 bus?

19 MR. HATHCOAT: The source of control
20 power is DC, it's all from the Unit 2 control room. The
21 Unit 2 control room basically has the controls to start
22 the alternate diesel generator and tie it on the
23 Unit 2 side.

24 MR. MITMAN: So the source of control
25 power is --

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1 MR. MCKENNEY: From Unit 2.

2 MR. MITMAN: -- from Unit 2 and on the DC
3 system?

4 MR. MCKENNEY: So I'm on slide 28, and
5 what this does is we would -- we're going to hook a
6 cable from -- disconnect a cable from A2 which right
7 here, from A2 and run it through the door into Unit 2
8 because these are on the same elevation and there's a
9 door, I'll show you an overhead view here in a moment,
10 and splice in approximately a hundred feet of cable and
11 tie it back into 2A901.

12 So we had to make some very minor -- the
13 termination points were damaged in 2A901. And when we
14 actually, physically repaired them, it took six hours.
15 So it was, the breakers were fine, it's just where the
16 cables terminated.

17 Also important on this is, you can see
18 that this success path No. 2 is completely independent
19 of success path 1 or what we installed. They use
20 different tie points. The physical location is
21 different. The sources are different.

22 And this is an overhead view on page --
23 slide 29. You can see where we disconnected the green
24 cable from A201's cubicle and ran it through the door
25 and it'd make it about this far, so we just had to run

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1 about a hundred feet of cable.
2 Of course, that's a hundred feet times
3 seven because we have seven conductors or three parallel
4 paths times three, plus one. And we would have tied it
5 in to the alternate AC switchgear in the back.
6 MR. DAPAS: Just to make sure I'm
7 following this, can you show me why given our discussion
8 earlier about the ultimate AC, 4160-volt bus the damage
9 associated with that bus did not impact this success
10 path, too? I just wanted to make sure I fully
11 understand.
12 MR. MCKENNEY: We would have to make some
13 minor repairs in the back of 2A9. I have some
14 photographs here I can show you, but we would have had
15 to make some minor repairs and as I stated, it took six
16 hours to make those for the permanent repairs when we
17 actually did do that.
18 MR. DAPAS: So what's the timeframe there
19 to assess, if you will, the extent and condition
20 associated with the damage to determine minor repairs
21 and all that's necessary and then the time to implement
22 those repairs were all factored into your timeline for
23 how long it would take you to complete these success
24 paths?
25 MR. MCKENNEY: Yes. Let me get to the

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1 next couple slides down and we'll discuss that.
2 MR. SULLINS: I just wanted to add that
3 while identified early, the tie point on the normal feed
4 to the A4 vital switchgear, we actually used this tie
5 point for a second offsite power feed later in our
6 recovery and the splices were very near where
7 illustrated on this picture.
8 MR. MCKENNEY: So this is slides 30 and
9 this is talking about the differences between what we
10 actually installed, we're always tying back to that
11 because it demonstrates that we were able to complete
12 these splices and terminations and pulling this cable.
13 So on the right is what we actually
14 installed. On the left is what would be required to
15 hook up success path No. 2. You can see it's about
16 700 feet of cable, half as many terminations or splices,
17 14, and we'd have to make some minor termination point
18 repairs in 2A901. So we can be pulling cable, we could
19 be making up the stress cones or the termination kits
20 while we're repairing the 2A9 switchgear. That could be
21 running in parallel and whatever electrical testing that
22 we felt we needed to do.
23 MR. KOWALESKI: So the only damage to
24 that switchgear was the connection points on the outside
25 -- output of that breaker. That's all that had to be

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1 repaired were those connections.
2 MR. DAPAS: And this is Marc Dapas again.
3 Understand, you're looking at success path 1 or success
4 path 2, right? Not both success paths, correct? You
5 would have had to make a decision to use one or two or
6 both --
7 MR. KOWALESKI: These could have, and in
8 the event of diesel failure, would have been pursued in
9 parallel.
10 MR. DAPAS: So getting back to Jeff's
11 question here, factoring that into your timelines,
12 ensuring sufficient cable availability, using the
13 processes that you've described, you're going to be
14 doing that with both of these contingency plans, would
15 that have resulted --
16 I wanted to understand with the time you
17 assumed to implement each contingency plan does that
18 reflect the recognition that you're pursuing both of
19 these in parallel and did you the right number of staff,
20 you know, that were focused on each one individually, or
21 are you relying on the same staff to make decisions and
22 how did you factor the fact that you would potentially
23 be pursuing two paths at the same time?
24 MR. KOWALESKI: If you recall back on
25 page 9, there were 45 electricians per shift, so 45

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1 electricians per shift could easily pursue both of these
2 options. There were 40 engineers per shift to provide
3 support, and 60 operation staff per shift. So there was
4 sufficient resources to be able to pursue both of these
5 paths in parallel.
6 MR. BROWNING: If you looked at the scope
7 of work that we were planning on implementing on a given
8 day during the outage, it would be comparable work.
9 Actually, it would be significantly less. To implement
10 what we're talking about would be significantly less
11 than what we were already planning on doing during any
12 incident.
13 MR. DAPAS: The context of the questions
14 I'd offer here, at least I'm not aware of risk
15 assessment's allowed for credit for cable routing here
16 and alternate power supplies, installed equipment and
17 when that equipment failed what redundancy do you have,
18 etc.? So, it's important that we understand clearly the
19 timeline assumptions here when you pointed out in one of
20 your earlier slides that you would have been able to
21 implement one of these contingency plans before you
22 would have seen that a core uncovered.
23 MR. BROWNING: Yes, sir.
24 MR. KOWALESKI: And we do have a timeline
25 picture that may help clarify that.

17 (Pages 65 to 68)

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1 MR. LOVELESS: Before you leave the --
2 this is David Loveless. In this particular success path
3 you're talking about accessing two areas that were
4 significantly restricted, at least early on in the
5 event. My understanding from the AIT that the entire
6 switchgear area in Unit 1 was closed off. At some point
7 no one was allowed in there, but then it was very
8 limited when it was. And then on the Unit 2 side --

9 SPEAKER: This is headquarters we're
10 having trouble hearing you guys. Could you speak close
11 to the mic, please?

12 Thank you.

13 MR. LOVELESS: On the Unit 2 side, we're
14 talking with the followup team about some of the work --
15 or on some of the -- that plus 2 Alpha 1 where they
16 couldn't get in there. They said, no, we've got
17 energized equipment in there, we've got water all over
18 the floor, nobody's going in there. So I would expect
19 to see both of those restrictions somehow.

20 When did we know that this green cable
21 was accessible and it was undamaged? When did we have
22 Unit 2 side cleared up enough that someone could
23 actually access it?

24 MR. MCKENNEY: If you look back on slide
25 29 -- actually, let's go back to this one, slide 27,

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1 able to go in and do these actions.

2 MR. LOVELESS: I guess my point is that
3 most of risk we're looking at is, at time zero we go
4 into station blackout, and the times for recover that
5 you're talking about aren't from somewhere a couple days
6 later after you stabilize and have been thinking about
7 it while. It's now. You need power now, and you're
8 telling me I'm going to be going into an area that we
9 haven't assessed to determine if it's structurally sound
10 yet and I've got other electricians I'm sending into the
11 area full of water with energized equipment.

12 So I do see them as overlapping.

13 MR. HATHCOAT: This is John Hathcoat. At
14 least on the Unit 2 side with emergency class
15 declaration around the 2A1-2A9 bus was a little bit
16 delayed from when the actual explosion occurred. That
17 was due to water on the floor, but after a couple hours,
18 and then about 13:30 is when we actually had the log
19 entry that we were able to assess the back of 2A9
20 safely.

21 So it was roughly six hours of being
22 delayed, and we were able to access that back -- and
23 we'd been back there for awhile being able to access the
24 area. So that's just a point of reference.

25 MR. MCKENNEY: Are there any more

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1 okay? This cable, we actually had access up to this
2 point. The major damage, structural damage, was in this
3 area. So they did put a fence right across here, but
4 this was visibly - was not damaged. So we could get to
5 this area easily. And we actually did do assessments
6 the first day in all this area.

7 MR. HARRIS: And David, let me see if I
8 can address your question. I believe what you're
9 referring to is at the onset -- immediately after the
10 stator drop event occurred, there were limitations
11 allowing operator access into the Unit 2 area because of
12 the water intrusion and certainly associated with that
13 area.

14 That was immediately after, and we dealt
15 with that in relation to, you know, recognition of what
16 the condition was for emergency classifications and the
17 danger.

18 What David is talking about is - would be
19 - would come in a much later in relation to developing a
20 recovery strategy and getting access in this area. So I
21 don't think there's any - these are not mutually
22 exclusive, or these issues are not contradicting each
23 other, but -- because immediately after the accident we
24 did try to restrict operator access to that area, but
25 later on during the recovery phase, we would have been

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1 questions on success path No. 2? And I'd like to move
2 onto success path No. 3 which is on slide 31. This has
3 to do with -- it's a variation of the station blackout
4 connection that we just talked about in success path No.
5 2.

6 What that involves there is we connect to
7 the same green cable that we showed on some of those
8 other ones there and we would, instead of connecting to
9 the 2A9 switchgear cubicle, for some we couldn't repair
10 that, and we had this particular option; we could have
11 disconnected a condensate pump, which is non-vital.
12 This is Unit 2, 2A1, Unit 2 switchgear, not the Unit 1.
13 And we would disconnect a condensate pump and connect a
14 temporary cable to its output breaker.

15 And, so we'd have to do some minor
16 reconfiguration of the control scheme for the breaker,
17 but we have -- it'd be the same as our load center
18 breakers. So we'd have the scheme well defined, could
19 easily have made the transition over to that.

20 If you can see from slide 32 here, the
21 route is basically the same, cable splice would be in
22 the same spot, instead of hooking to 2A9 over here, we'd
23 just loop back the cable and hook into this spot, so.

24 We would run success path 1 and success
25 path 2 or 3 in parallel. We wouldn't do both of these

18 (Pages 69 to 72)

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1 because they're -- this tie point on the opposite end
2 here, 409, is a snake. But it does provide us an option
3 if for some reason we couldn't get the 2A9 switchgear
4 repaired or if -- so we could have another place to tie
5 to get power.
6 It does provide some nice options also
7 that -- 2A9 also -- and this cable from 2A2 to the -- is
8 always energized. So this cable, which is shown in red
9 here, back on slide 31, from 2A2 to 2A904, that remained
10 energized through the entire event.
11 MR. CIRCLE: You mean 2A1?
12 MR. MCKENNEY: 2A1, thank you.
13 MR. CIRCLE: See, I was paying attention.
14 But I do have one question. This is Jeff Circle again.
15 You mentioned success paths 1 and 2 might be done in
16 parallel?
17 MR. MCKENNEY: Or 1 and 3.
18 MR. CIRCLE: 1 and 3?
19 MR. MCKENNEY: 1 and 2 or 1 and 3, but
20 not 2 and 3.
21 MR. CIRCLE: So we needed some
22 clarification.
23 MR. MCKENNEY: Yes. That's what that --
24 because 3 is a variation of 2.
25 As you can see, it's basically, the scope

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1 is the same, pretty much, as what we did on the
2 alternate C breaker, which is 901, with the difference
3 being where we wouldn't have to repair the 901 breakers.
4 We would have to do some minor interlock defeats and
5 reconfigurations so the breaker would now think that it
6 had a condensate pump hooked to the other end.
7 In addition to that, we were also looking
8 at other -- and these were three primary methods. We
9 were also looking at a unit back feed in case Startup 1
10 transformer was unavailable, which we'd back feed
11 through our main transformers, hook to the unit aux,
12 we'd basically hook up the same way as we did the
13 starter transformer. Just another source to get power
14 from the switchyard into the plant.
15 We also had a portable diesel generator
16 that was being shipped in that we could have, basically
17 480-volt, the step-up transformer, that could have
18 provided us 480-volt power.
19 MR. DAPAS: Can you elaborate -- this is
20 Marc Dapas. You have a slide there that would indicate
21 these additional success paths were considered and
22 scoped. I'd like to hear, maybe Jeremy, you can provide
23 a little more context. Where did this occur, was it
24 conceptual here or how far along were you in that
25 process scenario?

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1 And I'm trying to differentiate, quite
2 frankly, after the fact -- we could have pursue this
3 success path versus what was actually being considered
4 by the staff that was involved in responding to the
5 event?
6 MR. BROWNING: The three that we're
7 discussing with you are the three that we are modeling
8 because they were the three primary success paths that
9 we were considering; however, we did order the diesel
10 generator. The diesel generator showed up to the site
11 within 48 hours of the event occurring.
12 The back feed option is something that we
13 have done before, had the station back feeding off of --
14 so it's not a concept, it's something we've actually
15 done, but we weren't actually pursuing that because we
16 had stable transformers at that time.
17 And the restoration of A1 non-vital to
18 Startup 2, again, we actually took an approach that we
19 brought in Startup 2 during the recovery and powered it
20 up in the plant. But at the time of the event, those
21 were more concepts. We knew we could do them, but we
22 really weren't putting a lot of effort into it, other
23 than we were ordering the materials and resources we
24 needed to do it.
25 MR. DAPAS: And the context of my

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1 questions here -- I think you've heard the general theme
2 of questioning. What was the understanding of the
3 operators, what's involved in going out and verifying
4 what the plant conditions are, what are the equipment
5 availabilities so we can pursue these contingency
6 options.
7 What -- there's a lot going on here,
8 obviously, in response to this event, right? You had
9 flooding as a result of the fire main being damaged, you
10 had equipment that was damaged and understanding the
11 full extent of that equipment damage to determine
12 whether these paths were viable here, and what you need
13 to do to ensure that the effort expended is going to
14 result in the desired outcome because you fully scoped
15 out the condition. That's what I really need to
16 understand here.
17 MR. MCKENNEY: To give you little context
18 on what was scoped --
19 MR. JAMES: Before we answer that, let's
20 make sure we're talking about the options that you're
21 interested in, Marc. I think you're interested in the
22 three that we discussed in detail; is that correct?
23 MR. DAPAS: Well, the three that you
24 offer, the next step is to credit these and the risk
25 assessment, saying these were viable success paths,

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1 therefore, NRC where you've assumed as a result of
2 diesel failure here's where you end up. You're planning
3 to --
4 MR. JAMES: Because I think Jeremy was
5 answering that these three on -- these additional ones,
6 so we need to make clear that we're responding to the
7 three that you asked, which were our three success paths
8 that we proposed.
9 MR. BROWNING: So, have we answered your
10 question?
11 MR. DAPAS: After we've completed the
12 full discussion here today, I'll be able to answer.
13 MR. BROWNING: I wasn't sure we did.
14 MR. DAPAS: I think we're in the -- at
15 least I'm in absorb mode right now and I'll need to take
16 a little bit of time to make sure all the questions I
17 have are asked. Right now we're going on.
18 MR. MCKENNEY: That's a good segue into
19 slide 35.
20 MR. WILLOUGHBY: This is Leonard
21 Willoughby. I do have a question.
22 MR. MCKENNEY: Yes.
23 MR. WILLOUGHBY: There was other things
24 going on in the plant at the time. Right now we're just
25 focusing on the recovery of this area, but you had some

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1 other things going on in the plant that you also had to
2 expend resources to address, such as the steam generator
3 seal and stuff -- and how is that factored into all your
4 decision making process and all those other items that
5 you need to look at because there was a lot of things
6 going on over all?
7 MR. MCKENNEY: So different disciplines
8 in a lot of those cases, right, so this is mostly
9 electrical so I've got mechanical disciplines that are
10 working on seals and mechanics, and this is heavy
11 electrical here, right?
12 MR. WILLOUGHBY: But doesn't one person
13 -- who makes the final decision? It all rolls up into
14 one.
15 MR. BROWNING: Just from my observation,
16 from the EOF to the TSC to the implementing organization
17 that day, those decisions are being made by an emergency
18 director. And that emergency director is assessing
19 safety functions. So when we expend resources, we would
20 have put our resources on a safety function that was the
21 most challenging.
22 If the assumption is two diesel
23 generators aren't running and they need them to be
24 running, then based on his understanding of safety
25 functions, the trigger process driven. He goes through

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1 a process that comes out, electrical power is my top
2 priority and his resources.
3 He has to make decisions based on facts,
4 but a flowchart gets him to the end. And that's where
5 he would -- in this case we did have some challenges
6 with our seals, but those seals, even if they would have
7 completely failed, the mechanisms that would have
8 allowed that -- inventory could have been a challenge,
9 but if electrical is gone, the flowchart is going to say
10 priority is electrical, inventory is No. 2. As we
11 continue to watch that inventory because of the rate of
12 loss.
13 So I don't know if I'm answering your
14 question, but it's process driven against safety
15 functions and the information he has will drive him to
16 the that conclusion.
17 MR. WILLOUGHBY: You answered my
18 question.
19 MR. BROWNING: I just wanted to make
20 sure.
21 MR. MCKENNEY: I want to summarize the
22 different success paths in this slide. They're simple
23 design concept and simple to implement. Craft personnel
24 were qualified and scheduled to perform the same type
25 activities with the circ pump cable replacement, so they

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1 had the equipment on site, personnel on site that knew
2 how to do that work. It's activities that we do on a
3 regular basis even with it online maintenance work.
4 Cables were routed away from the damaged
5 area. It's important to know that the success paths,
6 other than 2 and 3, are spatially and electrically
7 independent of each other. They could be implemented in
8 parallel in sufficient time. Could have been done -- we
9 work these sequentially and we'll show that later in the
10 presentation.
11 And all three of the success paths we
12 presented are less complex than what we actually
13 installed in 4.4 days.
14 MR. DAPAS: This is Marc Dapas. I just
15 feel compelled to react to a simple design concepts.
16 You're relying on contingency plans here that involve
17 running cable runs here to establish power to 4160-volt
18 safeguard buses is not where you want to be.
19 So, I understand you're going through and
20 explaining how you would have restored power. But this
21 is -- that's not where you want to be. You want to be
22 in a situation where you're relying on installed
23 equipment here versus these contingency plans, cable
24 runs and terminated here and splicing. That's not the
25 desired approach here to be able to insure plant safety,

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1 right?
2 MR. KOWALESKI: Absolutely. The fact
3 that the event occurred is unacceptable. The damage
4 that occurred to the plant is unacceptable. But in
5 determining the safety significance of that, we have to
6 look at what would be a realistic response to it. And
7 this is a realistic response to it.
8 MR. CIRCLE: This is Jeff Circle. Just
9 keep in mind what we're talking about here is a station
10 blackout. These success paths are paths for mitigation
11 of a station blackout, so conditions are not typical of
12 normal outage. And it's not typical of normal outage
13 activities, so there's going to be a lot of stress
14 involved.
15 MR. KOWALESKI: Yes, and when you look
16 the timelines you'll see there is a substantial time
17 margin. I would point out, though, that work in the
18 Startup 1 area was done just as it would have been, the
19 environmental conditions, that the work done was the
20 same as a station blackout, the work done the Unit 2
21 area around the alternate ACD generator switchgear would
22 have been the same as it was during the time we
23 implemented would have been the same as a station
24 blackout because that is the opposite unit which had
25 different power sources.

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1 So there's a consideration that the
2 actual installation that was done had a lot of
3 similarities of plant conditions to conditions they
4 would have seen during a station blackout.
5 MR. DAPAS: I appreciate you're pointing
6 out there this is not significantly different from the
7 actual response you invoked here, right, with how you
8 established power to 4160-volt. It's not just modeling
9 here, you are extrapolating, right, from what you
10 actually ended up doing with timelines that reflect what
11 occurred, right?
12 MR. KOWALESKI: That's correct.
13 MR. DAPAS: So I appreciate that
14 distinction. I think what you're hearing some of the
15 questions here is making sure we understand how you
16 factor various things here, and the station blackout
17 scenario is different than both diesel's are running,
18 continuing of power, the safeguard's buses here, you're
19 in a station blackout and you've indicated you would be
20 having different cable, you would be considering the
21 shorter length. That would be your primary focus here
22 from a safety function and I understand that.
23 But also, with that shift in focus is,
24 there's a little bit different operating environment
25 here, so just how do you account for that?

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1 MR. KOWALESKI: Yes and we will explain
2 how we account for that when we cover that model.
3 MR. CLARK: This is Jeff Clark. I have
4 one more technical question that I didn't ask before. I
5 thought you might covered it in some of the other
6 diagrams, but going back to success path No. 1 and you
7 had the temporary breaker with the DC control power.
8 Was that just a local operating breaker, or did you have
9 auxiliary operations in control?
10 MR. MCKENNEY: It was local operating,
11 but we ran a cable from the Startup transformer DC and
12 ran it over to the breaker to give it DC power.
13 MR. CLARK: Okay. I understand. Thank
14 you.
15 MR. MITMAN: Jeff Mitman. On slide 35, I
16 want to explore some of your characterization a little
17 bit. The first two bullets, you talk about simple
18 design and simple to implement. First of all, it's my
19 understanding success paths 1, 2, 3, and 4 you haven't
20 completed the design today; is that is correct?
21 MR. MCKENNEY: We did not implement these
22 designs because we didn't have to.
23 MR. MITMAN: Did you complete the
24 designs?
25 MR. MCKENNEY: We scoped the design, we

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1 did not complete a design.
2 MR. MITMAN: So the designs are not
3 complete. So a year and some months later the designs
4 are not finished. All right. Second --
5 MR. KENNEDY: Hey, Jeff, hold on, just
6 for clarification. Did you intend to complete them?
7 MR. MCKENNEY: No.
8 MR. MITMAN: What I'm trying to get at
9 is, conceptually they may be simple, but they're not
10 five minutes worth of work, okay? So the
11 characterization of them as being simple designs, I
12 think, in risk space is -- simple has a certain meaning
13 in risk space, you know, typically simple is something
14 that an operator can do in five minutes. These are not
15 five-minute activities. These are engineering
16 activities that will take a team of engineers hours to
17 complete. The implementation of these are not
18 activities that are done in five minutes.
19 It took your over four days to implement
20 what you wanted with teams of electricians and operators
21 and others to complete the work. So, I understand that
22 they're not rocket science, but nonetheless, in risk
23 space, their complicated activities that take a lot of
24 checks on them and a lot of people verifying what's been
25 done and a lot of care in getting them implemented.

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1 Is my understanding of that correct?
2 MR. MCKENNEY: The slide is intended from
3 an engineering and installation standpoint that it's
4 simple. Now as far as the time, that's a different
5 concept for engineering.
6 MR. KENNEDY: I would offer that "simple"
7 probably is not the right word to choose for this
8 quorum.
9 MR. DAPAS: I thought that was evident
10 when I made my earlier comment. I don't want to belabor
11 the point here. I think the role I'll offer here of the
12 NRC staff is to fully understand the assumptions here
13 you've made, how you feel the success paths should be
14 credited, and you need to be asking questions that will
15 further illuminate, if you will, how you factored this
16 into your overall risk assessment here.
17 We'll have an opportunity to engage here
18 and determine, based on our independent review, an
19 assessment; how much credit we think is appropriate
20 considering uncertainties, etc. The vein of the
21 questions really need to get to a full understanding of
22 your conclusions and the basis for those.
23 So let's proceed, please.
24 MR. SULLINS: Okay. We'll move to our
25 success path 4. This is Gary Sullins again, and we are

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1 on slide 36. We understand that in the present risk
2 assessment, inventory control considers gravity feed
3 from a borated water storage tank that the assumption
4 that there's no electrical power available.
5 In our loss of decay heat removal
6 procedure and strategy there actually are six prescribed
7 methods for make up. One has been analyzed, which is
8 passive gravity feed. Three involve 4160-volt power.
9 That there are two others that rely on 480-volt driven
10 pumps for the mode of force. And so we'll be discussing
11 one of those alternatives.
12 The success path that we'll be discussing
13 involves use of our borated water recirc pump. And our
14 loss of decay heat removal procedure, we detailed
15 guidance to align P-66 borated water recirc pump with a
16 suction supply from either our BWST or our spent fuel
17 pool for makeup to the RCS.
18 I should also note that this pump also
19 serves as makeup source for spent fuel pool, and given
20 an assumed station blackout, we are interested in
21 restoring this capability for that purpose as well.
22 This is a success path that was not
23 evaluated at that time of that event. And the basis for
24 that is we were setting priorities based on the
25 conditions that we had. After the stator drop event we

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1 had four of our six makeup sources available. And so
2 this was not classified as a need or scoped at that
3 time.
4 But given the assumption of a station
5 blackout, we would from four, actually more than that,
6 prevent to zero make up sources, so with an extended
7 blackout we would recognize that inventory loss would
8 become a concern, and we would be pursuing options
9 through our support staff for that.
10 Any questions on the concept?
11 MR. LOVELESS: Just one point of
12 clarification. This David Loveless. Unless I'm missing
13 something, this is what in risk we would call more of a
14 delaying action, not a success path in and of itself.
15 It would give you more time to get a success path in
16 place. Am I hearing that right because we're going to
17 be boiling in the core and the spent fuel pool. We're
18 not going to be a stable place.
19 MR. SULLINS: That's the first
20 consideration of it. Much like our spent fuel pool, it
21 can be used for longtime cooling, but that involves
22 getting energy out of the reactor building,
23 consideration of the venting, thing of that nature.
24 MR. LOVELESS: Okay.
25 MR. SULLINS: And to support this

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1 function we would, again, use a temporary modification.
2 This time using the London Line power that we referred
3 to earlier and David will explain that for you.
4 MR. MCKENNEY: Okay we're on slide 38.
5 This particular one we're showing a disconnect switch
6 S-28 on this upper left-hand portion of your diagram
7 here.
8 This is actually 600 amp, 480-volt
9 disconnect that's located in the south end of the
10 turbine building, very remote from where the stator
11 dropped. And this is the disconnect we actually used
12 for restorations of our non-vital load centers post
13 event. So this is -- and this is fed from the London
14 Line, which is our yard power, which is -- it was not in
15 the section where the stator dropped. So it wasn't
16 impacted by the stator drop.
17 So what this success path involves is
18 running a cable, 480-volt cable, from the disconnect and
19 tying directly to the B51 bus, which is the motor
20 control, 480-volt motor control center, it's in our aux
21 building. It's also located away from the stator drop
22 area. And then we take from a spare breaker off of B51
23 and feed B21, which is a non-vital. And these motor
24 control centers, I'll show you in a photograph here in a
25 minute, are about 18 inches apart.

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1 This is very common type of activity that
2 we do during outages, run temporary power. We've
3 actually used this in the opposite direction where we
4 fed B21 power to B51 to supply the spent fuel pool pump
5 when we had bus outages on the red train AC power during
6 refuelling outages.

7 What this does is it brings 480-volt to
8 B51 which gives your battery charger back. So you would
9 be able to maintain your red DC. Also feeds the
10 inverter, spent fuel pump, instrument AC, and gets us
11 over here to B21 where it would feed our borated water
12 storage pump or -- excuse me, borated water pump, which
13 is the pump Gary talked about earlier.

14 MR. LOVELESS: And 600 amps is enough to
15 provide for all those loads?

16 MR. MCKENNEY: Yes. The largest load
17 associated with that is the battery charger, and it has
18 a 150-amp breaker, but it's a hundred-amp load. So
19 there'd be sufficient loads for that.

20 This is overhead view of the cable
21 routing. The stator drop is off the page at the top, so
22 this is in the very far south end, run a cable up
23 through a door, through another door, and B51 is about
24 200 feet of cable. And then we run a jumper from 51 to
25 21. You see the relative location of those two.

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1 A photograph of the S-28 disconnect
2 switch. And this is in the room, this is B51. Here is
3 where we would terminate the cables behind these two
4 doors here, and you can see the relative location
5 between 51 and 21. And we would run the jumper cable
6 from one spare breaker to another and we would be able
7 to power the borated water recirc pump.

8 So I'm hesitant to put this slide up
9 there when it has "simple" on it --

10 (Laughter)

11 -- but it is simple, I mean, from a
12 construction aspect.

13 MR. BROWNING: Dave, did you mention that
14 we actually performed the jumper between those to buses
15 every other outage?

16 MR. MCKENNEY: Yeah, when we do those bus
17 outages, we run the jumper between every other refuel
18 outage, depending on which train outage we're in.

19 MR. BROWNING: And understanding poor
20 choice of words, we've got that feedback. What we're
21 trying to communicate is this is work that we would
22 typically do and implement without a lot of challenges
23 to it's being successful.

24 MR. MCKENNEY: So it's typical of work we
25 do during outages. It wasn't affected by the event, and

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1 it was located remotely from where the event happened,
2 and it's independent of the 4160-volt path. And it
3 doesn't have any relationship between the 4160-volt
4 side.

5 And if for some reason that wasn't
6 available, we could have tied straight on top of the
7 contact here. There's less of the variations you can do
8 on 480-volt side that could accomplish this in the same
9 timeframe. And we estimated this would take 20 hours to
10 implement. And that includes some scoping time for
11 engineering to figure out exactly what to do because the
12 actual electricians I talked to said they could have it
13 done in less than a shift.

14 MR. WILLOUGHBY: I do have one question.
15 You mention that -- this is Leonard Willoughby. You
16 mentioned that you do this every other outage or every
17 outage. How long does it normally take you?

18 MR. MCKENNEY: Well, we have the, you
19 know, the papers all are proof for this, it's a
20 repetitive kind of task, right, so, it we actually run
21 -- during outages we run a, do a conduit between -- that
22 we wouldn't necessarily do, and in usually takes us a
23 shift to install, 12 hours.

24 MR. LOVELESS: This is David Loveless.
25 What you're talking about though is just what's labeled

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1 as temporary cable B that you do every outage. You
2 don't connect to the --

3 MR. MCKENNEY: We do not connect to the
4 London Line.

5 MR. SULLINS: The 480-volt power that Mr.
6 McKenney described also supports our other two makeup
7 sources that don't rely on 4160-volt power; the spent
8 fuel pool cooling pump spent fuel pool cooling pump, P-40
9 Alpha, it also sets us up for gravity feed capability.
10 Our capability for the reactor building would be through
11 the reactor building purge system. The inboard purge
12 isolation dampers rely on red DC power and instrument
13 air, both of which were available to us, or would be
14 available to us with N2 supplying instrument air and
15 this temporary mod powering our DC bus.

16 The last item on this slide gives urgency
17 to doing something with 480-volt and that is to preserve
18 our indication.

19 If we were to experience a station
20 blackout, it would be a priority, not as high as
21 restoring the ultimate heat sink, but to get some power
22 to our battery chargers before our batteries are
23 depleted. And this concept that was presented to -- in
24 your meeting today was -- I looked at this from the
25 perspective of, I'm in the TSC, what are our priorities?

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1 Number one is recovering vital 4160-volt,
2 the diesels, and ultimate source. Number two is keeping
3 the DC so we can see what's going on in the reactor
4 building, and that would prompt some time of power to
5 the battery charger. Number three, we're without makeup
6 capability, we have six methods. They don't all rely on
7 4160-volt power, what can you do with that? Given those
8 priorities, this is what the engineers -- basically this
9 is an exercise that they would be the TSC engineer, I'm
10 the TSC manager with those priorities in very short
11 order you can -- this is what I would propose.

12 The next slides illustrates --

13 MR. MITMAN: Jeff Mitman. Before we go
14 on, the condition the plant's in at this point is the
15 canal, the cavity is flooded. Now the normal source of
16 water to flood the cavity is normally the borated water
17 storage tank. It's my understanding that that's, in
18 fact, what had happened. You used the water in the
19 borated water storage tank to fill the cavity.

20 Is my understanding correct?

21 MR. SULLINS: Yes, that is correct. We
22 had approximately four feet in BWST, it's 9,700 gallons
23 per foot plus some few more.

24 MR. MITMAN: So approximately 30 to
25 40,000 gallons. If you'd gone to using the borated

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1 water transfer pump at, say, a nominal flow rate of a
2 hundred gallons a minute, that would give you something
3 like 40 minutes worth of water.

4 Again, is my understanding correct?

5 MR. SULLINS: From the normal alignment
6 that is correct. We did not describe the details of
7 this strategy, but I would direct that we set up our
8 makeup capability from our B5B security procedure for
9 BWST makeup and we have multiple sources, clean water
10 sources in our yard, and that would provide a makeup
11 capability to our BWST.

12 MR. MITMAN: When you say clean water
13 sources, do you mean non-borated water sources?

14 MR. SULLINS: Yes, that's correct.

15 MR. MITMAN: And so, you've got an
16 analysis you've contemplated putting non-borated water
17 into the primary system?

18 MR. SULLINS: Not directly into the RCS.

19 The strategy, provided we needed this for a longer
20 period of time, the P-66 provides makeup to spent fuel
21 pool or directly to the RCS.

22 So the sequence I would follow is I would
23 first use the borated water in the BWST as makeup to the
24 RCS for boil off. Then I would transfer using the same
25 lost decay heat removal procedure available from

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1 inventory from the spent fuel pool. I would then make up
2 to the spent fuel pool and you have mixing, past reactor
3 engineering -- since we had not reloaded with fresh fuel
4 to maintain one and a half percent shutdown margin, we
5 need approximately -- just slightly under 400 PPM boron
6 in the RCS. So we would not go directly without --

7 MR. KOWALESKI: But you're not leaking
8 the boron? You're evaporating -- the boron stays in a
9 solution, so you're replacing inventory and your boron
10 is still there?

11 MR. SULLINS: That's right. But there is
12 consideration for mixing and so the methodology I
13 prescribed for you would be the course that I would
14 follow.

15 MR. BROWNING: I wanted to be clear. The
16 capacity is 100 gallons a minute, the need was 50
17 gallons a minute.

18 MR. MITMAN: And the operators knew that?

19 MR. SULLINS: Yes. We post required
20 makeup capacities.

21 MR. MITMAN: And, of course, you had some
22 excess capacity in the spent fuel pool that you could
23 also use if the engineering judgment gets to that point.
24 You also talked about, on slide 43, the ability to
25 gravity feed.

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1 MR. SULLINS: Yes, sir.

2 MR. MITMAN: Now, my understanding is
3 with four feet of water in the BWST, the water level in
4 the BWST is lower than the water level in the cavity,
5 and therefore if you try establish gravity feed, you'll
6 try and won't succeed, but you'll try and refill the
7 BWST. So, I'm surprised -- could you explain a little
8 bit about what you mean by that bullet about gravity
9 feed?

10 MR. SULLINS: Certainly. We would need
11 to make up the BWST again without borated water to our
12 procedurally required -- a value greater than 21 feet,
13 and then this is the last contingency because you are in
14 that case relying on the boil-off effect and you might
15 have some mixing concerns, but it does provide that
16 capability.

17 And that was really all I wanted to make
18 of that.

19 MR. MITMAN: And gravity feed, if I
20 remember correctly, is describe in your loss of decay
21 heat removal procedures, correct?

22 MR. SULLINS: That's correct. That's
23 where the 21-feet limit is supplied.

24 MR. BROWNING: The makeup to the BWST is
25 proceduralized, we do not have to create that makeup

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1 source. We'd have to think of it.
2 MR. SULLINS: That answer your question?
3 We've had a number of questions related to timing and
4 the fact that -- we appreciate that there are many
5 things going on in our facility and that we would have
6 to establish priorities, but the most significant factor
7 for risk from our perspective is the passive cooling
8 capacity that existed in the fuel transfer canal. That
9 provide for us an available inventory of 4.8 days.
10 What this slide illustrates is the time
11 required for each of our four success paths relative to
12 the time available.
13 And we appreciate the comments regarding
14 parallel paths for success path 1 and success paths 2 or
15 3. What I'd like to point out here, if success path 1
16 were our first priority then we would begin that
17 activity with plans to commence the backup if there's a
18 problem with our offsite power source from Startup 1,
19 that we pursue parallel paths. It's illustrated in a
20 simple manner here, but what's key is the time available
21 and that -- what we've modeled, we've taken a reflective
22 look of how do we do business, and what would we
23 reasonably do.
24 And if we're in the TSC and we can't get
25 either of our diesel's back, we will pursue multiple

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1 options -- if there's a problem, if that Startup
2 transformer, that first priority, we want a back up to
3 go to. And Mr. McKenney's established that that was
4 physically viable, and what this illustrates is that we
5 had the time to execute that.
6 Any questions?
7 SPEAKER FROM PHONE: Yeah, this is Sunil
8 Weerakkody at headquarters. I have a question on slide
9 44.
10 MR. SULLINS: Okay.
11 SPEAKER: Just a clarification, I know
12 you're comparing the success path for the different
13 success options for the 4.4 days after the core uncover
14 then you have the time to start boiling which is about
15 12 hours. So am I understanding this correct that given
16 any of these success paths you would boil the core,
17 start boiling the core or is that also?
18 MR. SULLINS: In the unlikely event of a
19 station blackout where we could not recover diesel, we
20 predict that there would be core boiling in that
21 recovery.
22 SPEAKER: Again, this is something that
23 I'm reflecting on, so when I call this a success path,
24 it's a success path with core boiling where you have
25 started core boil off, but you have prevent core damage?

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1 MR. SULLINS: Yes, sir, that's correct.
2 SPEAKER: Now, given that you'll be
3 having some boil off, right, where does the steam go?
4 And would that affect any of those follow-up actions
5 that you count on in the success path?
6 MR. SULLINS: That's a good question.
7 Once the core reached the boiling condition that would
8 prohibit access to the reactor building and we have
9 factored that in to what we credit for actions.
10 SPEAKER: Thank you.
11 MR. SULLINS: Other questions?
12 MR. KENNEDY: On the timeline, does it
13 include everything today we've talked about today with
14 respect to the engineering work that would be done, the
15 laying out of cables and breakers, does it take into
16 account the delay in access to inspecting the switchgear
17 and the breakers, you know, initially after the event?
18 You know, pretty much all the questions that were asked.
19 MR. KOWALESKI: Kriss, it's based on what
20 we actually did. So we actually installed this in 4.4
21 days. So all those access issues and all those impact
22 were part of that. And then what we looked at is what
23 scope was eliminated because these didn't include all
24 the breakers, relays and additional routing and
25 additional splices. It essentially prorated that

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1 estimate down.
2 But you can see that there's sufficient
3 margin that if there was 12 hours of delay, there's
4 still substantial margin time to complete these options.
5 MR. KENNEDY: Do you think that would
6 also bound -- implementing these actions, if you had a
7 station blackout -- would there be any complications
8 that would be created by the fact that you were doing
9 these activities in a station blackout plus the
10 conditions that you have actually had?
11 MR. BROWNING: That's correct. And
12 that's what Joe was trying to explain earlier. If you
13 looked at the turbines and look where some of these
14 cables would be routed -- we routed, we spliced around
15 Startup 3, it would be no different than a blackout.
16 The environment we would have been working in were very
17 similar environments to actually work in, where these
18 splices were occurring.
19 MR. MCKENNEY: They were in the turbine
20 building, they weren't anywhere that had any
21 radiological concerns.
22 MR. KENNEDY: -- lighting access --
23 MR. BROWNING: Actual conditions were
24 that of a blackout on Unit 1.
25 MR. DAPAS: This is Marc Dapas, follow

25 (Pages 97 to 100)

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1 up. I have a question, and I don't know if this is a
2 significant time contributor, but I think he
3 acknowledged that if you lost the diesel you'd have to
4 understand why and was it the result of a faulty bus
5 here, and what testing you need to do before you go and
6 power that bus via your alternate cable routing
7 associated with your success paths. So there's some of
8 our time associated with that, right? Is that factored
9 in?

10 MR. BROWNING: That would be a correct
11 statement.

12 MR. SULLINS: Let me take just a moment
13 if I could, Jeremy. We have clear distinction through
14 our alarms for the probable cause of loss of the diesel.
15 If we have a switchgear lockout, then we know we've got
16 a problem with the switchgear itself and the conditions
17 that caused the diesel itself to lockout would point
18 toward a problem with the diesel alone. So we do have
19 good indications and alarms to direct us to the cause.

20 MR. MITMAN: This is Jeff Mitman. How
21 would the fact that you don't have a train B battery
22 affect this? Because without the train B battery, you
23 don't have some of your indications, some of your
24 alarms.

25 MR. SULLINS: Okay. You're referring to

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1 depended on the 480-volt on the red side. And when the
2 non-vital sources went away, the No. 1 diesel started
3 using its battery and then provided DC power to the
4 green side.

5 So the sequence I believe we're talking
6 about is the No. 1 diesel fails to start and now we're
7 in a blackout. So in terms of assessing conditions of
8 our green train switchgear, it's not been exposed to --
9 we would treat it as functional, but that we haven't
10 given the diesel the opportunity to tie to it.

11 MR. CIRCLE: Would you have considered
12 PDG 2 operable under those conditions? Because you
13 wouldn't have any indication of a problem at that point.

14 MR. SULLINS: We would know that it's not
15 got control power, and we would consider it operable and
16 work toward establishing control power to it for its
17 operation. In our station blackout procedure we're
18 directed to use the EDG procedure and restore the EDG
19 and that's where we --

20 MR. DAPAS: If it doesn't have control
21 power, it's not functional.

22 MR. SULLINS: Yes.

23 MR. DAPAS: So you say you consider it
24 operable. If you don't have control power to that
25 diesel, it's not available.

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1 our initial condition with the D06 battery disconnect?

2 MR. MITMAN: Correct.

3 MR. SULLINS: The affect would be that,
4 if we had the station blackout and we're having trouble
5 starting the No. 2 diesel then we would address that DC
6 power source on recovery, the No. 2 diesel. Beyond
7 that, it's one additional operator action is how I would
8 assess it.

9 MR. BROWNING: I don't know that we
10 actually answered the question. We had a 480-volt buses
11 cross tied, so we did have DC power. We didn't have the
12 battery connected, but we did have DC power.

13 MR. MITMAN: But in the scenario we're
14 exploring is the station blackout, and with a station
15 blackout there is no battery on the train B DC power.
16 And so when we start talking about knowing, you know,
17 we'll have lockouts, we'll see the lockouts in the
18 control room, we'll know what's going on, whether we've
19 got a lockout or whether we've got a diesel problem, I'm
20 just trying to explore the impacts of what the control
21 room would know if, in the middle of a station blackout,
22 there's also minus the train Bravo DC power?

23 MR. SULLINS: We are getting quite
24 technical, but I'll try to answer that question. At the
25 time of the event, the DC power on the green side

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1 MR. SULLINS: Yes, thank you for the
2 clarification Mr. Dapas. What I'm saying is we don't
3 consider it damaged or suspect. And I thought that -- I
4 misunderstood the question.

5 MR. DAPAS: But that diesel wouldn't be
6 available because you don't have control power?

7 MR. SULLINS: Absolutely.

8 MR. DAPAS: You learned that when you
9 went to start the diesel. You didn't otherwise
10 recognize it as having lost diesel 1?

11 MR. SULLINS: And just to directly answer
12 your question, we've not considered the diesel
13 operative.

14 MR. HARRIS: So -- this is Richard
15 Harris. There is a dependency on the No. 1 diesel.
16 That was accounted for in the unit -- in our modeling,
17 the ANO modeling.

18 MR. SULLINS: Does that answer your
19 question, Mr. Mitman?

20 MR. MITMAN: I think we're getting there.
21 One of the questions that was asked was, if you have a
22 lockout of, say, the A3 bus, okay, now there's a fault
23 on the A3 bus. It's not what happened that day, but
24 we're ahead of ourselves in our risk analysis, our
25 consequence analysis, but if we do have a fault of the

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1 A3 bus and you do have a lockout, now, do you know you
2 have a lockout because you've got DC power on that
3 division. But you don't have DC power on the other
4 division and so you don't know what the condition of the
5 other bus is. And now you don't have the DC power that
6 you need to start the train -- the train B diesel, you
7 don't have DC power on it, and half the plant, half the
8 indication, half the alarms, half the annunciators are
9 not working because they don't have DC power.

10 MR. HARRIS: Jeff, this is Richard
11 Harris. Let me see if I can address that from the
12 perspective of analysis. When you look at the
13 switchgear in the lockout, there is a probability of
14 failure associated with that. When you look at overall
15 risk of diesel failure, then you look at if it fails to
16 start, fails to run, you're looking at support systems,
17 which would be the air supply, the surface water, you're
18 looking at fuel.

19 So all of that rolls into the diesel
20 ability to run and then probability of failure. The
21 switchgear is only a small part of that failure. It
22 should be included, but I would move that it's not a
23 significant impact on risk in relation to the diesel --

24 MR. CIRCLE: For the base case it
25 wouldn't be, but for this particular case this

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1 is would we start pursuing these success paths, and what
2 I'm trying to assure you of, I personally would not have
3 to know if I had a damaged bus or a damaged diesel. I
4 would be asking my TSE and my EOF what are we doing to
5 establish a connection from offsite to onsite.

6 Now before we land that lead and turn it
7 on, I would want to know the condition of that bus and I
8 know my staff would want to know. But what we're trying
9 to communicate is we didn't wait. We knew we had
10 diesels running, we knew we had to get offsite power, we
11 immediately started assessing the condition of the
12 plant, we immediately started implementing our plan in
13 parallel with the contingencies, and all I'm telling you
14 is if that diesel went away, whether it was the bus that
15 drove it offline, DC that took it offline, or a support
16 system, these guys would have implemented one of those
17 contingency plans.

18 But before we energized it, clearly, we
19 would have understood the condition of that plant.

20 MR. CIRCLE: Right. And we don't doubt
21 it. We're just looking at the impact and trying to
22 assess the impact. As far as the actions are concerned,
23 we know that you would do something.

24 MR. DAPAS: What I've also heard, this is
25 Marc Dapas, that your timeline accounts for the fact

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1 configuration is very sensitive. Because in this case
2 you're feeding the B train DC from an A train charger.
3 You've disconnected the B train battery. So anything
4 that happens on switchgear A3 is going to have a big
5 impact.

6 MR. HARRIS: You're right, the
7 consequences would be significant; however, the
8 probability is not significant.

9 MR. CIRCLE: I don't quite believe that,
10 but you can go on.

11 MR. SULLINS: The question was related to
12 the operator response. And where he had time to respond
13 and that was implemented, factored into our strategies
14 in our recovery. We operated for weeks with diesels in
15 pull-to-lock with operator control of starting the
16 diesel, since it was not necessary to automatically to
17 tie onto the bus with a blind condition, we wouldn't go
18 blindly close in the DC breaker, but you would go toward
19 a controlled restoration.

20 This is first time presented with the
21 scenario, but I would predict that we would do a
22 controlled restoration where loads are opened up and
23 then you first energize the bus, and then in a
24 controlled manner recover control power to the diesel.

25 MR. BROWNING: I'm thinking the question

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1 that you have to ensure that the buses in this condition
2 where you could power the feed successfully, and that's
3 accounted for in the timeline.

4 MR. BROWNING: Yes, sir. We're running
5 cables in parallel, we're splicing in parallel, we're
6 accessing what it is that happened.

7 MR. MCKENNEY: When we put Startup 1, the
8 path that we put in service, so we did testing on that
9 transformer and that was part of the 4.4 days, right?
10 So we went through and made sure that the health of
11 Startup 1 was intact before we energized that
12 transformer.

13 MR. DAPAS: I do think the line of
14 question was we have train A DC power cross connected to
15 train B and it impacts control power to a diesel which
16 then gets to the probability that you could have lost
17 that diesel, you know, it's not a normal electrical
18 lineup here, right, for providing full power to the
19 diesel source. However, the questions remains and what
20 we're trying to understand is that is there any
21 additional element there and how did you factor that
22 into your analysis?

23 MR. SULLINS: I do want to assure that
24 the questions are adequately answered. Appreciate the
25 question.

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1 To summarize, our technical presentation
2 of the success paths, the key item, I guess, is
3 confidence in the success of these the time margin, 4.8
4 days. The second factor is the substantial resources
5 available for response, as we've discussed earlier, we
6 would have the support structure of an emergency
7 response organization setting priorities and supporting
8 operations and maintenance. We have straight forward
9 installations for which our people were trained and it's
10 consistent with their outage responsibilities.

11 The defense in depth aspect is important
12 to me. The fact that we had available to us parallel
13 paths for 4160 and available to us an alternate diverse
14 means for RCS makeup.

15 And then lastly, the demonstrated success
16 with what we did with the full package with the breaker
17 still within the allowed 4.8 days.

18 Any questions for David?

19 MR. KENNEDY: I would propose that we
20 take a break at this point. We've been going for about
21 two and a half hours. Maybe take a ten-minute break
22 before we get into the really good stuff and interesting
23 stuff which is the risk significance. It's 3:31
24 central, if we could be back at 3:41 central and
25 restart. The bathrooms are down out the door to the

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1 left.

2 (Break taken from 3:31 p m. to 3:46 p m.)

3 MR. WERNER: Operator, are you on the
4 line?

5 OPERATOR SYLVIA: Yes, sir, I'm on the
6 line. Just opened up all the lines.

7 MR. WERNER: All right. We're ready to
8 restart.

9 OPERATOR SYLVIA: You may begin.

10 MR. KOWALESKI: Before Richard goes, this
11 is Joe Kowaleski, we'll provide a written timeline for
12 how to safely assess the condition of the bus as input.

13 MR. MITMAN: Thank you.

14 MR. SULLINS: This is Gary Sullins. A
15 point of clarification, we had questions regarding
16 operation of our No. 2 diesel for station blackout and
17 the question was related to operability. We would not
18 consider the diesel operable without DC power; however,
19 we have procedures for starting the diesel without DC
20 power and are trained on those procedures, so that start
21 capability exists for us.

22 MR. CIRCLE: This is Jeff Circle. Just
23 to clarify that question is, actually, what would be the
24 concern if you restore DC power once you start the
25 diesel and not knowing how diesel 2 had failed?

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1 Let's say you had failure in diesel 1 or
2 some fault or something that blacked out the A3 bus.
3 Now if diesel 2 failed along with diesel 1, there's a
4 chance that they might not have picked up the electrical
5 configuration which was responsible for diesel 2
6 failing, would they be that quick to restart diesel 2
7 given there state of knowledge?

8 That's the question that we asked,
9 actually.

10 MR. SULLINS: Make sure I understand the
11 question. You have diesel 2 operating with DC control
12 power provided from a red train.

13 MR. MITMAN: Right.

14 MR. SULLINS: And if diesel 2 fails --

15 MR. MITMAN: If diesel 1 fails. If
16 something on -- I guess red train is your train A, I'm
17 having a little trouble with the color designations. If
18 diesel on train A, diesel 1 fails or something happens
19 to the switchgear --

20 MR. SULLINS: Okay.

21 MR. MITMAN: Then power is going to be
22 lost in DC control power, and power is going to be lost
23 to A4 and force the start of diesel2, but diesel 2 would
24 not start. So you'll have a situation where diesel 1
25 would lockout for some reason. Diesel 2 wouldn't start.

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1 And it may not be apparent to the watch what's going on
2 at that time.

3 So, would they be quick to restore --
4 let's say they restore DC power and manage to get diesel
5 2 started, would they be quick to start diesel 2, not
6 knowing if there was some electrical fault that failed
7 it in the first place?

8 MR. SULLINS: MR circle, now that I
9 understand the question, what I'd like to do is to give
10 it some thought and then come back to it later so we can
11 proceed.

12 MR. CIRCLE: That's perfectly fine.

13 MR. HARRIS: Okay. Let's get started on
14 the significant termination discussion. My name again
15 is Richard Harris and I am the Manager of Emergency
16 Planning at ANO, and you might ask yourself why is the
17 Manager of Emergency Planning talking to you about risk
18 significance. Previous before assuming the position of
19 emergency planning, I was a risk analyst for ANO. I've
20 also previously held an operating license on Unit 1, but
21 more importantly, Jason Hall, our PRA engineer, is in
22 the back of the here, so we may call on him if you have
23 any questions, because he actually performed the
24 analysis, he may be able to answer any specific
25 questions, but we did have a group of PRA engineers that

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1 could pull together to go through the analysis and
2 provide the results that we'll talk about today.
3 The main point that I think we should get
4 out of the previous discussion from David and Gary is
5 that when you look at the timeline for the available
6 time to core uncover, and you look at the actual time
7 that it took us to restore power to Startup 1, we
8 restored power before our estimated time to core
9 uncover and that's a fact.
10 So when you consider that fact then you
11 have to acknowledge that the probability of failure
12 restoring off that power is something less than one.
13 What we want to do in addition to that
14 discussion is talk about the success paths that Gary and
15 David outlined and how we considered those in our risk
16 assessment, and the methodologies that we looked at in
17 relation to this particular issue.
18 So our key objective that I think we want
19 to come away is that we want to insure that we have a
20 realistic estimate of risk using the best available
21 information that we have.
22 At the end of the presentation, I will
23 provide and discuss real briefly the results that we
24 derived independently for ANO.
25 So, what we started with was the event

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1 tree model that provided to us, and we reviewed that
2 model to understand the method used and the results that
3 were obtained. We didn't have the complete model that
4 the NRC utilized, so we were somewhat restricted in our
5 review and our analysis on the information that was
6 available.
7 So, you know, at the end of day, whenever
8 we go back and whenever you guys go back and look at the
9 information provided today, you'll be able to take this
10 information and use it in your full PRA analysis.
11 The assumption relating to 4160-volt
12 power, it's currently in the model and if you look at
13 event tree, what I'm talking about is this branch here
14 and also associated with DHR, mainly because there are
15 some assumptions in the DHR cut sets that are driven by
16 a loss of power. We believe that the assumptions are
17 not realistic simply from the fact that we did recover
18 onsite power in the available time.
19 Again, this is the event tree that we
20 just looked at.
21 On slide 50, one of the things that we
22 were challenged with, and I believe it's one of the
23 things the NRC was challenged with as well, is what
24 method do you use to perform an HRA-type of analysis for
25 the conditions and the situation we found ourselves in

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1 based upon the stator drop.
2 We were in a shutdown condition, the fuel
3 transfer canal was flooded up. So what we did is we
4 took -- we felt like it was imperative upon ANO to
5 develop a methodology that could be used by the NRC
6 going forward.
7 We reviewed the standards that were
8 available in the industry and could not identify a
9 definitive standard that could be used for this type of
10 analysis. But, again, our ultimate goal is to get a
11 best estimate factor to be used and acknowledging that
12 it's not 1.0.
13 So what we did is we determined a -- we
14 assembled an expert team and we considered the different
15 methods that were available. At the end of day the
16 following methods that we ultimately selected were the
17 HRA calculator and we also used EPRI's SHARP 1,
18 Systematic Human Action Reliability Procedure.
19 The elements that we considered when we
20 went through this development and this methodology was
21 we looked at cognitive and decision making portion of
22 the HEP or the human error probability calculation. We
23 also looked at the design development. And I want to
24 spend a little bit of time on the design development
25 just based on some discussions we had earlier during

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1 Gary and David's presentation. And also the execution.
2 So the first thing we want to talk about
3 is the cognitive decision making.
4 Much like the operator in the control
5 room, when he gets a cue, the cues were self-evident
6 post stator drop. We knew that we had lost our
7 connectivity to offsite power. The engineering staff
8 and the TSC in the plant recognized that we had to
9 protect ourselves against -- protect the safety
10 functions of plant. And we also recognized that we had
11 resources available, and we had to look the
12 modifications that were also available.
13 Given these conditions, we reviewed the
14 HRA calculator for its applicability. And when we looked
15 at the cognitive portion of the HRA calculator, we
16 deemed that that portion of the HRA calculator for this
17 particular element of the human error probability.
18 MR. MITMAN: Before you move on, Jeff
19 Mitman here, the HRA calculator has several methods
20 imbedded in it to do cognitive analysis. Which of the
21 embedded methods did you use for this?
22 MR. HARRIS: Jason, I'll let you speak to
23 that.
24 MR. HALL: We used the cause-based
25 decision.

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1 MR. MITMAN: Could I get a copy of the
2 analysis, please?
3 MR. HALL: Yeah.
4 MR. HARRIS: Moving on to the next
5 element that we had to consider was the design
6 development. As was discussed during Gary and David's
7 presentation, you know, there weren't any procedures in
8 place. There wasn't any guidance in place post stator
9 drop. It was up to the engineering team to develop
10 these design factors or do the design development going
11 forward.
12 So, looking at the resource limitations,
13 the effect on effect on existing systems, the operating
14 crew and the staff interaction, taking credit for the
15 fact that we've done this before, the type of
16 modifications we're talking about here were not unique
17 to ANO and they've been performed many times during
18 outages, we did conclude -- and looking at this
19 particular portion of the HEP that the HRA calculator
20 really didn't do a good job of adequately addressing
21 this issue.
22 So alternate approaches were considered.
23 And at the end of day we decided -- we determined that
24 the SHARP event tree, recovery event tree approach would
25 be an adequate approach to assess this different element

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1 in the HRA analysis.
2 MR. KOWALESKI: Just want to make sure of
3 a clarification on a point. We didn't have one
4 individual do this risk assessment in the HRA
5 calculator. We had a team of experts, we contracted
6 experts in to assist us with this. So we had
7 considerable resources applied to this. Just wanted
8 make sure that was clear.
9 MR. LOVELESS: This is David Loveless.
10 Can you spend a moment explaining the demarcation
11 between where you said the cognitive portion of the
12 action was done versus this, I'm assuming it's part of
13 the action of the design development?
14 MR. HARRIS: Certainly. In the cognitive
15 portion, you would have to consider the cues that were
16 available to the team as they determine what the status
17 of plan is. They would also have to look at -- compare
18 that cue against the safety's functions because,
19 ultimately, that's what we want to protect.
20 The team would then go in and look at
21 those safety functions to prioritize. They would look
22 at the resources available. They would look at the
23 temporary modifications that needed to be developed to
24 protect that safety function. And they would make a
25 decision as -- the decision-making point of that would

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1 be to determine which access to go after first, and
2 which modifications that needed to be planned and
3 developed first.
4 MR. LOVELESS: And all of that, that you
5 just described, was done with cause-based HRA
6 calculator.
7 MR. HARRIS: The portion of the HRA
8 calculator that would apply to that, we did.
9 So moving on to the -- looking at the
10 recover event tree, what we used was, and we've talked
11 about, I think, most of these in Gary and David's
12 presentation, so I won't spend all our time -- we spent
13 a lot of time earlier talking about simple versus
14 complex. From an engineering perspective, this was a
15 very simple modification, and that's why we chose the
16 simple branch on this particular event tree. Again,
17 because we've done it so many times in the past, the
18 engineering team, as David mentioned, he's got a lot of
19 years of experience and done this with many outages, the
20 practice and the ability to do this, the training was
21 there.
22 We did consider that the nature of the
23 work environment was poor based on stress and safety
24 factors associated with the issue that the team may have
25 been under at the time.

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1 And that would have led us to a
2 qualitative probability failure to moderate flow and
3 then using screening values as defined by SHARP, we
4 determined that that value would be .03 for this
5 particular aspect of the HRA.
6 MR. MITMAN: I'm going to have a couple
7 questions on this slide. I was able to get a hold of a
8 copy of SHARP 1 and take a quick look at it last night.
9 I found in there the event tree, the decision tree that
10 you're looking at here, and I understand where you got
11 the questions from and the splits on that.
12 Could you talk a little bit about the
13 values that put in there that describe short,
14 intermediate, and long, and how you came up with less
15 than one hour, one to four hours, and greater than 4
16 hours?
17 MR. HARRIS: The long leg associated with
18 this particular branch is the fact that we had 4.8 days.
19 MR. MITMAN: Yes, but, again, it was only
20 a quick review of SHARP 1, but I didn't see SHARP 1
21 defining long as greater than 4 hours, and so I assume
22 that that was a decision that your expert team made as
23 they evaluated that.
24 Is that a fair assumption?
25 MR. HARRIS: I understand your question.

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1 You're saying, where did that 4 hours come from?
2 MR. MITMAN: Correct.
3 MR. HARRIS: It came from our HRA anal --
4 the fleet, southern fleet have an HRA analysis, and the
5 guiding principles within the HRA analysis are defined
6 based on 4 hours. So that's typically what we use for a
7 typical HRA analysis would be a 4-hour timeframe.
8 Obviously, in this case, the 4 hours
9 didn't apply, and so -- and we probably should have
10 taken it off of this presentation because it does add a
11 little confusion, but the fact that we had 4.8 days did
12 provide us that we had time available for the action.
13 MR. DAPAS: I guess the question I have
14 is does this human action reliability procedure which I
15 guess is the SHARP 1, does it provide any guidance there
16 regarding the timeframe that you're talking about, long
17 or medium or short differentiation?
18 MR. MITMAN: Based on -- I haven't
19 thoroughly read SHARP 1 yet to know, and so I turn it
20 over to Entergy and say, does SHARP 1 tell you how to
21 define short, intermediate, and long?
22 MR. HARRIS: I'd have to go back and look
23 and see if there's any specific guides there.
24 MR. MITMAN: Next question is, you're
25 using this as an --

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1 MR. KOWALESKI: That was an output of the
2 expert team, so what we need to do is provide that for
3 you.
4 MR. DAPAS: Yeah, I think it would be of
5 value for -- I'll ask the risk analysts here on this
6 side of the table, but I think it would be of value for
7 us to understand where you relied on, if you will, the
8 expert judgment of the team you assembled versus
9 applying the guidance that exists and the standards that
10 you were using --
11 MR. HARRIS: Certainly.
12 MR. DAPAS: -- HRA calculator or the
13 SHARP procedure.
14 MR. HARRIS: Certainly. I think that
15 would be -- we can certainly do that.
16 MR. DAPAS: And of course, associated
17 with that is the basis for the judgment of the exercise
18 and why you considered that reasonable.
19 MR. HARRIS: Okay.
20 MR. MITMAN: And looking at SHARP in the
21 column that's labeled qualitative probability of
22 failure, if I remember, that comes right out of SHARP.
23 The low through high-end state qualitative values. In
24 the far right column you associated some quantitative
25 values. Did that come directly out of SHARP or did that

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1 come out of your expert judgment?
2 MR. HARRIS: If you look in SHARP, it
3 will define an upper bound of 0.1 and lower bound of
4 0.01 and then it also specifies that for those that -- a
5 range between low and high, that the range be
6 distributed evenly. So it's somewhat subjective as to
7 what goes where, but there is a little bit of guidance
8 to chart as to how to assign these values.
9 And our fleet guidance, the Entergy fleet
10 guidance, we've used, we've done that. So this
11 information that you see here, these numbers came right
12 out of our guidance, our internal fleet procedures.
13 MR. MITMAN: I'd like to see -- could I
14 get a copy of that guidance, please, and could I get a
15 copy of the entire analysis on, you know, how you set
16 the tree up and how you made the decisions on the branch
17 points?
18 MR. HARRIS: Okay.
19 MR. MITMAN: And the last question about
20 this is, you've characterized it as a decision tree for
21 evaluating the engineering judgment. But isn't it a
22 little bit more than that? It's the engineering
23 judgment and the actual construction work that went into
24 building the connection between offsite and onsite
25 power?

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1 MR. HARRIS: No, this is just dealing
2 with the design development where we looked at, you
3 know, what the engineers had to do to put a process in
4 place and develop the guidance, the written
5 instructions, to provide to the craft in the field to
6 perform that execution -- that activity.
7 MR. MITMAN: So you're going to talk
8 shortly about the evaluation of the execution?
9 MR. HARRIS: That's right. So the next
10 element we would talk about is the execution factor.
11 And what we looked at here was the execution steps that
12 were developed for successful implementation. Again,
13 what Jason did in his analysis, was he took the,
14 actually, work order instructions that were developed
15 and he used those in the context.
16 We did determ -- the team -- say -- I'll
17 clarify that. The team determined that the HRA
18 calculator could be used for this application because if
19 you think in terms of the HRA calculator and how it's
20 structured, it's structured to be used via procedures
21 for execution. By the time we get to this portion of
22 the recovery, the team in the field will have
23 constructions available to them that were developed by
24 the engineering team.
25 And so using the temp mod process the

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1 written instructions were developed. We used those
2 written instructions as part of this analysis and deemed
3 that the HRA calculator could indeed be used.
4 So now that we've gone through these
5 various elements and we've determined which tools could
6 be applied, what we did was we actually did the
7 quantification. And I'm just going jump right along,
8 move right along and we'll look at the fault tree that
9 we used to quantify this particular recovery.
10 What you'll see on the left side of the
11 screen or on your hard copies in front of you is
12 actually the recovery associated with the Startup 1
13 recovery. The branch -- the event that you're looking
14 at here at the bottom actually is the numeric value
15 quantification results from the HRA calculator for this
16 particular element.
17 On the right side of the branch here
18 you'll see the recovery efforts associated with the 2A9
19 and also the condensate pump feeder breaker. And you'll
20 note that they are anded as two independent
21 recovery efforts, but there is a dependency here
22 associated with the alternate AC 2A9 recovery and the
23 condensate pump recovery.
24 Also you'll note at the top of the tree,
25 the development of -- the design development factor.

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1 This is the factor that came out of the SHARP 1
2 methodology. So what we've done is we've used this
3 fault tree to capture the portion of the analysis
4 we could perform in the HRA calculator and the portion
5 of the analysis that we could -- would pull from the
6 SHARP methodology, the event tree.
7 And using this quantification or this
8 fault tree, we did calculate a recovery factor
9 associated with 4160-volt. And you note that rather
10 than put the recovery factor for the design development
11 down in the tree, as -- for each one of these elements
12 we pulled it to the top which provides a little bit of
13 an overestimation of risk associated with that
14 particular parameter.
15 MR. MITMAN: Jeff Mitman. Before you
16 leave that, the far left solution is the actual solution
17 that you implement, correct?
18 MR. HARRIS: No, this is actually the
19 success, this is actually one of the success paths that
20 we presented to you.
21 Now, given the way that we quantify this
22 value, it wouldn't change very much if we were to assess
23 it based on what we actually did.
24 MR. KOWALESKI: But, to be clear, the
25 actually installed power recovery is not included in the

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1 model.
2 MR. HARRIS: So, using this fault tree --
3 MR. LOVELESS: Can we go back for a
4 moment? This is David Loveless. I guess I'm trying to
5 understand exactly what you're modeling here in the two
6 recoveries under an or gate -- those are recoveries 2
7 and 3 that have some combination, so there's really a
8 50/50 chance that you take on each one of those, right?
9 I'm not sure the quantification is right putting those
10 both under an or gate.
11 MR. HARRIS: And I'll have to look at
12 that in a little bit more detail, David, you may be
13 right. But I will point to the fact that this risk here
14 is going to dominate these results.
15 MR. MCKENNEY: In actuality -- this is
16 David McKenney -- we would have pursued that particular
17 path and you could use it either place, so it wasn't --
18 in the development and the design section you could have
19 just moved the termination point from one place to
20 another.
21 MR. HARRIS: So it would have been a true
22 or.
23 MR. MCKENNEY: If we had a problem with
24 one of the two breakers, we could have moved to the
25 other breaker with sufficient time.

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1 MR. MITMAN: But the way you've got it
2 modeled, if one fails then the whole train, then the
3 whole -- then the or gate fails?
4 MR. HARRIS: Right.
5 MR. LOVELESS: The other question I have
6 is that, I guess, are these numbers your cognitive and
7 your execution --
8 MR. HARRIS: Yes they are.
9 MR. LOVELESS: -- values?
10 MR. HARRIS: Yes they are. We didn't
11 break them down in -- used HRA calculators using those
12 two elements to come up with a value that we used in
13 this fault tree.
14 MR. LOVELESS: And when send those to us,
15 we'd like to actually have the calculator files so we
16 can pull it up in calculator and look at your selections
17 on your usages.
18 MR. HARRIS: Sure. Okay. So as we
19 quantify the fault tree, our resulting point estimate is
20 3.1E-2 for this particular recovery pattern.
21 MR. LOVELESS: Before we leave this, one
22 more thing that I struggle with as I'm looking at this
23 and I struggle with it every time we're looking at a
24 complex event occurs and you have multiple pathways.
25 You're modeling pathways that you've

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1 determined at this point would be success paths. But at
2 the time of an event, it just happens, you're not sure
3 what the conditions are, there are going to be failure
4 paths, and those paths are going to be split fractions
5 with these, so they're going to pull off resources,
6 they're going to pull off decisions and you may make the
7 decision to go down a failure path, and that's not
8 modeled in here.

9 MR. HARRIS: Well, HRA we don't model
10 failures of commission.

11 MR. LOVELESS: We don't typically try to
12 model recovery after a dropped stator.

13 MR. HARRIS: The questions you're asking
14 are very good questions, and I was thinking earlier when
15 you guys were quizzing Dave and Gary, the questions you
16 asked us are questions any good PRA or risk analyst
17 would ask. And so, when I came on board to participate
18 we asked those same questions.

19 And I asked these guys, you know, did you
20 really do this? And if you did, how did you come to
21 this conclusion? And if you came to this conclusion,
22 how did you develop these success paths and how far did
23 you take it? And I walked away from that conversation
24 with these gentleman convinced that those guys had done
25 the right thing and developed the right tools and the

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1 right models and the right strategies to develop this
2 particular recovery action.

3 MR. LOVELESS: And I understand that. I
4 understand that you took a look at one item and said
5 they did the right thing here, but we're talking about
6 failure probabilities in each of those in the one in a
7 hundred range. So this happens a hundred times and
8 you're going to have different groups of people in your
9 TSC, different response teams, how many times do you
10 have to get that group together before they come up with
11 a failure path that goes the other direction?

12 MR. KOWALESKI: The whole premise,
13 because it's an event that occurred and setting the
14 event frequency to one, is that this event occurred.
15 And so it occurred during this outage. And that's in
16 essence what's bothering you. And I think if you look
17 at the timelines, there is substantial margin in time to
18 account for a lot of these deviations from normal
19 practice.

20 And typically the timelines for an online
21 model your talking about are a couple hours to taking
22 action, minutes to taking action. And we're talking
23 days to taking action. And so, we could have given
24 these installations -- design an installation in time,
25 could have gone down the path, failed option one, gone

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1 to option two, failed it and gone to option four
2 sequentially.

3 If we'd have done that, we'd have pursued
4 parallel paths, but given a different set of
5 circumstances, would the design evaluations come up a
6 little differently? Yes. But what we are looking at
7 the circumstances that occurred, which is the whole
8 basis for setting the event frequency at one in the
9 first place.

10 MR. LOVELESS: Well, we set the event
11 frequency to one and then we have, what we'll call
12 failure memory model where everything beyond that can
13 fail in different ways at whatever their nominal value
14 is. Unfortunately we don't have data to show what's the
15 nominal value of your TSC failing to come up with these
16 ideas. That's the struggle in using these.

17 You're modeling the three that you
18 thought of on that day, and I'm not -- they're probably
19 the best thing for your plant, you know your plant
20 better than I do, I'm not challenging that at all.
21 We're simply looking at the frequency and probability of
22 failing under those types of conditions.

23 MR. DAPAS: You had a comment.

24 MCCANN: Thank you. John McCann,
25 Entergy. We clearly acknowledge that this is, to some

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1 degree, new ground, right? I mean, we're at a place
2 where, I think we would all agree, probability of
3 failure of any of these success paths is not a hundred
4 percent. But then what is it?

5 I think this approach that we've come up
6 with is clearly going to be subject to some tweaking, to
7 some rethinking. But what we're trying to get across
8 here is this is a logical way to approach it that is
9 kind of consistent with the way we normally do
10 probabilistic risk assessment. I'm sure we will have
11 more than ample opportunity, hopefully, to discuss it
12 further, but, you know, for now, that's what we're
13 trying to get across.

14 MR. DAPAS: I'd offer, John, from looking
15 at your slides and listening to your discussion, you
16 indicated you're looking for the realistic estimate of
17 risk here and you feel that the probability for failure
18 to restore offsite power was something less than one.

19 Now how do you best determine what that
20 probability is, and then, you know, what influence does
21 that have when you apply that to your event tree. And
22 so, I heard there's no definitive standard for
23 calculating the recovery actions you were using.

24 The methodologies and guidance that is
25 available in trying to determine how best to provide

33 (Pages 129 to 132)

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1 that realistic estimate of the risk. I'll offer the
2 questions you are hearing here is in a vein seeking to
3 understand how you apply those and may have some
4 different views on how best to apply those, but the
5 objective, clearly, of this conference is to understand
6 how you applied those and how you arrived at your
7 results.

8 And I'll offer, should we arrive at a
9 different conclusion, we are subject to the same
10 rigorous evaluation or review of how we got there and we
11 have to clearly justify our conclusions and what
12 methodology's we used and do that.

13 MR. SULLINS: I hope it will help, I was
14 a member of the team from the operations' perspective
15 and I would look at final result and is say, is that
16 reasonable, also look at the activity involved and what
17 are the fatal errors that one could make. And the key
18 thing is you don't cause damage through your recovery
19 activities, and there are very few of those type errors
20 to make, given that we would apply electrical testing
21 standards, measuring and checking that there's integrity
22 before you put power on a circuit.

23 And given the time, it's in the modeled,
24 but when I looked at are those numbers reasonable, I'm
25 recognizing that if there's a logic error when they were

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1 correcting the -- or adjusting the logic in the circ
2 water pump breaker, there's ample time to adjust for
3 that and achieve success. So that was the sanity check
4 applied from an operations perspective.

5 MR. HARRIS: And the main thing we want
6 you to get out of this is to understand what we did.
7 And you asked some good questions and you've asked for
8 some documentation that we owe you. So we can sit down,
9 you know, outside of this purview and go through the
10 analysis and we'll be available to answer any of these
11 questions as well.

12 So, in the alternate evaluation, really
13 what we're doing here is we're just trying to take some
14 different approaches, much like Gary said, that it makes
15 sense to him that what we were doing was reasonable and
16 the results we were getting were reasonable. So we took
17 just a couple of different approaches to say does the
18 numbers that we're getting make sense in relation to a
19 different look.

20 Here we looked -- we just used a simple
21 statistical method, and using a normal distribution,
22 mean time to repair, assuming 60 hours, which is the
23 long leg for the Startup 1 recovery effort, and a
24 standard deviation of 20 hours, gives you a probability
25 of failure of $2.6E-3$. Just a simple look.

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1 MR. LOVELESS: We read this slide earlier
2 and weren't completely sure what you were saying. You
3 started with -- well, maybe I'm wrong. Why don't you
4 start with how you applied that.

5 MR. HARRIS: We didn't apply this, first
6 off. We did not apply this. All we're doing here is
7 we've already established what we feel like is the best
8 estimate, and using the method that we discussed a few
9 minutes ago.

10 MR. DAPAS: $3.1E-2$.

11 MR. HARRIS: That's correct.

12 MR. KOWALESKI: So this is just if you
13 look at it a different way is it even close.

14 MR. LOVELESS: I understand, but we're
15 not clear on how you looked at it.

16 MR. HARRIS: So, we simply took a macro
17 that was set up to do, using normal distribution,
18 calculate a probability of success, probability of
19 failure. We went into that, again, looking at the mean
20 time to repair, which, again, we assume to be 60 hours.
21 20 hours we assume for the standard deviation, and then
22 we calculated, basically it's a plug and chug within
23 this particular application, put in those values, see
24 what you get out for success.

25 MR. LOVELESS: So the distribution was a

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1 time distribution and you just randomly sampled the
2 across it and said the tail is --

3 MR. HARRIS: That's right. It's a very
4 simple analysis.

5 MR. MITMAN: So the 2.63 is the mean
6 failure probability out of that analysis?

7 MR. HARRIS: That's correct. Jeff
8 clarified that in his slide.

9 MR. MITMAN: The $2.6E-3$ is
10 the mean failure probability out of that analysis.

11 MR. HARRIS: That's right.

12 (Many speakers on top of one another)

13 But it's all driven based on the
14 assumption that 60 hours and a 20-hour standard
15 deviation are correct.

16 -- that is correct --

17 -- we have a high degree of confidence --

18 -- if you could change those --

19 -- based on the discussions --

20 -- the 20 hours, we could debate that all
21 day, but I don't think that would serve our mutual
22 purpose.

23 MR. DAPAS: I think we're making progress
24 in terms of it being all day here.

25 MR. HARRIS: I'll try to help us along.

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1 So alternate two, in this case all we did was we assumed
2 the fact that we did have off offsite power restored in
3 4.4 days, we knew that we had an available time of
4 4.8 days. We look at the fact that night orders were
5 in place, operator actions to close the breakers and
6 energize the buses were not complicated, and we simply
7 did an HRA -- used the HRA calculator in this particular
8 application to find out what the value would be for
9 failure probability, and we came up with 2.0E-3.

10 Again, this assumes actual condition. We
11 were, we actually had power, how long would it take us
12 to get that power in place should we need it.

13 MR. LOVELESS: Rather than assume for
14 you, once you -- the conditions you were at, my
15 understanding, you had to make a decision that you were
16 in an emergency, you met your emergency standards. Some
17 amount of time, I'm assuming not a lot, at that point
18 you had to go out and close the breaker, what's the next
19 operator actions at that point? You've been boiling in
20 there for a long time, you're way down, I'm going to
21 guess probably whatever the next operator actions, the
22 timing, just getting power to the bus is not successful
23 by itself.

24 MR. HARRIS: That's a very good point.
25 All this looks at is restoring power to that bus. There

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1 would be additional operator actions that are needed.
2 We didn't look at those. And those would increase this
3 value as well.

4 But again, looking just looking at this
5 perspective, we felt like we've got at least an insight
6 that we didn't have before. And were we to include the
7 things you're talking about, this number would go up.
8 How much would it go up? My guess, it would probably
9 double or triple. So it really wouldn't invalidate what
10 we had done before. Good question.

11 So the final thing we're going to talk
12 about is the inventory recovery in relation to the NRC.
13 We looked at the event tree here and concluded there was
14 no real credit given for this particular recovery action
15 here and David spent a lot of time looking at it. One
16 of the things we looked at in relation to the 4160-volt
17 and the inventory recoveries was, is there any
18 dependencies?

19 And the conclusion, ultimately, is, as
20 was discussed earlier, there were no dependencies
21 between 4160-volt recovery and the inventory control.
22 We had sufficient resources on site to pursue those
23 paths.

24 MR. MITMAN: Before you leave that --
25 Jeff Mitman -- the three other contingencies that you

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1 developed to supply power to the 4160 buses. Those were
2 to some degree scoped out during the event, okay you had
3 those conceptually in your mind, you started to think
4 about them and what resources you would need and what
5 analysis you would have to do and maybe even start
6 thinking about writing work orders.

7 But this other contingency to supply
8 480-volt power to the borated water transfer pump, you
9 didn't think of that during the process, during the
10 event. That was something that was developed after the
11 event was over, you restored power, and now you were
12 thinking about risk.

13 Do I understand that correctly?

14 MR. HARRIS: That is correct. But as
15 David and Gary talked about earlier, our processes would
16 have driven this.

17 MR. MITMAN: Personally, I think that
18 this is a success path with -- it's a very valuable
19 success path. Have you incorporated it into your
20 procedures as of this point more than it was previously
21 incorporated into your procedures.

22 MR. HARRIS: I'll let Gary or David
23 respond to that.

24 MR. SULLINS: Not yet, but we've had
25 active discussions regarding that. It highlighted the

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1 value of this pump and this strategy.

2 MR. MITMAN: I think your point here is a
3 very vital one, and that is that it's a method that's
4 completely independent of your failure. And so you
5 don't have to worry about, well, if it happened a little
6 bit differently, you know, the damage would have been
7 somewhat different. It doesn't matter. You can simply
8 run something into the plant, know it's coming from a
9 good source, know it's going to an MCC that can be
10 thoroughly isolated from whatever the fault is.

11 MR. HARRIS: Let's go ahead and move on
12 and we'll look at how we modeled this in the fault tree.
13 On the right side of the fault tree, what you'll see is
14 the alternate source of water, the BWST, and that was a
15 question, I think, Jeff had asked earlier today in the
16 discussion was what about the BWST. What we've done is
17 we've modeled restoration of water to the BWST in order
18 to account for this particular recovery.

19 We've also thrown in the failure,
20 mechanical failures for the necessary pumps and then
21 over on the left here, you'll see the development of
22 recovery, the same thing we used from the SHARP 1 event
23 tree model, and the HRA calculations assuming the
24 cognitive execution steps.

25 MR. LOVELESS: This is David Loveless.

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1 The whole right side of this looks like it's fire water.
2 MR. HARRIS: We have the B5B pump. We
3 assumed credit for a fire truck that was on site at the
4 time. And then we had also a decent fire water pump.
5 MR. LOVELESS: Well, during the event we
6 had broken headers and that affected mostly how do we --
7 how would that have come into play?
8 MR. SULLINS: We have three portable
9 pumps. And this would have been given priority for at
10 least one. We called the local fire department, the
11 London Fire Department was on station standby as a
12 contingency for fire water. We did isolate the fire
13 main, the ruptured section, within a couple hours so the
14 fire water pumps were available to restore pressure to
15 the header in short order. So I don't see that as a
16 competing factor.
17 MR. LOVELESS: The portions that were
18 damaged were not used in your fire water makeup
19 procedures?
20 MR. SULLINS: No, it's independent.
21 MR. BROWNING: It's completely on the
22 other side.
23 MR. MITMAN: The fault tree that you've
24 set up here and we've been talking about this fire
25 protection component of it. That's an or gate up there.

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1 Didn't you intend that to be an and gate that not one
2 of, you know, the way it's currently written, any one of
3 these five things fail and the whole scenario fails.
4 MR. HARRIS: That's right.
5 MR. MITMAN: And so it should be an and
6 gate and not an or gate.
7 MR. HARRIS: Well, when you look at the
8 failures, though, we've got a common cause failure of
9 all the pumps -- you've got a common cause failure --
10 you also have a hydrant -- we have a valve closure here.
11 So these failures -- and then the operator action to
12 align off that water source -- the recovery action to
13 actually take those steps -- so any of one of those
14 failures would have caused failures to the --
15 MR. CIRCLE: They need to isolate the
16 hydrant from everything else.
17 MR. DAPAS: The answer here is you feel
18 an or gate is appropriate. We were questioning why it
19 shouldn't be an and gate.
20 MR. HARRIS: We believe it would be
21 nonconservative to apply an and gate there. Something
22 we would definitely go back -- we'll go back and revisit
23 that. But we believe that to be the case.
24 MR. DAPAS: I think our role here is to
25 see if we can understand why you decided to use an or

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1 gate.
2 MR. HARRIS: And just to go to the top
3 again, you know, the operator action. If the operator
4 fails to perform this action, this top gate fails,
5 regardless of anything else. That's the biggest
6 argument for the or gate.
7 If you quantify this model, or this fault
8 tree, we get a value of 4.0E-2. So, given the recovery
9 factor we've talked about the results, when we apply
10 these to the NRC's event tree model, and again, we don't
11 have the entire model, but given what we do have, we
12 feel like the -- well, from the results that we've
13 determined would be around 5.5E-06 conditional core
14 damage probability.
15 MR. KOWALESKI: I do believe when you
16 look at two of the inputs on the ultimate source of
17 water, I believe one of them should be an and gate here.
18 I think they're all or, but I think we did have an and.
19 MR. HARRIS: We can certainly go back and
20 revisit that. It really won't affect the overall
21 results. The numbers down there are not going to be
22 significantly -- was there another question?
23 MR. BROWNING: This is Jeremy. I was
24 going to make a comment about the concept around what we
25 were doing. If I could bring you back to the

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1 discussion. An element of this is something that we
2 would have done during every other refueling outage, so
3 the concept to put it in place, given the question, you
4 said, you'd have had to thought all this up because you
5 didn't have it.
6 The concept would have already been there
7 because we're jumping between two buses that we would
8 typically do. That other leg that would come off from
9 this connection, we have used that, not in this specific
10 application, but in a similar application. So that's
11 why, from my perspective, the basis for why this would
12 be credible is the concepts were pretty much already on
13 the table. Although we didn't ask the question during
14 the event because the need never arose.
15 MR. HARRIS: What you're looking at here
16 in relation to -- we performed a sensitivity analysis on
17 the results. Basically, using a factor of about 10 low
18 and a bounding upper value estimate of 0.1 for the
19 4160-volt recovery and the inventory control, Jason
20 performed this analysis. And basically, we got a range
21 of values in E-06. You'll notice the gray blocks in the
22 middle is approximately what we got for the point
23 estimate.
24 MR. LOVELESS: Can you explain this to us
25 a little bit better? What it is your --

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1 MR. HARRIS: If you'll look in this
2 column here on the left you'll see 4kV recovery. The
3 mean value, the point estimate value that we used in the
4 analysis is here. Simply went, approximately, in order
5 of magnitude low and then a bounding value of 0.1 to the
6 high end.

7 Same thing here for inventory control.
8 The mean value is here with a lower value of about,
9 approximately, 10 and up or down 0.1. So if you go to
10 either one of those boxes here, you can cross reference
11 and determine what the value you would get if you assume
12 0.1 and 0.1.

13 MR. CIRCLE: So all the 4kV recoveries
14 are all the success paths? Combinations of success
15 paths?

16 MR. HARRIS: The 4kV would be the fault
17 tree.

18 MR. SULLINS: It was dominated by the
19 design development factor which was applied at common
20 point.

21 MR. CIRCLE: Right, thanks.

22 MR. HARRIS: Now, real quickly I would
23 like just to present, you know, we looked at -- Jason
24 developed an event tree model and quantified the ANO
25 model using the same results that we've talked about in

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1 calculator, which has a large number of methods in it.
2 I don't think we have enough information right now to
3 put our hands around it and say that we agree with their
4 decision that it was the best tool. I think we do agree
5 that there isn't a definitive method for doing this kind
6 of work.

7 MR. MITMAN: And if I can add to that.
8 This is Jeff Mitman. It does add some insights in that
9 it's only method that I've ever seen that talks about
10 non-proceduralized actions and untrained actions and
11 speaks directly to equipment -- trying to calculate
12 equipment recovery probabilities using a human
13 reliability method.

14 So it adds some insights that we didn't
15 have otherwise. But it's not a widely used, widely
16 adapted, widely geared to methodology. But there's a
17 lot of interesting insights from it.

18 MR. KENNEDY: Then just another
19 follow-up. Making an assumption about what our HRA
20 calculator limitations are, but just to confirm, I
21 assume our limitations are associated with what you just
22 described, Jeff, lack of procedures, lack of training,
23 et cetera or --

24 MR. MITMAN: It goes a little bit beyond
25 that. The guidance that we have on how to deal with

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1 this discussion today for recovery factors.

2 Modifying that model, we calculated the
3 value of 4.8E-06, which is relatively close to the value
4 that we projected that the NRC model would provide. So
5 in conclusion, I think we can all agree that
6 overwhelming evidence that the fault of the failure for
7 4160-volt KV is not 1.0. And ANO has researched and
8 instituted what we believe to be a reasonable method for
9 assessing risk of recovery factors.

10 And the bottom is just simply restating
11 what I stated a few minutes ago, that we believe the
12 value to be in the E-6 range associated with risk for
13 the stator drop event in Unit 1.

14 MR. DAPAS: You came up with 4.8E-06 as
15 the overall CDF, right?

16 MR. HARRIS: Not CDF, CCDP. That is
17 correct.

18 And that concludes our presentation.

19 MR. KENNEDY: I know we asked a lot of
20 questions about the SHARP 1 methodology and your
21 evaluation and the process, but I want to hear from both
22 sides. Is the use of that a revolutionary method in our
23 opinion or we just don't know enough about it?

24 MR. LOVELESS: I think SHARP is kind of
25 somewhat outdated method. It wasn't put into the HRA

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1 this is expressly laid out in RIS 2008-15, which is
2 specifically written to how to credit in pure A for SDP
3 and applications. What we call B5B measures, which is
4 what we're discussing here. It's un-proceduralized use
5 of non-permanently installed equipment.

6 And the guidance in there says that if
7 you don't train and you don't have procedures and you
8 don't have the methodology in the base model, you get no
9 credit. All right? That's what the risk says, and
10 that's what collectively the circ panel had to contend
11 with during our evaluation process. And that's what
12 we'll have to contend with as we go back to make a
13 decision.

14 MR. DAPAS: I just want to comment. I
15 was going to make reference to this in my closing, but I
16 think it's appropriate to comment now. We have
17 guidance. We need to look at that and, you know, your
18 overarching point here is that the recovery probability
19 here is not failure to recover, is not 1.0. You
20 provided your view on what is the best estimate to use
21 for that.

22 I think we need to look at that in the
23 context of what existing guidance we have here and
24 determine does your approach seem reasonable here. I
25 understand where you used SHARP. I understand where

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1 you've used the HRA calculator. We need to look at that
2 and determine independently here, do we feel that you
3 applied that appropriately and are your conclusions
4 reasonable here.

5 Probably -- a reason why our guidance
6 says, you know, you should use X, Y, and Z here, right,
7 because it's probably a function of our experience over
8 time and the challenges you face in trying to come up
9 with reasonable risk estimates. So, I think you've done
10 a very good job in my view of explaining how you applied
11 the methodology, how you arrived at the risk numbers
12 that is you did.

13 It's offer, unless we have any other
14 questions about how they applied it, I actually see we
15 have "break" on the slide here, which leads me to the
16 next point here. Do you want to take about a 10-minute
17 break? How would you like to proceed here? We've been
18 at it for awhile.

19 MR. KOWALESKI: Before we go there, I
20 would like to add one more point of view to whether a
21 order of magnitude risk from normal risk is reasonable
22 for the post-event conditions that existed. And that
23 point of view would be to go look at what's the required
24 power supplies, given a normal outage.

25 So in a normal outage with reactor vessel

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1 head off and 23 feet of water above the vessel. The
2 shutdown outage protection plan would require one
3 offsite power supply and two other power supplies or two
4 emergency diesel generators, three power supplies.

5 It would require only one decay heat
6 train and that's because that large inventory of water
7 is essentially credited because if you have a decay heat
8 train fail, there's substantial time to recovery that
9 opposite decay train service. So that the difference
10 between the equipment available after this event in a
11 normal shutdown outage protection plan is the one
12 offsite power supply.

13 If you look at tech spec requirements for
14 reactor vessel head off, it's flooded up, 23 feet above
15 the fuel, the requirements are two power supplies. It
16 requires on offsite and one generator. It requires only
17 one decay heat train.

18 So the difference between what we had and
19 what's required by tech specs for that plant condition,
20 flooded up with the vessel head off, is that one of our
21 power supplies was a diesel generator instead of an
22 offsite power supply. That's the only difference.

23 And when you look at the reliability of a
24 diesel versus the reliability of the offsite power, or
25 the frequency of the loss of offsite power, they are not

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1 substantially different. So when you do kind of a
2 comparative to the plant condition after the event to
3 normal outage required conditions, and tech spec
4 required conditions, it seems very reasonable that a one
5 order magnitude of risk is represented. Because all
6 you've done that's different from tech spec requirements
7 is replace an offsite power supply with an emergency
8 one.

9 Just an alternative way of looking at it
10 in terms of is this realistic, believable, reasonable
11 that this would be the outcome of a significant success.

12 Do we need a break?

13 MR. BROWNING: Mr. Dapas, it's up to you.
14 If you would like a break we can take a break. When you
15 come back we will look into the Unit 2 risk assessment
16 and insights and additional information we would like to
17 provide. And conclude with our corrective actions
18 around the event.

19 MR. DAPAS: All right. Let's take a
20 five-minute break here. And I will try to set the
21 example by being disciplined in that regard. If we
22 could come back in five minutes that would be great.

23 (Break taken from 4:44 p.m. to 4:52 p.m.)

24 MR. BROWNING: Okay. This is Jeremy
25 Browning again. Just kind of refocus us a little bit.

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1 We're switching units. We're going to start talking
2 about Unit 2. Unit 2 is a quite a bit different in that
3 what we're going to be talking about from success paths,
4 we're not talking about design development-type things.
5 Everything that we're going to talk about asking for or
6 pursuing credit is already modeled in our PRA. There's
7 no difference on Unit 2 than Unit 1, the operators did
8 respond in an appropriate manner and all our
9 safety-related equipment in actuality did perform its
10 intended function.

11 Some of our priorities, what we decided
12 to do and what we decided to pursue on Unit 2 is based
13 on actual plant configuration and not the postulated.
14 If I could I'd introduce John Hathcoat, he is our shift
15 AOM, and he was in the control room the day of the
16 event.

17 MR. HATHCOAT: Thanks. I want to try to
18 move things along, so if I move too fast, please stop
19 me. We'll go back and I'll answer questions. The
20 objectives I want to talk are procedurally directed
21 electrical power recovery strategies. Specifically
22 three different options we had: Offsite power coming
23 in, and I want to use in diagram quite a bit, offsite
24 power coming in from Startup 2 to our 2A2, which is our
25 non-vital 4160-volt switchgear, talk about that

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1 availability path. Alternate AC diesel generator to
2 4160-volt 2A9 bus, which we already talked quite a bit
3 about that, that availability path. And also the
4 ability to cross tie between red train vital 2A3 bus,
5 4160-volt bus, and green train 2A4 4160-volt bus. The
6 ability to cross tie those.

7 So those are the three main recovery
8 strategies I want to talk about. And the availability
9 of each one of those independently reduces the overall
10 risk profile for Unit 2. And then talk a little bit
11 about the differences between the NRC model and the ANO
12 model and how there's no credit provided with the NRC
13 model.

14 Just a quick overview. Unit 2 was a
15 hundred percent power when the event occurred. We had a
16 reactor trip, as you guys have alluded to, uncomplicated
17 post-trip response. The staff did a good job
18 stabilizing everything, going through diagnosing reactor
19 trip recovery.

20 We had normal fast transfer from our unit
21 aux transformer over to our Startup 3 transformer that
22 powered our red side and our green side. And there was
23 no issues with the plant. Everything was stable at that
24 point. And we were supporting Unit 1 at that time.

25 About 90 minutes later, we had a Startup

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1 3 lockout. And that was a result, the water migration
2 into the 2A1 bus from our Startup 3 to 2A113. That
3 created a Startup 3 lockout, at that point we fast
4 transferred power over to Startup 2. Startup 2
5 automatically tied onto our red side, 2A1 bus to our 2A3
6 vital bus, stable.

7 I did want to point out it did not fast
8 transfer over to the 2A2 non-vital side because of the
9 configuration of our hand switch. We hadn't pull-to-
10 lock, which basically is a configuration that will not
11 allow the breaker to automatically close.

12 I do want to point out it was available
13 the whole time if we needed it. I'll talk a little bit
14 about that. We had a hundred voltage condition on the
15 green side 2A4 bus, the No. 2 emergency diesel generator
16 automatically started as designed, tied on, we had a
17 stable condition. We had power on the green side, a
18 vital from our diesel, red side from offsite, everything
19 was stable, we were focusing on Unit 1 at that point.

20 MR. MCKENNEY: John, just a couple
21 clarifying. This is David McKenney. The fault actually
22 happened between the transformer and the breaker. So it
23 did not happen in the breaker, it was in the bus work
24 between those two.

25 MR. HATHCOAT: Thank you, David.

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1 MR. MCKENNEY: And then the reason the
2 diesel generator started on the green side was because
3 of the Startup 2 breaker being in (gets too quiet to
4 hear).

5 MR. KOWALESKI: There's a particular
6 vulnerability for how that bus comes through the floor.
7 It's different than a breaker. So a small amount of
8 water on the floor doesn't cause an issue with the
9 breakers like it does with that bus coming through.

10 MR. WILLOUGHBY: This is Leonard
11 Willoughby. I have one question. It was on slide 75.
12 You said you had an uncomplicated post-trip response.
13 Can you please define uncomplicated?

14 MR. HATHCOAT: Yes, sir. At that point
15 uncomplicated means that there was no adverse conditions
16 that we had to additionally address as far as, like,
17 feed water control, or steam bypass control system; any
18 other additional complications that would create a
19 diagnosis other than reactor trip recovery. So the
20 control room stamped diagnosis reactor trip recovery and
21 stabilized the plant at that point.

22 MR. WILLOUGHBY: My understanding is that
23 you had a problem with the feed reg valve, you had a
24 mismatch indication, wouldn't that complicate the trip
25 response? Because you had to send operators out.

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1 MR. HATHCOAT: We did, we actually
2 actuated emergency feed water during the trip, but the
3 alpha main feed reg valve failure did not constitute a
4 complication. That question's come up and we've
5 addressed it.

6 MR. BROWNING: I guess by definition, we
7 call an uncomplicated reactor (unintelligible) if we go
8 into reactor trip recovery. If we diagnose an off
9 normal procedure that would require us to go to an
10 emergency operating procedure or an abnormal operating
11 procedure, we consider it somewhat complicated. But
12 because the operators reactor trip recovery, there were
13 no significant challenges, although there was a problem
14 with the P reg valve that did not constitute, for
15 example, a loss of heat or challenge the operator's
16 recovery.

17 MR. MITMAN: Jeff Mitman. Just so I'm
18 clear. It's my understanding that Unit 2 being a CE
19 plant, post trip the normal feed water supply to the
20 steam generator to this main feed water.

21 MR. HATHCOAT: It is normal.

22 MR. MITMAN: But because of an indication
23 problem with a feed reg valve, the operators shut down
24 normal feed water, main feed water and went to -- I
25 don't know whether you call it emergency feed water or

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1 aux feed water?
2 MR. HATHCOAT: That's right. Emergency
3 feed water. We have a condition called reactor trip
4 override, and that main feed water control system goes
5 into, and if it did not go into reactor trip override,
6 which the indication was it didn't, we trip our feed
7 pump and make sure emergency feed water is actuated.
8 That did occur.
9 MR. MITMAN: And just so everybody
10 understands, the analysis that we did, we didn't do a
11 normal transient analysis, we did loss of feed water
12 analysis. We used the loss of feed water train event
13 tree rather than a transient event tree. Giving credit
14 for emergency feed water.
15 MR. HATHCOAT: Leonard, did we answer
16 your question, sir?
17 MR. WILLOUGHBY: Uh-huh.
18 MR. HATHCOAT: So talk a little bit about
19 our Startup 2 design and why we were in a (pull-to-lock?)
20 configuration to 2A2. Basically, Startup 2 is capable
21 of supplying both units as we talked about. We have
22 procedures that limit the number of the buses that can
23 be automatically transferred to 2A2, but as I mentioned,
24 the configuration we were in, we could have came out of
25 the pull lock condition and it would automatically tie

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1 on the 2A2 if needed. And it's capable of manually
2 loading 2A2 from our Startup to our transformer.
3 So we had Startup 2 transformer available
4 for green train. We had procedural guidance to manually
5 energize 2A2 if we needed it, but we were in a stable
6 condition at the time with red power being supplied from
7 off site and our green vital switchgear being powered
8 from our No. 2 diesel.
9 So we were in a stable condition, and we
10 did later transfer power to 2A2 from Startup 2
11 successfully with no issues.
12 So Unit 2 was in a stable condition with
13 power to all our safety equipment. Redundant systems
14 were available for decay heat removal, and the alternate
15 AC diesel generator was not damaged from the Unit 2 side
16 as we talked about earlier, and it was available.
17 And we initially declared the alternate
18 AC diesel generator in 2A9 unavailable, and that was
19 based on the function of 2A9 and alternate AC diesel
20 generator having to supply Unit 1 and Unit 2, both. So
21 we did not fully assess the damage to 2A9. We believe
22 it was just from the feeds going to A1 and A3 on the
23 Unit 1 side. We later confirmed that.
24 I mean, the big thing is we didn't need
25 it to support Unit 2. We had, as I mentioned, both

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1 diesels available to us and offsite power. We had at
2 this point, basically four or five power supplies
3 available to us.
4 MR. LOVELESS: This is David Loveless. I
5 know we talked a little bit about it when we were in --
6 talking about Unit 1, but I do believe the AIT interviews
7 indicated that operators in Unit 2 did not believe
8 alternate AC diesel was available to them for some
9 period of time.
10 MR. HATHCOAT: To answer your question,
11 I've talked to the control room supervisor, the shift
12 technical advisor, the shift manager, and multiple SROs
13 that were there, and I was there that day, too. We
14 didn't really have a good understanding of any damage of
15 2A9 until that afternoon. So it was, we fully believed
16 it was available to us to that point. Then we got the
17 indication that, hey, there's damage or the cable pull
18 from going to Unit 1 is pulled out.
19 Now at that point, the question is kind
20 of subjective. It's like, okay, well, do you follow
21 your procedure if you need it in a blackout condition or
22 do you go down and assess it before you actually use it?
23 Half of the SROs I asked would basically say we would
24 follow through. I know it was just the damage to the
25 Unit 1 side, there was no issue with the breakers on

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1 Unit 2. We would have used it, the shift manager
2 basically indicated that, yeah, I know there's
3 something, I think it's isolated to Unit 1 feeds. I
4 would have relay techs go down there and look in the
5 back just to make sure it is isolated. So there is some
6 subjectivity to that, but every one of the SROs that I
7 talked to believed it was available.
8 MR. LOVELESS: Do we have capability -- I
9 know that on the bridge the AIT team lead, but I also
10 know he can't ask a question.
11 SPEAKER FROM PHONE: Actually, David,
12 this is Geoff Miller, I led the augmented inspection
13 team. There was a log entry in the Unit 2 control room
14 logs at 1:30 p.m. that indicated that the 2alpha9 bus
15 was degraded and the alternate AC diesel generator was
16 unavailable for either unit.
17 MR. HATHCOAT: Right.
18 MR. KENNEDY: I was wondering where they
19 were going because your bullet says initially declared
20 unavailable. So I think that...
21 MR. HATHCOAT: Yeah, that is not -- that
22 is a poor choice of words right there. Initially it was
23 declared unavailable at 13:30 when we got the feed back
24 from the field at that point.
25 MR. KENNEDY: But up until that time,

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1 operators -- that's what we're talking about. Between
2 the time of the event 1300, the question is whether
3 operators thought it was available or unavailable?
4 SPEAKER FROM PHONE: This is Geoff Miller
5 again. I'd also like to just bring out that in that
6 period of time there also there had been an emergency
7 declaration on Unit 2 and there was a loss of let down,
8 a loss of charging, trip of all reactor coolant pumps,
9 so by this point I wouldn't consider to have been
10 uncomplicated.
11 MR. HATHCOAT: Well, now that was later.
12 This was the Startup 3 lockout which was 90 minutes
13 later when all those conditions we were dealing with in
14 the control room. The post trip response was
15 uncomplicated. Just to clarify that.
16 SPEAKER FROM PHONE: That is true, but
17 power for Unit 2 really didn't become an issue until
18 that point.
19 MR. HATHCOAT: That's right.
20 MR. DAPAS: I think it's fair to say you
21 had some challenges here in dealing with the event and
22 recovery associated with Unit 2. I understand the
23 post-trip recovery was uncomplicated per your definition
24 of what constitutes complicated versus uncomplicated,
25 but I think the salient point here is, you had some

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1 challenges here that you had to address subsequent to
2 the initial event here as a result of the impact on the
3 bus work here, right?
4 MR. HATHCOAT: That's correct. Let's
5 talk a little bit about priorities being dictated by our
6 circumstances. If additional power challenges were to
7 occur after the Startup 3 lockout, we would assess the
8 condition that we had, whether it be a loss of offsite
9 power of Startup 2, transformer were to go away we would
10 have lost both of our diesels and we would have had a
11 station blackout condition, or if we would have had a
12 feed source with our steam driven EFW pump, we would
13 have diagnosed appropriate EOP, and we would have
14 pursued recovery power based on that scenario where we
15 re-diagnosed.
16 The priority would be feeding from
17 Startup 2 if it would be available. In the loss of all
18 site power condition, obviously wouldn't be, but in this
19 case, if it was available and we lost power to our vital
20 buses, we would pursue bringing power in from Startup 2
21 if it was available.
22 We had procedural direction to do that.
23 Operators are trained on it in the simulator and the
24 classroom. And really the only action that we would
25 have to take in the control room would be taking the

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1 hand switch for 2A211 how to pull a line, it would
2 automatically tie on. So procedural guidance, operators
3 would have that available to them to do that.
4 The second path in a blackout condition
5 would be the alternate AC diesel generator, and again,
6 we're talking about the availability of it. The fact of
7 the matter is, it's physically available to us. We
8 confirmed that later. The question is, how would the
9 operating crew go about getting to that point to
10 starting it up and loading it. And that's kind of up to
11 debate a little bit right now as to whether we go down
12 and inspect it or we would just execute the procedure as
13 it's written and tie it on.
14 And then the cross tie capability of 2A3
15 and 2A4 is another point that we would use, depending on
16 where power was coming in, we had the diesel available
17 on this side, our offsite power available on this side,
18 we could cross tie over and get our electric driven
19 steam pump to our steam generators which is supplied
20 from the red side.
21 So that gives us that capability. Same
22 thing here, if we had power coming in we could cross tie
23 2A1 and 2A2 you get [coughing] steam pump, which is
24 non-vital but is fully capable of supplying our steam
25 generator. Do depending on the combination and safety

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1 function that we needed at the time, we could cross tie
2 our buses.
3 As I mentioned, the feed from Startup 2,
4 we proceduralized -- I won't talk about that a whole lot
5 more, I think everybody has a picture on it. Certainly
6 available to us. I don't want to say simple action, but
7 it's one hand switch in the control room --
8 MR. CIRCLE: This is Jeff Circle. Does
9 Startup 2 have enough capacity for both trains?
10 MR. HATHCOAT: It does. And then the
11 alternate AC diesel generator, you know, the feeds to
12 Unit 2 were unaffected. Visible damage, we talked about
13 being on the Unit 1 side only. It's fully capable of
14 supplying our loads. And this was later confirmed by
15 engineering and electrical maintenance that there was no
16 issue on the Unit 2 feeds from 2A9.
17 And the big thing I want to point out is
18 2A9 at this point was not given a high priority because
19 of the stability of the plan on Unit 2. We had offsite
20 power in, we had a diesel that was running, another
21 operable diesel. So our focus, really was on Unit 1 and
22 supporting them at this time.
23 And I mentioned, emergency, you know, EOP
24 for station blackout condition, we would have used the
25 alternate AC diesel generator to start it and tie it on.

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1 Just to give everybody perspective, it takes about --
2 once the time the blackout would occur it takes us about
3 15 minutes to re-diagnose the blackout and give the
4 direction to the director operator to actually start it
5 and tie it on.

6 So it's about a 15 minute evolution once
7 we actually have the condition. And that's adequate
8 time available to establish a feed source to our steam
9 generators. And that's considering, you know, we have
10 in this scenario, in a blackout, we have our steam
11 driven EFW pump feeding both steam generators.

12 A blackout gives it, at six-hour point,
13 due to battery depletion, we actually say, okay, let's
14 go ahead and send a local operator down, take manual
15 control of the 2P7 alpha turbine due to DC control
16 circuitry and the DC valves and then transition over to
17 that.

18 Before go to that point, 6 hours into the
19 procedure, we would have had adequate time for the
20 control room staff to call relay techs, send them down
21 to 2A9, look in the back of it and say, yep, it is just
22 isolated to Unit 1, and you guys can move forward with
23 tying it on to one of our safety buses.

24 That's why I wanted to point that out.
25 Even though there is some question about some SROs would

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1 side from 2A9 to A3 and A1, right? What I think I heard
2 you say is, operators -- you would have dispatched relay
3 technicians to do a Megger test and that would have been
4 the extent of the condition for you to determine if 2A9
5 was in fact available and could be energized from the
6 alternate AC diesel and then power the Unit 2 safely.

7 MR. HATHCOAT: That's correct. We did
8 that several days after when conditions were stable and
9 it tuned out the Meggers test were good and the breakers
10 were good.

11 MR. DAPAS: Okay. What I'm hearing from
12 John is that you were confident that that bus was
13 available and those are the actions you would have
14 expected and the operators considered that as an
15 available...

16 MR. HATHCOAT: Absolutely, sir. And I
17 was in the control room at the time and I followed up
18 and asked each one of them.

19 MR. MITMAN: This is Jeff Mitman. 2A9 is
20 immediately next to 2A1 if I remember correctly. All
21 right. In 2A1, there was water on the floor on 2A1. So
22 is it safe to assume there was water on the floor in
23 front of 2A9, all right? And the question I'm getting
24 at is, I would think that the staff would be cautious
25 about performing a lot of testing on 4160-volt bus work

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1 move forward with it, some of them would, maybe, suggest
2 going out and getting the relay techs.

3 MR. CIRCLE: This is Jeff Circle. Are
4 you saying that this -- all these activities could be
5 completed in 15 minutes? Send technicians down?

6 MR. HATHCOAT: No, sir. I'm saying
7 normal procedural guidances is to diagnose the blackout
8 and then give the direction to tie it on procedurally in
9 the control room.

10 MR. CIRCLE: Right.

11 MR. HATHCOAT: But if we'd have had a
12 condition where, say the shift manager -- hey, I want to
13 call relay, send them down there, look in the back of
14 2A9 and make sure that there's no issue with it, we
15 would have done that in, say, an hour or less.

16 MR. MCKENNEY: Yeah, I talked to the
17 relay techs and asked them specifically how long would
18 it take in a blackout condition. They said it would
19 take about an hour and about an hour to get it
20 reenergized. To go to Megger the bus to verify that it
21 was not damaged configuration and the breakers were off.

22 MR. DAPAS: And so just so I understand.
23 There's been a lot of discussion about what the
24 operators understood is the condition of 2A9 here, and I
25 understand it had damage associated with what the load

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1 with water on the floor, and that they're going to be
2 hesitant to do that work.

3 MR. MCKENNEY: The water on the floor was
4 very small and had ran in the back of the one cubicle.
5 So this is next to it. There was some water on the
6 floor in the front and a little bit in the back. All
7 the feeder cables from the alternate AC diesel generator
8 come in the bottom, but it's cables. It's not bus work
9 like this other so, and all the other feeders that go
10 out of it come out the top.

11 MR. MITMAN: I understand the actual
12 situation, but we're talking about working around
13 energized switchgear at 4,000 volts with water also in
14 the vicinity. We've got a busted fire main that's
15 distributing water places were it's never intended to be
16 water, okay? And I think it's going to slow things down
17 at a minimum.

18 MR. MCKENNEY: Well, in this particular
19 case we'd be in a blackout and be de-energized, right?

20 MR. HATHCOAT: Yes. And if I may, I'll
21 try to give a better picture. It wasn't water all over
22 the floor. There was a couple of puddles behind 2A1.
23 The busted fire main was outside the wall in the train
24 bay. It really wasn't in front of the 2A9 switchgear.

25 MR. MITMAN: I understand, but there was

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1 enough water and enough problems with 2A1 to keep people
2 away from that bus for hours because they weren't sure
3 what was going on, and there was a reluctance to go in
4 front of the bus and check out cubicles, and which one's
5 damaged and what's the extent of damage? So there's
6 damage on the bus, there's water in the vicinity, we
7 know that water caused the damage on the bus.

8 I just think there's going to be the
9 reluctance and the caution, which I think is appropriate
10 around this kind of equipment would extend to, at least
11 slow down the normal response that you wouldn't have
12 under more normal circumstances.

13 MR. BROWNING: And those cautions, again,
14 in my mind I'm trying to see what actually happened. We
15 were protecting that area because we did have energized
16 equipment. In station blackout when the operators get
17 to that step that says go bought the alternate AC
18 generator in, it is de-energized.

19 Now before we -- whatever we would have
20 done or how we would have approached that would have
21 been a different mindset. When we're in a blackout,
22 it's de-energized and how we approach it would be a
23 different approach than the way we actually approached
24 it the day of the event when we had power on those
25 buses.

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1 MR. MITMAN: But blackout, as I
2 understand it, is defined as de-energizing the vital
3 buses 2A3 and 2A4. So you could be there with power on
4 2A1 and 2A2 and no power on 2A3 and 2A4. Again, all I'm
5 suggesting is that there's going to be a little bit
6 extra caution taken when addressing the issue and trying
7 to reenergize the vital buses from the AC diesel
8 generator.

9 MR. KOWALESKI: We agree, and the
10 probability of failure has been adjusted for that.

11 MR. DAPAS: That's where I was going to
12 go. I think it might be Jeff's done a very good job
13 articulating the challenges the operators faced here,
14 and what reluctance may exist. If you think, John, you
15 accurately, if you characterize from your perspective
16 how you would approach that. If Jeremy, right, the
17 mindset that exists when you're in a station blackout
18 here.

19 I think we need to understand how you
20 accounted for that. We'll need to in our internal
21 discussions reach a view on how we should appropriately
22 account for that. But I'd be interested in
23 understanding how you factored that. When it gets to
24 the uncertainty aspect, you know, we're trying to bound
25 liability analysis and how you accounted for that in

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1 your...

2 MR. BROWNING: That's absolutely fair.

3 MR. HATHCOAT: I'll move us along here.

4 We've already talked about the building the cross tie,
5 2A3 and 2A4 are vital. 4160-volt buses, we have
6 standard attachments and proceduralized and operators
7 would have certainly used it if need be on the day of
8 the event.

9 So in conclusion, on the Unit 2 side,
10 we've talked about the pretty specific paths that we
11 don't have credit for in the NRC model, and the
12 differences between the NRC model and the ANO model.
13 The Startup 2 availability, alternate AC diesel
14 generator, and ability to cross tie or vital buses.

15 So in the end, we ended up with four out
16 of five possible power sources were available to the
17 Unit 2 control room that day of the event. We had the
18 resources, the specific training, and the specific
19 procedures to utilize all those power sources if needed,
20 and the confidence to know that we would have been
21 there.

22 MR. CLARK: Let me ask a question before
23 you go on. This is Jeff Clark. So you lost reactor
24 cooling pumps. Did you go into the cool down?

25 MR. HATHCOAT: We did.

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1 MR. CLARK: So that was a natural-circ
2 cool down?

3 UNIDENTIFIED SPEAKER: That is correct.

4 MR. CLARK: Is that considered normal for
5 Unit 2?

6 MR. HATHCOAT: Absolutely not. That is
7 not normal.

8 MR. KOWALESKI: That is not normal
9 operating procedure.

10 MR. HATHCOAT: That occurred, not in that
11 post-trip, that occurred after the Startup 2 lockout
12 which caused us to lose our 6900-volt buses.

13 MR. KOWALESKI: The immediate trip was
14 uncomplicated. 90 minutes later when we lost our
15 [unclear] that's when these additional complications
16 occurred.

17 MR. BROWNING: Operators re-diagnosed and
18 diagnosed the conditions, this is not normal procedure,
19 so they would, again, if we lost the diesel, they would
20 have re-diagnosed and put us in an appropriate EOP where
21 it's functional or blacked out or whatever.

22 MR. CLARK: Okay. Thank you.

23 MR. HARRIS: Let's move on to
24 significance determination. It's getting late in the
25 day, I'm going to move through this pretty quickly. And

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1 I just want to hit on the very critical points. We
2 looked the at the dominant cut sets that were provided
3 in the NRC assessment for the loss of feed water model,
4 and we looked at what was contributing to that on a
5 sequences we noted that we needed power, okay?

6 Given that and the discussion that John
7 just provided with you, we looked at 2A2, alternate AC,
8 and the cross tie between 2A3 and 2A4. As John
9 indicated, 2A2 was available. It's a simple matter of
10 pull the lock, procedures in place by operations. Our
11 current model for ANO 2 has a failure to recover that
12 8.0E-4 because it is in the control room, it's a simple
13 action, not much time taken to do that.

14 I guess the recovery that's most
15 challenging would be alternate AC and taking credit for
16 that. Model -- we do have a recovery action in the
17 model for the alternate AC. However, because of the
18 issues associated with alternate AC, we felt like we
19 needed to make some adjustments in model to account for
20 these.

21 And what we did was pretty simply we took
22 out availability on the alternate AC and we applied a
23 0.1 factor for unavailability to increase that to .17
24 from the nominal value to account for the fact that the
25 alternate AC did have some issues, it wasn't straight

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1 forward, it wouldn't, you know -- the operator may have
2 had to take additional time to insure that that
3 particular success path was available.

4 And the final one, again, is the 2A3/2A4
5 cross tie capability. Again, it is in our model and we
6 have a value of 2.0E-4 associated with that value.

7 So when we look at the Unit 2 model
8 because we don't have the NRC model again in this case,
9 we calculated a risk of 1.8E-6 conditional core damage
10 probability for Unit 2.

11 MR. LOVELESS: I guess this is what I
12 really don't understand. You say you used values that
13 were in your current model. You say you adjusted the
14 probability of failure of the alternate AC diesel up a
15 little bit, and yet in October-September timeframe you
16 provided an analysis that shows CCDP of 3.0E-5,
17 presumably from your current model. What's different?

18 MR. HARRIS: And I can't answer that
19 question. I'll let Jason respond to that.

20 MR. HALL: Originally, with the -- we had
21 the two 2A9 unavailable in that analysis. It drove the
22 risk up to 3.0E-5 for the CCDP. And we also credited an
23 operator action for the breakers when they were -- in
24 Startup 2 is being -- could fail, these breakers would
25 cause the Startup 2 transfer to fail. So we credited

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1 that operator action.

2 MR. LOVELESS: So you added a new
3 operator action into your model that wasn't there
4 before?

5 MR. HATHCOAT: Correct.

6 MR. LOVELESS: And what is that specific
7 action?

8 MR. HALL: If one of those breakers when
9 you load shed from Startup 2, If they don't --if the
10 breakers fail, an operator will go down and pull, and
11 manually operate the breaker. And there's several
12 breakers. That's included in my analysis for the...

13 MR. LOVELESS: Okay.

14 MR. HARRIS: So performing a -- using an
15 insert program, simply using insert, performed a
16 sensitivity analysis surrounding a point estimate we
17 calculated for the Unit 2 results. We determined that
18 3.9E-07 is the probability for the lower bound and
19 5.3E-06 for the upper bound.

20 MR. LOVELESS: What was it that you
21 adjusted for that sensitivity analysis?

22 MR. HARRIS: That we adjusted -- we ran
23 insert using the point estimate for the additional core
24 damage probability.

25 MR. LOVELESS: So it's like a Monte Carlo

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1 simulation?

2 MR. HARRIS: That's right.

3 MR. CIRCLE: So you didn't change any
4 values, you just ran the insert program?

5 MR. HARRIS: That's all we did. That
6 concludes my presentation.

7 MR. KENNEDY: We're getting ready to
8 transition from risk to some other discussions. I just
9 want to make sure -- we'll have another opportunity, but
10 before we leave the risk, make sure that the senior
11 reactor analyst and these folks don't have any questions
12 before we move on to what is really the non-risk
13 discussion. We'll have another opportunity, you time to
14 think about it. Okay. Not right now?

15 MR. DAPAS: Just check maybe if we could
16 with the risk analyst who joined us on the bridge. I
17 thought I heard a couple.

18 MR. KENNEDY: Sunil, Antonio, do you have
19 any comments for us.

20 SPEAKER ON PHONE: Sunil has -- he left
21 for the day. I don't think that the questions -- I
22 think I'm having questions asking for information from
23 the licensee to give us an understanding of the basis of
24 the calculations. I think those questions have been
25 asked and we will wait for this information and review

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1 it.
2 MR. DAPAS: Thanks See-Meng.
3 MR. JAMES: Okay. I'm going to cover
4 very briefly with you the site actions that we took
5 associated with corrections or improvements to our
6 material handling procedure that dealt directly with the
7 lifting of the stator. And I'll be very brief on that.
8 I think we've covered that in quite a bit of detail
9 already. And also describe in more detail actions that
10 we've taken associated with our project management
11 procedure from the root cause that we saw, enhancements
12 that have been made there to further enhance the
13 oversight of those activities.
14 And then finally describe the common
15 cause initiative that we have underway that will provide
16 us with some additional insights as well as any
17 additional corrective actions that we could take. That
18 will include a review of the standard op.
19 Just briefly, out of the stator drop root
20 cause, looking at the activities surrounding the review
21 that was performed associated with the temporary lift
22 assembly. What we saw is there were weaknesses in our
23 procedure -- our material handling procedure Unit A 119.
24 Clearly that procedure could be improved by us providing
25 additional specification for the review and approval of

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1 design documentation associated with those temporary
2 lift assemblies.
3 We actually took those lessons learned
4 and applied them in the lift of the refurbished stator
5 that went back into the unit once the construction
6 activity were completed. Included in there were
7 detailed engineering calculation package that documented
8 all that material, which included both the computer
9 modeling of the assembly that was used in that
10 particular application as well as hand calculations,
11 detailed documentation of load testing that was
12 performed.
13 This particular instance we actually load
14 tested the complete assembly at vendor's facility as it
15 would be constructed in the ANO turbine building at
16 greater than 125 percent of anticipated load. That
17 assembly was then disassembled and shipped to the site
18 where we examined all the critical welds associated with
19 it and then reassembled it in the turbine building with
20 an examination performed by Entergy Engineering at that
21 point in time also.
22 And then finally, a third-party
23 independent review was performed by an expert that is
24 familiar with all these codes that are applicable to the
25 design of this particular application.

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1 Basically what we did is include those
2 same requirements now in our procedural requirements and
3 the material handling procedure. Those are all
4 specified in that procedure for these detailed type
5 evaluations will be documented for all future
6 applications of similar nature.
7 We also revised our fleet procedures
8 associated with project management. What we saw there
9 is that there was enhancements that could be made,
10 particularly with respect to the guidance for contract
11 language. What we weren't getting is the details
12 that we needed to perform a thorough evaluation. So
13 went into that procedure and verified -- went into that
14 procedure and made modifications to ensure that those
15 type of documentation associated with code compliance,
16 vendor detailed design, calculations were provided, not
17 just for this type of application, but from any
18 applications where that would be necessary for us to
19 perform an independent review.
20 We also looked at that procedure with
21 respect to its guidance on the makeup of the project
22 management team. When you looked at the particular team
23 makeup for the stator project, what we found is it
24 lacked the expertise necessary to evaluate this type of
25 special application.

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1 We had individuals on that team with
2 expertise in load handling, large load handling, and
3 expertise with respect to civil engineering, but they
4 didn't have this particular expertise associated with
5 this application.
6 So what we went and did is went back into
7 that procedure and revised it to specifically look for
8 -- specifically require when we put together one of
9 these project management teams that we go look at these
10 particular applications where high consequence
11 evolutions are occurring as a result of the project and
12 ensuring that the team makeup either has that expertise
13 within the staff or that it requires that expertise
14 through a third party or some other application.
15 MR. DAPAS: Dale, this is Marc Dapas.
16 I've got a question along those lines where I see that
17 you're looking at verification of a third party,
18 independent review of vendor calculations and I assume
19 that specific to the material handling program --
20 MR. JAMES: That is correct.
21 MR. DAPAS: The question I have, more
22 broadly, do you look at -- do you have the expertise
23 inhouse to independently assess the quality of the
24 deliverable products that you're getting from the
25 vendors there because there's other applications where

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1 you use contractors, use vendors, so did you leverage
2 the learnings from this to look at other processes for
3 which we use contractors to ensure that it's not some
4 issue there that hasn't been identified as a result of
5 appropriate oversight?

6 MR. KOWALESKI: Maybe I could address
7 that. This is Joe Kowaleski. You could put the
8 engineering work by vendors into two broad categories.
9 One would be engineering work which would effect the
10 design of the plant and plant equipment. And we have a
11 robust procedure that looks at the risks and
12 consequences associated with those activities.

13 And then it applies a structured set of
14 mitigating actions which include for high consequence
15 items, independent third-party reviews. Sometimes we
16 have that expertise, but more often we'll hire an
17 independent third party to come in and do that type of
18 work.

19 Where this improves our oversight is for
20 vendor, or more particularly, usually, project specialty
21 vendors that have to do design engineering or
22 engineering calculations in support of project work,
23 such as a special lifter. Now, and there's other
24 examples of that, like a generator bundle.

25 So this, where we needed to improve this

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1 instance, identified the failure of the temporary lift
2 assembly rack, the drop of the stator as a high
3 consequence, low probability event. And we actually
4 based upon that put into place a risk mitigation plan to
5 address that.

6 Part of that risk mitigation plan
7 included a requirement to do a load test on that
8 assembly. Now the root cause describes how, why that
9 didn't occur, but what we is at that level of decision
10 making we could add another barrier by requiring that
11 those risk mitigation plans be specifically the
12 responsibility of a management level individual within
13 our organization that will be accountable to ensure that
14 the plan is carried out appropriately and fully
15 documented and evaluated to assure the adequacy of those
16 plans. We put that in place also since the root cause
17 was completed.

18 As far as communicating the lessons
19 learned out, we've had extensive input with INPO. They
20 have provided them the lessons learned so they could
21 communicate that information out to the industry. In
22 fact, Jeremy just recently participated in a web cast to
23 the industry where we discussed the event and the
24 lessons learned, I believe there was over 150 industry
25 participant.

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1 was relative to engineering done in support of project
2 activities. And so that's what this is looking at.
3 We've taken some actions with that, which is
4 identification to make sure we've got the expertise. We
5 have an ongoing evaluation to look at applying that
6 engineering procedure to project task engineering as
7 well as design engineering. And that is not is complete
8 yet for the fleet, but we are in the process of doing
9 that.

10 MR. DAPAS: Okay. Thank you.

11 MR. JAMES: We also, as part of our
12 corrective actions took an action to reinforce the
13 standards in our -- associated with vendor oversights
14 that are already specified in our EN-DC-114 procedure,
15 our project management procedure.

16 Followed by that we developed what we
17 call a what it looks like sheet or "WILL" sheet, which
18 is a tool that we use to, basically have the project
19 manager assess those particular aspects out of our
20 project manager procedure that deals with the vendor
21 oversight on the projects that they are involved with.
22 Those documents have been reviewed by the senior project
23 management on site.

24 One of the things that we saw from the
25 root cause is that we actually, in this particular

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1 MR. BROWNING: Actually, it was closer to
2 200. And the significance of that is IER is coming out
3 on this event. It was very focused on cause and
4 corrective actions and because this event occurred in
5 Arkansas, you can say I'm the primary sponsor of that
6 IER and I'm going to be imposing through INPO actions
7 for the industry to take.

8 So if I felt it was very important for my
9 peers to understand the significance of the consequence,
10 the importance of the cause, and the understanding of
11 the cause, and then this IER results in industry-wide
12 actions, that they understand the basis for those
13 actions.

14 So they heard that from me personally
15 through this web cast and there were over 200 hundred
16 participants in the nuclear industry that were on that
17 web cast.

18 MR. DAPAS: Is that IER capture a
19 contract on oversight? You talked about aspects of
20 that.

21 MR. BROWNING: It captures everything
22 that we are discussing with you today.

23 MR. KOWALESKI: There was a second
24 industry operating experience document that comes out --
25 that is coming out, I think it came out yesterday --

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1 that more broadly addresses contract oversight in
2 general. So this is specific to this event, but there
3 is one that talks about broad enterprise risk, large
4 consequence to nuclear safety in plant equipment, it
5 addresses other industry that --

6 SPEAKER: Specifically to the senior
7 level oversight of contract work scope.

8 MR. JAMES: I'm on slide 97 now. This
9 last month we also initiated an effort to perform a
10 common cause review of conditions that have occurred in
11 this plant over the last 15 months. That included a
12 standard drop event in that, there were seven total
13 conditions that we had them look.

14 This is being performed by a team of
15 outside analysts with expertise in performing this type
16 of analysis, also with fleet and ANO resources. In
17 addition to looking at those seven specific events,
18 we're also looking back over the last two years at all
19 of our more significant alpha and bravo condition
20 reports to see what additional insights that may give us
21 using trend coding as well as keyword searches of those
22 documents.

23 We are also looking at the part of the
24 last two years worth of external assessments that have
25 been performed on site both from outside agency and then

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1 internal assessment reports.

2 We also were part of that review
3 utilizing interviews of personnel on that evaluation.

4 MR. DAPAS: You say you were looking for
5 common causes you focused on keyword searches like
6 oversight as example. Can you give a little more
7 context to this common cause factor and how you
8 approached it?

9 MR. JAMES: Well, particularly when they
10 were using keywords or using trend codes, they were
11 looking for any particular trend code or keyword that
12 was -- occurred more readily than others for looking for
13 a common causal type evaluation. But also with respect
14 to the identified issues out of the seven specific
15 events that they were looking for, looking for those
16 also in any of those other condition reports using the
17 keywords and causal code evaluations.

18 MR. DAPAS: Were these events that
19 involved mechanical failures, human error, a combination
20 of? Just curious how you targeted those seven.

21 MR. JAMES: Yeah. They were, I'll give
22 you some examples. They were the overspeed trip of the
23 ultimate AC diesel generator, the bravo decay heat pump
24 breaker failure, the stator drop itself, the flooding
25 barrier leakage issues, and other similar events like

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1 that.

2 And also we had them specifically looking
3 for this as part of this evaluation with respect to
4 oversight, and did oversight play a role in any of those
5 events? So we're anticipating getting some good
6 information from that evaluation with respect to
7 oversight specifically also.

8 That effort should be wrapping up this
9 month and we'll be sharing those results.

10 MR. DAPAS: I do have a related question
11 and perhaps the team can answer quickly. You mentioned
12 the alternate AC diesel and the speed trip and I know
13 that we put it was a vendor recommendation preventative
14 maintenance associated with a capacitor, am I recalling
15 that correctly?

16 MR. JAMES: Yes, sir.

17 MR. DAPAS: The question I have is, you
18 know, we were conducting a risk assessment, going
19 through that process, but I do have a question, it may
20 be for internal discussion here. To what degree was
21 that diesel available given that latent condition that
22 existed and does it have any impact -- we heard
23 extensive discussion about alternate AC diesel and 2A9,
24 et cetera, but I do have a question regarding any
25 overlap such that the reliability of that diesel given

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1 that latent condition existed because it didn't manifest
2 itself on the actual overspeed trip, right?

3 MR. JAMES: Yes, sir.

4 MR. DAPAS: And I, quite frankly, don't
5 recall the timeframes, but I think that's something we
6 need to look at if we haven't already.

7 MR. KENNEDY: When did the overspeed trip
8 occur? Before the event or after? So it was before
9 March 31st?

10 MR. BROWNING: And corrective actions.

11 MR. DAPAS: And, well, any other -- I
12 know we've had some discussions about, you know, we look
13 at this event probability of failure of one, but then we
14 also looked at trying to model this if it occurred at
15 any outage at all. So that's why I wanted to make sure
16 I was able to connect the dots there. I think I've
17 nuked this out, thanks.

18 MR. MITMAN: Just one quick addition to
19 that. The rules of the road for RP is you don't
20 normally add more than one form of sufficiency. There
21 all evaluated independently. So we have to look at how
22 that applies here, and whether we would be appropriate
23 under our guidance and procedures to combine, normally
24 we don't combine two analysts.

25 MR. DAPAS: I understand, but it sounds

47 (Pages 185 to 188)

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1 like you've implemented corrective actions such that
2 that diesel was available at the time of the event. The
3 issue had been corrected, so we're focusing on plant
4 configuration, equipment availability during the time of
5 the event here, so thanks.

6 MR. JAMES: That concludes my remarks
7 unless there are any further questions.

8 MR. KOWALESKI: Everything we just talked
9 about, the site response and the cause analysis and what
10 I was going to address is this last section is fleet
11 learnings, both actions completed and actions that we
12 currently have in progress associated with primarily
13 contractor oversight.

14 We talked a lot about the safety
15 significance of this in terms of what was the realistic
16 estimate of potential for core damage frequency and
17 we've given you our belief or the best estimate of that.

18 I don't want that to take away at all the
19 other significance of this event which is the fact that
20 we did have a fatality, we did injure other employees,
21 and we did put the plant at some level of risk. And
22 that should not have happened.

23 We depend on contractors because of
24 resource leads and for specific skill sets that we as a
25 utility don't have. But we have to have that

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1 defines the oversight for each project given a risk
2 matrix for that project.

3 Development a risk matrix, identify the
4 high consequences, we've put a structure for oversight
5 plan in place around those consequences to ensure that
6 they're mitigated.

7 We've met multiple times with members of
8 the fleet to give them the lessons learned associated
9 with this event and contractor oversight. We've made
10 some organizational changes to be more effective with
11 the contractor oversight. Specifically, for major
12 projects, which is where a lot of these high consequence
13 vendor contract design activities occur, we put in place
14 a corporate engineering group to do those risk
15 assessments and help oversee that the mitigation
16 strategies that are put in place for those
17 engineering-related activities and also the non --
18 engineering related activities in terms of risk.

19 And we've also added oversight for our
20 maintenance support and site project manager. So we now
21 have director levels and senior managers that are
22 providing oversight of our main support services
23 contractors and all those contractors that are doing
24 minor projects at our sites.

25 Across the board, we've made improvements

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1 dependence. We are seeing issues, the industry is
2 seeing issues with performance of those contractors. So
3 we have to have in place a robust process of oversight
4 that protects and corrects those errors that a vendor
5 may make before they produce a consequence to the plant
6 or to people.

7 We are committed to putting such a robust
8 process in place to ensure that this never happens
9 again. I've been involved in the industry for over 30
10 years and it's the first time a fatality's occurred in
11 any kind of relationship to a plant or multiple plants
12 that I've had oversight of. And it's quite disturbing.
13 You just can't allow it to happen again.

14 That said, actions completed. We talked
15 about the material handling procedures for the fleet has
16 been changed to reflect the lessons learned that Dale
17 discussed, specifically strengthening controls and
18 documentation of load lifts, calculations associated
19 with this. And we also talked about the project
20 management procedure for the fleet has been modified for
21 specification design documentation requirements for
22 engineering activities to support projects for
23 determining specific expertise for high consequence
24 activities that a project vendor may perform.

25 And for putting in place a structure that

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1 in the skill assessments of the supplemental supervision
2 that we utilize at the site. So we will assess their
3 skills for being able to implement, hopefully,
4 verifications, peer checks, safety rules, performance
5 rules that we have on the site.

6 So those skill assessments have been
7 improved by assuring that there's an Entergy presence in
8 terms of [can't hear] for those supervisors and also to
9 have a demonstrated activity that does an assessment of
10 how well they do in observation how well they give feed
11 back to workers to make sure they follow the rules.

12 MR. DAPAS: Just a follow-up question.
13 This is an application for the entire fleet, right?

14 MR. KOWALESKI: Yes, these are fleet-wide
15 actions.

16 MR. DAPAS: Not just Entergy south?

17 MR. KOWALESKI: That's correct. The
18 entire fleet.

19 The additional actions in progress.
20 We've initiated a common cause evaluation for contract
21 performance issues. We've started that and completed an
22 initial piece of that, which is a select group of
23 significant contractor issues we've seen on projects.

24 We have selected a group of the most
25 significant contract, major contract issues we've had.

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1 We've done a vending exercise to try to determine if
2 there's anything immediate we need to go after reflected
3 at.

4 What we found is this last action that
5 I'll talk about that we are starting to implement for
6 the fleet. Again, these are in progress, but we're
7 going to complete that common cause evaluation by
8 looking at two years worth of any project-related cause
9 evaluation that we've done. Any project-related
10 commission report that documented an issue with document
11 limitation, we went back to all the alphas and bravos
12 and the cause analysis and specifically looked into
13 oversight and how the projects were managed --

14 MR. BILL JAMES: Bill James, the project
15 management. Just for clarity we are going to look at
16 all alpha and bravo across the entire Entergy fleet. We
17 are going to then, the conditions found within those
18 conditions reports, we're going to look at them from the
19 vantage point of project management and engineering as
20 well as engineering associated with project management.

21 Anything in the maintenance contractor or
22 otherwise arena that doesn't have an engineering or
23 project management aspect to it, will go to the
24 maintenance organization who will be participating. So
25 it's going to be across the board looking at all the

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1 condition reports and the alpha and bravo space that
2 we've had. So we're not going to go back and pick it up
3 in the future. We're going to do it all the first time
4 through.

5 Objective is to be complete with this
6 summer and then based on the insights, the learnings out
7 of that, that would complement what we've done to date,
8 those will go back into our processes to begin to judge
9 point to preclude something like this from happening to
10 us again.

11 MR. KOWALESKI: Jeremy is participating
12 on a committee that's looking at contractor oversight
13 law and helping mold the document that was just
14 released, that's going to go through the entire industry
15 for these limitation improvements to contract oversight.
16 So we will have both our Entergy-specific analysis as
17 well as the industry analysis to form future actions.

18 And the last item. When we did that
19 initial bit, what we identified as the most single
20 impact we've had [coughing] in the past. If we do a
21 good job of identifying the high consequence tasks or
22 risks in our existing project, if we do a good job of
23 identifying what are acceptable mitigating actions to
24 take, what we can improve on is how we validate or
25 provide oversight of the completion of those mitigating

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1 actions.

2 Elevating that oversight to a management
3 level and providing more rigor in the documentation
4 validation process. And that's the action that we're
5 going to proceed with implementing through the fleet
6 that we think will have the biggest impact to improve
7 our contract oversight to reduce risk.

8 MR. BROWNING: So if there's no
9 additional questions, then I do have a few closing
10 comments that I would like to make and -- one of the
11 fears that I had entering this conference was what I
12 stated in my opening comments. In my mind there's a
13 very distinct difference between us trying to establish
14 a reasonable estimate of the risk of core damage as a
15 result of this event. Clearly, we put the plant and the
16 operators in a challenging configuration that we should
17 have never done. That resulted in some level of
18 increased risk and our job is to achieve an accurate
19 assessment of that.

20 And the distinction between that and what
21 Joe talked about, the actual consequences and the
22 unacceptable consequences that occurred that day,
23 they're real and they're personal to me.

24 I know where I was Easter Sunday at 7:30.
25 And those consequences are real. And there's a

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1 commitment to what Joe is talking about and what I'm
2 talking about, too.

3 Again, the objective of this conference
4 is one in part to make sure you understand that we
5 recognize the significance, and I know from dialoging
6 and based on the feedback that I -- whether it's body
7 language or eyes, I'm not underplaying the significance
8 of the consequence.

9 I'm not underplaying the challenge that
10 we unnecessarily put our operators on -- the unnecessary
11 challenge that we put on our safety-related equipment
12 and that can never happen again, and make a distinction
13 between what was the actual best assessment of the risk
14 of core damage that was present.

15 There's a very clear distinction in my
16 mind that there's two different things. And our
17 objective was to present to you, and I know it's
18 additional information, information we haven't provided
19 to you. It's a methodology that we created that needs
20 challenge to make sure we get to that accurate
21 assessment of risk, but it is our best attempt to take
22 the facts that we have, provide you with that
23 information and our methodology and we're open to
24 receive your challenge and feedback on that methodology.

25 And I do appreciate the opportunity to be

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1 able to share with you today.
2 MR. WERNER: This is Greg Werner of the
3 Nuclear Regulatory Commission. We're going to take a
4 break. The NRC is going to leave the room and we are
5 going to get on a conference with our counterparts at
6 headquarters and other areas and caucus. And then we're
7 going to see if we have any additional questions or
8 information that we need to ask before we complete the
9 conference.
10 So we're going to go to the room next
11 door. Entergy folks, if you guys want to caucus in this
12 room next door, it's also available for y'all if you
13 want to have some internal discussions outside the
14 meeting room.
15 MR. DAPAS: This is Marc Dapas. For
16 those folks on the phone, members of the public that
17 have patiently been waiting for the opportunity to ask
18 questions, I'll just outline it is our intent to
19 expeditiously reach a determination whether we have any
20 additional questions here. And then I'll be closing the
21 regulatory conference here formally and then open it up
22 for any questions to members of public.
23 So we'll do our best to reach closure
24 here on any additional questions that we have in
25 relatively short order, seeing as we've been at this for

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1 five hours.
2 MR. WERNER: We're estimating about 10-15
3 minutes probably.
4 MR. DAPAS: I was reluctant to provide an
5 estimate, but since you -- my goal would be 10-15
6 minutes.
7 (Break taken from 5:55 p.m. to
8 6:25 p.m.)
9 MR. KENNEDY: Let's see, the length of
10 time we were out doesn't reflect the quality of the
11 discussion so, but, I think what does reflect the
12 quality of the discussion is a few questions that we
13 actually have. So we do have two follow-up -- I think
14 it's two follow-up questions.
15 So, we'll go through those. In addition,
16 we have a number of information requests. What I would
17 propose is that Mike Bloodgood get together with
18 Stephanie and go through those in detail. We think that
19 what we ask for you all will not have to develop, so we
20 think that you should be able to provide us that
21 information sooner rather than later.
22 MR. KOWALESKI: Is May 9th -- a week from
23 --
24 MR. KENNEDY: May 9th is, I think --
25 MR. KOWALESKI: -- close of business next

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1 Friday, next Friday. I think that'd be good for
2 anything that we've talked about so far.
3 MR. KENNEDY: And then if something comes
4 up between now and then, just let Greg know and he'll
5 touch base with the folks that requested the information
6 and we'll work through that. Appreciate you, Stephanie
7 and Mike, for documenting those and getting together and
8 make sure we have all the -- I also asked the risk
9 analysts to get together, too, since we want to make
10 sure that we've captured the specific requests.
11 MR. WERNER: I think Jeff and Mike
12 Bloodgood and Stephanie will get together.
13 MR. KENNEDY: We had just a couple of
14 questions and Jeff mitt man has the first one regarding
15 the flooding aspect of the event.
16 MR. MITMAN: This is Jeff Mitman. With
17 the Stator drop, a fire water header was severed and it
18 took a length of time to get the fire water system shut
19 down. And in that length of time it put a certain
20 amount -- quite a bit of water under the basement of the
21 turbine building and some of that migrated over into the
22 aux building. And some of that water ended up in decay
23 heat removal pump fault, and we were wondering if, and
24 if so, how you factored that into any -- into your risk
25 analysis or your review of the risk analysis, and then

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1 any of the consequences it might have had on -- or
2 impact on that risk analysis?
3 MR. SULLINS: I'm not familiar with risk
4 analysis details, I'm sorry.
5 MR. HARRIS: I'm talking with Jeff right
6 now.
7 MR. DAPAS: I will add one comment. We
8 are, of course, looking at that separately in the
9 context of flooding vulnerabilities, or the context
10 there that they have an impact on this event and
11 response associated with this event.
12 MR. HARRIS: Okay. I talked to Jason.
13 The analysis associated with the flooding of the default
14 was done as part of a separate analysis versus flooding
15 events. He did not include any information from the
16 impact of that flood in the analysis he performed as
17 part of the Stator drop that we talked about today.
18 MR. MITMAN: Okay.
19 MR. KENNEDY: Then if you could hand the
20 remote mic to --
21 MR. KOWALESKI: When we provide the
22 information we talked about providing we should go ahead
23 and provide an assessment of potential impact.
24 MR. TINDELL: This is Brian Tindell, the
25 Senior Resident Inspector of Arkansas Nuclear One. How

50 (Pages 197 to 200)

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1 did you account for the EALs in your recovery action
2 credit for both Unit 1 and Unit 2?
3 MR. WERNER: And I think that in
4 particular, he was interested in how the personnel
5 availability, if you went beyond alert would be
6 impacted?
7 MR. KENNEDY: So you declare site area
8 emergency or a general emergency, in some of these
9 scenarios and you have accountability to deal with, how
10 did you factor that into...
11 MR. BROWNING: That's a good question.
12 We did consider the availability of resources, and you
13 would have to reach the point beyond set of core damage
14 before you would escalate from the alert so we, in
15 looking at that, we would stay in an alert class for the
16 success paths that were presented today which would keep
17 the resources described.
18 MR. WERNER: So essentially you would
19 have to do a core uncover? Is that what you said?
20 MR. BROWNING: Yes.
21 MR. DALE JAMES: Yeah, that is correct.
22 Our review looked like it would, before you would be
23 escalating, you would be have to have imminent core
24 recovery.
25 MR. WERNER: Did that answer your

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1 question?
2 MR. LOVELESS: I thought part of the
3 question was that there was that there was a -- if
4 Unit 2 was going towards a site area emergency and
5 station blackout, how would that impact overall safety
6 services?
7 MR. KOWALESKI: Just a clarification.
8 Are you asking if we need to consider both units into a
9 single significance assessment?
10 MR. LOVELESS: I was trying to clarify
11 Brian's question.
12 MR. KENNEDY: Are there scenarios where,
13 you know, in the risk evaluation where personnel
14 availability would be affected because one of the units
15 had declared, you know, site area emergency or general
16 emergency where accountability came into play?
17 MR. SULLINS: This is Gary Sullins. As
18 described previously, we looked at it from the
19 prospective of Unit 1, the Unit 1 analysis, he
20 considered -- recall that we're dealing with
21 unavailability of electrical distribution equipment
22 within Unit 1. Our start up transformers remained
23 available, so we did not extrapolate to consider a
24 degraded power for Unit 2 or that separate initiating
25 event for blackout.

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1 MR. WERNER: I think that concludes
2 questions for the caucus. Mark, did you want to make
3 any additional closing remarks?
4 MR. DAPAS: Yes I do. Thanks. Couple
5 thoughts. One, I really do appreciate the perseverance,
6 patience, and discipline you've exercised here in
7 providing us your perspective in the stator drop events.
8 We've been at it for over five and a half hours here.
9 We've had extensive discussions and a lot of detailed
10 questions, but very important that we reach a full
11 understanding of your perspective. I think as described
12 in one of slides and I think I mentioned this when I
13 opened, the goal is a realistic estimate of risk
14 utilizing the best available information. Because the
15 consequences of our risk determination are significant
16 here.
17 We're looking at a preliminary red
18 finding, that constitutes high safety significance,
19 that's for Unit 1. Now for Unit 2, a preliminary risk
20 assessment there was a yellow finding which is
21 substantial risk significance.
22 And, you know, obviously, dependent on
23 the finalization of those risk significance
24 determinations depends on where you are in the reactor
25 oversight process action matrix here and what's the

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1 degree of regulatory oversight, and when you have a red
2 finding and supplemental inspection 95003 and
3 independent safety factors, so clearly there's a
4 significant resource expenditure by the agency in
5 providing increased oversight here. And a number of
6 actions that you would end up taking should you find
7 yourself in that particular column of the action.
8 My point in all that is, it's very
9 important that we do all we can as part of our due
10 diligence and independent assessment to arrive at the
11 most realistic assessment of risk significance, and I'll
12 come back to that in a minute.
13 I really appreciate the perspective
14 provided by Mr. Sullins and Mr. Hathcoat, the Assistant
15 Operations Managers for Unit 1 and Unit 2, respectively.
16 You were in the control room and I think it was
17 particularly valuable for us to hear your perspective
18 there regarding what you were facing, and as we
19 underscored, very important that you look at it in the
20 context of what the operators understood to be the plant
21 condition at the time and what equipment was available
22 and what decisions you would have made because it is
23 challenging when you're looking at it over a year after
24 the fact with information and knowledge we have now and
25 try and determine, okay, you're in a station blackout

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1 event and you're dealing with an adverse environment
2 here and there's the stress factors associated with
3 that.
4 And you know, as part of that realistic
5 assessment of risk, with available information
6 adequately considering those factors that come into play
7 when you find yourself in that particular situation. I
8 was very appreciative of the comment you made,
9 Mr. Browning and yourself, Mr. Kowaleski, regarding the
10 consequences of the event here, in recognizing that it
11 was the actual consequences were unacceptable here given
12 the fatality and the injuries that occurred, not
13 withstanding the focus of this conference certainly is
14 the risk significance. And I do appreciate the comments
15 that you shared with us and the actions you're taking
16 regarding oversight of contractors to insure going
17 forward that the behaviors don't translate into a
18 problem where you actually are dealing with a
19 significant issue from reactor safety context.
20 But let me come back to, for just a
21 minute, this realistic estimate of risk utilizing the
22 best available information. You heard us with our
23 questions. I think one of things we struggle with here
24 is there is no definitive standard for calculating
25 recovery actions for shut down conditions.

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1 You, I think, did provide us clearly with
2 your perspective regarding methodologies you used and
3 why those were appropriate. And you're correct. We did
4 not give credit for recovery of the 4160-volt bus or
5 inventory control. We're going to go back and look at
6 what you proposed and determine based on our assessment
7 whether that's reasonable here.
8 I do appreciate the significant time
9 margin you've indicated exists here and that provides
10 some additional, if you will, space to consider
11 uncertainty there. And I do appreciate the perspective
12 regarding the comparison of the normal outage
13 configuration and what's required by the tech specs,
14 comparing that with the plant condition after the event.
15 I think we struggle, too, with we have
16 definitive guidance when we talk about recovery actions
17 whether they're proceduralized and when there's training
18 here. And when you're talking about Unit 1 here and the
19 different success strategies, you know, the three
20 success paths here that you've presented to us, those
21 weren't proceduralized and trained on in the same
22 context of what our guidance would provide of how we
23 should treat the manual actions, etc., so we'll need to
24 look at that and determine whether what have you have
25 provided us appears reasonable.

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1 So, next step here, I think we have a
2 clear understanding by virtue of what you presented to
3 us, the basis for your assumptions and how you
4 approached in determining the risk significance. The
5 next step for us is to consider that fully and then
6 we'll communicate the final risk significance to you via
7 a separate correspondence here. I'll offer, if we do
8 have any questions as we're going through that process
9 we won't hesitate to reach out because it's important
10 that we don't have a gap in information here.
11 So with that, I will close and again
12 thank you for the time and the manner in which you
13 answered our very detailed questions. With that, I'll
14 close the formal portion of the Regulatory Conference
15 and Greg can open it up to entertain any questions from
16 those members of the public that might still be on the
17 phone may have.
18 Thanks.
19 MR. WERNER: Thank you, Mark.
20 Operator, can you go ahead and begin to
21 cue up questions for those on the phone?
22 OPERATOR SYLVIA: Thank you, we would now
23 like to open the lines for any questions. If anyone
24 does have a question, please hit star-one and record
25 your name when prompted. Again, it's star-one to ask a

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1 question. One moment to see if we have questions.
2 MR. WERNER: I'll just provide a quick
3 briefing again, we will alternate between members of the
4 public attending this meeting here in the room, as well
5 as those on the bridge. For both of those in the room
6 and on the phone bridge, please introduce yourself,
7 state your affiliation, and then ask your question or
8 make a comment.
9 Questions and comments be limited to
10 three minutes at a time. So we'll start with a member
11 here in the room. Are there any members of the public
12 that would like to ask a question. If you'll raise your
13 hand, I'll come to you with the mic. Anybody?
14 All right. We have no questions here in
15 the room. Operator, do you have any questions from
16 members on the phone bridge?
17 OPERATOR SYLVIA: I am showing no
18 questions.
19 MR. WERNER: I understand no questions.
20 We'll just second it one more time. This will be the
21 last chance. Sure no questions? No questions?
22 Well, that concludes our conference.
23 Again, thank you for your attendance. And as a
24 reminder, members of the public please fill out a public
25 meeting feedback form. There's some on the table over

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1 here, up against the wall.

2 And for members of the public on the
3 phone, if you'll go to the public meeting website and
4 look at our announcement, I think there will be a public
5 meeting form that will be automatically populated, I
6 think at midnight tonight, so if you'll go and get that
7 form tomorrow and fill it out and send it to us, we
8 appreciate it.

9 Thank you very much.

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1 THE STATE OF TEXAS)
COUNTY OF TARRANT)

2
3 This is to certify that I, KATHLEEN MCCURRY, a
4 Certified Shorthand Reporter, reported in shorthand the
5 proceedings at the Nuclear Regulatory Conference meeting
6 on May 1, 2014 at 1:00 p.m., and that the foregoing 209
7 pages contain a full, true and correct transcript to the
8 best of my ability of said proceedings.

9 Given under my hand and seal of office on this the
10 ____ day of _____, 2014.

11
12
13 _____
Kathleen McCurry, Texas CSR 8567
Expiration Date: 12/31/2015

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