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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

5 (ACRS)

6 + + + + +

7 REGULATORY POLICIES AND PRACTICES SUBCOMMITTEE

8 + + + + +

9 OPEN SESSION

10 + + + + +

11 WEDNESDAY

12 SEPTEMBER 7, 2011

13 + + + + +

14 ROCKVILLE, MARYLAND

15 + + + + +

16 The Subcommittee met at the Nuclear  
17 Regulatory Commission, Two White Flint North, Room  
18 T2B1, 11545 Rockville Pike, at 1:30 p.m., John D.  
19 Sieber, Chairman, presiding.

20  
21 COMMITTEE MEMBERS:

22 JOHN D. SIEBER, Chairman

23 SAID ABDEL-KHALIK, Member

24 J. SAM ARMIJO, Member

25 DENNIS C. BLEY, Member

1 CHARLES H. BROWN, JR., Member

2 JOY REMPE, Member

3 MICHAEL T. RYAN, Member

4 JOHN W. STETKAR, Member

5 NRC STAFF PRESENT:

6 CHRISTINA ANTONESCU, Designated Federal  
7 Official

8 JOHN BURKE, RES/DE

9 MICHAEL CASE, RES/DE

10 CLIFF DOUTT, NRR/DLR

11 GURCHURAN SINGH MATHARU, NRR/DE/EEEE\*

12 ROY MATHEW, NRR/DE

13 MATTHEW McCONNELL, NRR/DE/EEEE

14 KENN MILLER, RES/DE/MEEB

15 DARRELL MURDOCK, NRR/DE

16 SHEILA RAY, RES/DE

17 GERALD WAIG, NRR/DIRS/ITSB

18 GEORGE WILSON, NRR/DE

19

20 ALSO PRESENT:

21 THOMAS KOSHY, NRC Consultant\*

22 MICHAEL VILLARAN, Brookhaven National  
23 Laboratory

24 \*Participating via telephone

25

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

1:28 p.m.

CHAIRMAN SIEBER: The meeting will now come to order. This is a meeting of the Regulatory Policies and Practices Subcommittee and I am John Sieber, Chairman of the Subcommittee for this meeting.

ACRs members in attendance are Charles Brown, Dennis Bley, John Stetkar, myself, Sam Armijo, Said Abdel-Khalik (who is Chairman of the full committee), and Joy Rempe. We may have Mike Ryan here also later on but right now he's not here.

Christina Antonescu of the ACRS staff is the designated federal official for this meeting.

During this meeting the staff will discuss the draft final Regulatory Guide RG 1.93, "Availability of Electric Power Sources." And Reg Guide 1.218, "Condition Monitoring Techniques for Electric Cables Used in Nuclear Power Plants."

The subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for deliberation by the full committee.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal

1 Register on August 23, 2011.

2 We have received no written comments or  
3 requests for time to make oral statements from members  
4 of the public regarding today's meeting.

5 Mr. Tom Koshy, a former member of the RES  
6 staff, will be participating by the bridge line as an  
7 RES staff consultant. The purpose of Mr. Koshy's  
8 presence by bridge line is to answer questions that  
9 the committee may pose.

10 A transcript of the meeting is being kept  
11 and will be made available as stated in the Federal  
12 Register Notice. Therefore, we request that  
13 participants in this meeting use the microphones  
14 located throughout the meeting room when addressing  
15 the subcommittee. The participants should first  
16 identify themselves and speak with sufficient clarity  
17 and volume so that they may be readily heard.

18 Now we will proceed with the meeting. I  
19 call upon Mr. John Burke, Acting Branch Chief, the  
20 Mechanical and Electrical Engineering Branch of the  
21 Division of Engineering in the Office of Research to  
22 provide some introductory remarks.

23 John.

24 MR. BURKE: Thank you.

25 Mike, do you have anything you want to

1 say?

2 MR. CASE: Sure. I'm Mike Case. I'm the  
3 Director of the Division of Engineering in the Office  
4 of Research. We're often asked by the program offices  
5 to develop the Reg Guides to sort of support them in  
6 their program. We are going to talk about a couple of  
7 them today. I just wanted to offer a few items of  
8 context.

9 First, I want to express a little bit of  
10 appreciation to the ACRS because part of my  
11 responsibilities is the Reg Guide Update Program. You  
12 probably know it's a commission-directed program and  
13 there's about 450 Reg Guides in the NRC Library of Reg  
14 Guides. So we've been moving through those through  
15 the years so we're down to less than 200 of them to  
16 go.

17 As you probably know, every one of those  
18 Reg Guides involves at least one interaction with the  
19 ACRS. I've been doing this for a couple of years and  
20 I'm really proud to say that the ACRS has never been  
21 a scheduler impediment to get the Reg Guides done so  
22 we really appreciate that from a program perspective  
23 that the ACRS contributes as much as it does in that  
24 area.

25 What else? A lot of these Reg Guides are

1 important but not urgent and so, once again, it's to  
2 the ACRS' credit that they can take the time and  
3 effort that it takes to take some of these things that  
4 aren't urgent.

5 They are not like COLs. They're not like  
6 license renewal application. They're not like design  
7 certification reviews. Get them on your schedule and  
8 get us feedback on these Reg Guides. I think it's  
9 important. I appreciate that the ACRs does that.

10 Second, I want to make you aware of what  
11 I call special circumstances with these two particular  
12 Reg Guides. Our presenters today are not really the  
13 primary authors of these Reg Guides.

14 The primary author of these Reg Guides  
15 were two other members of our staff. They were Tom  
16 Koshy and Satish Agrawal. Between them they probably  
17 had about half a century of experience in nuclear  
18 power plant operations and electrical issues.

19 Fortunately, just this last month Satish  
20 retired and Tom went on assignment over to IAEA and  
21 he'll return in about three years as an NRC employee.  
22 That's why we have Tom on the phone to sort of supply  
23 maybe some of the background information.

24 Because of that I ask for your forbearance  
25 with our young and talented junior staff, but our real



1 mission is to get you the information that you need to  
2 make a decision on these Reg Guides. We do have a lot  
3 of support here from program offices and other folks  
4 involved in these Reg Guides.

5 Then finally I just want to talk a little  
6 bit about Sheila's Reg Guide. It's somewhat of an  
7 interesting one. If you look at Rev. 0 of this Reg  
8 Guide you'll find out it's probably issued in 1974 so  
9 that makes it about 36 years between revisions so it's  
10 been a long time. That was one of the challenges with  
11 this Reg Guide.

12 When you read it if you are familiar with  
13 the Tech Specs you'll sort of recognize that it has a  
14 lot of links to the action stations in the Tech Specs.  
15 Most of our regulatory history is really tied up in  
16 Standard Tech Specs and not in this particular reg  
17 guide.

18 One of the challenges for this reg guide  
19 is to sort of write it consistent with a lot of the  
20 regulatory history that has occurred in Standard Tech  
21 Specs. That is one thing that you'll see in this reg  
22 guide.

23 The second, we had a significant operating  
24 experience event that occurred. That was the  
25 Northeast blackout. The staff issued a Generic Letter

1 as a result of that so it also incorporates that  
2 experience.

3 The third thing that it does is something  
4 that we actually learned from the ACRS. It at least  
5 talks about future plants so it talks about passive  
6 designs. That was the other item that I think was  
7 important in this particular reg guide.

8 So as far as what we're looking for as an  
9 outcome for this particular meeting, we're looking to  
10 supply you enough information at the subcommittee  
11 level so that you will be able to write a letter. I'm  
12 thinking something sort of like the letters from Ed  
13 Hackett back to Bill Borchardt that says that he has  
14 no objections to the staff plans to issue this reg  
15 guide as a final reg guide.

16 With that I'll turn it back to Sheila.

17 MS. RAY: Thank you. As Mike mentioned,  
18 my name is Sheila Ray and I'm here to talk to you  
19 about Reg Guide 1.93, the availability of electric  
20 power sources.

21 Next slide, please. Slide 2. Reg Guide  
22 1.93 Rev. 0 was issued in December of 1974. The LCO  
23 actions and completion times were incorporated into  
24 the Standard Tech Specs.

25 This Reg Guide was revised for a number of

1 reasons: First, to incorporate the lessons learned  
2 from the 2003 Northeast blackout and Generic Letter  
3 2006-02 on "Grid reliability." Furthermore, this Reg  
4 Guide addresses the impact of deregulation and also  
5 includes information on passive and evolutionary  
6 designs.

7 Next slide. The Northeast blackout  
8 occurred on August 14, 2003, and impacted the  
9 Northeastern United States and parts of Canada. Nine  
10 Nuclear Power Plants tripped and power was restored  
11 anywhere from one to six-and-a-half hours.

12 The emergency diesel generators functioned  
13 per design basis to maintain safe shutdown conditions.  
14 Thus, the Northeast blackout was significant in terms  
15 of the number of plants affected and the duration of  
16 the power outage.

17 Next slide.

18 MEMBER STETKAR: Sheila, how long was  
19 power off at Browns Ferry from the tornados?

20 MS. RAY: From the tornados? I am not  
21 sure. I would have to get back to you on that.

22 MEMBER STETKAR: About four days.

23 MS. RAY: Thank you.

24 MEMBER STETKAR: How long was power off at  
25 Turkey Point because of -- I've forgotten the

1 hurricane name.

2 PARTICIPANT: Andrew.

3 MR. BURKE: Almost seven days.

4 MEMBER ABDEL-KHALIK: Seven days.

5 MEMBER STETKAR: You're right.

6 MR. BURKE: And at Waterford three for  
7 Katrina it was about three-and-a-half days.

8 MEMBER STETKAR: Okay. Thanks.

9 MR. MATHEW: Let me give you some more  
10 background. What we found from our studies regarding  
11 the loss of offsite power. Clearly lost of power --  
12 restoration takes longer than previously assumed so  
13 that's some of the change we are looking at, different  
14 rules. We're looking at 50.63 station blackout, part  
15 of that.

16 MEMBER STETKAR: I'll let you get through  
17 your background.

18 MS. RAY: Okay.

19 MEMBER STETKAR: I want to kind of ask a  
20 fundamental question before you get into some of the  
21 details of the Reg Guide.

22 MS. RAY: Okay.

23 MEMBER STETKAR: But get through the  
24 background information first.

25 MS. RAY: All right. Slide 4.

1 CHAIRMAN SIEBER: Let me interrupt just to  
2 check to see that the bridge line is actually working.  
3 Is Tom Koshy on the bridge line?

4 MEMBER STETKAR: Is anyone out there?

5 MR. MATHEW: They might be muted on their  
6 side.

7 CHAIRMAN SIEBER: Well, we'll check on  
8 that. Why don't we go ahead.

9 MS. RAY: Okay. Slide 4. In February  
10 2006 the staff issued Generic Letter 2006-02 as a  
11 result of issues identified in the Northeast blackout.

12 Next slide, slide 5. Generic Letter 2006-  
13 02 discussed several issues. First, the use of grid  
14 studies by the transmission system operator to assist  
15 nuclear power plants in monitoring grid conditions for  
16 offsite power operability.

17 Also included information on communication  
18 between the grid operator and the nuclear power plant  
19 to be aware of situations that could result in  
20 inadequate voltage or a loss of offsite power.

21 Secondly, Generic Letter 2006-02 included  
22 information to consider grid conditions in maintenance  
23 risk assessments and monitoring the grid during  
24 maintenance activities.

25 Lastly, the Generic Letter included

1 information to identify offsite power sources and  
2 transmission paths for offsite power restoration.

3 Next slide, slide 6. Reg Guide 1.93  
4 discusses the staff's position on acceptable  
5 restrictions if the available power sources are less  
6 than the LCO.

7 DG-1244 was issued in September 2010 for  
8 public comment. I will be discussing the changes  
9 between Rev. 0 and Rev. 1 in the upcoming slides.

10 Next slide, slide 7. Reg Guide 1.93  
11 applies to both single and multi-unit sites and is  
12 consistent with the Standard Tech Specs.

13 Next slide. The regulatory basis for Reg  
14 Guide 1.93 is GDC 17 which specifies that two  
15 independent offsite circuits shall supply power from  
16 the offsite transmission network to the onsite  
17 distribution system.

18 The licensee shall provide redundant  
19 onsite AC and DC power supplies. You shall provide  
20 sufficient capability and capacity to ensure the fuel  
21 design limits and design conditions for the reactor  
22 coolant pressure boundary are not exceeded.

23 Next slide, slide 9. For pre-GDC plans  
24 applicable design criteria are provided in the UFSAR  
25 and this was added to Rev. 1 of Reg Guide 1.93.

1 Next slide, slide 10. Revision --

2 MEMBER STETKAR: Let me stop you now

3 because now you're getting specific changes. The Reg  
4 Guide carries forward what protected the LCO  
5 completion times from the original version of the Reg  
6 Guide that was issued in 1974. That initial -- those  
7 were the early days of the world.

8 Dinosaurs were crawling out of the swamps.  
9 We were trying to figure out what Tech Specs might be,  
10 what might be included in Tech Specs. Apparently some  
11 really smart people back then got together and decided  
12 that there were limits like two hours and 24 hours and  
13 48 hours and 72 hours. They made a lot of sense and  
14 they have been around for a long time.

15 There have been a lot of lessons learned  
16 in the last 36 years regarding, as we already noted,  
17 the amount of time that might be required to restore  
18 off-site power based on the cause of its failure, the  
19 reliability of onsite AC power systems depending on  
20 how they are configured and the equipment we use.

21 The question is why in 2011 do we need to  
22 specify those arbitrarily selected times in a new  
23 version of this Regulatory Guide? What benefit,  
24 technical benefit is added by specifying all of those  
25 explicit time limits in this Regulatory Guide?

1 MS. RAY: I would ask for some help.

2 MEMBER STETKAR: That's a generic  
3 question. I don't want to get into is 24 hours  
4 reasonable for X or is 72 hours reasonable for Y. The  
5 question is why do we need to specify those times  
6 generically in this Regulatory Guide?

7 MR. MATHEW: This is Roy Mathew from NRR,  
8 Electric Branch. The perspective is Rev. 0 was the  
9 basis for operational restriction. You have less than  
10 minimum number of sources which were onsite at offsite  
11 power. This revision is the set changing the basis of  
12 the tech spec. We still have to keep the original  
13 basis for the tech spec so that is carrying forward.

14 We have specific section for Part 52 plans  
15 where my understanding is -- correct me if I'm wrong  
16 -- the tech spec has not been finalized so staff is  
17 still reviewing it. Rev. 1 is carrying forward the  
18 original assumptions and basis for operation  
19 restriction, limiting condition operation. Nothing  
20 has changed. The only change we are making we learned  
21 a lot of lessons from the 2003 blackout.

22 When we say offsite power is operable, we  
23 learned that you have to look at the grid side. You  
24 have to know the condition of the grid to make sure  
25 the offsite power is operable.



1           MEMBER STETKAR: You're getting into some  
2 details that we will discuss, I think, a little bit  
3 later under some of the different scenarios. I'll  
4 pull you back to what do we need to specify those  
5 times in this revision of the Regulatory Guide.

6           MR. MATHEW: I mean, like I said before --

7           MEMBER STETKAR: And if we do, I would  
8 personally like to know what the technical basis is  
9 for each of those times generically for every plant in  
10 the country because that's the way this will be  
11 applied.

12           MR. MATHEW: One caveat is the Reg Guide  
13 is specifying the standard consistent with the  
14 standard tech spec. Wherever the difference is the  
15 tech spec dictates the real conditions like limiting  
16 condition. Whether it's 72 hours or 24 hours, that is  
17 dictated by the plant tech spec.

18           MEMBER STETKAR: I understand that and I  
19 understand that if I'm a licensee and I want to adopt  
20 standard tech specifications, I need to provide  
21 adequate justification of why they apply to my site.  
22 I understand that if I'm the licensee and I decide to  
23 depart from the standard technical specifications, I  
24 need to provide analyses to justify that departure.  
25 I understand all of that.

1           Why in the Regulatory Guide do we need  
2           those numbers; 24 hours, 72 hours, 48 hours? Why do  
3           we need to perpetuate something just because 36 years  
4           ago some smart guys decided those seem to be  
5           reasonable numbers because they didn't know anything  
6           better.

7           MR. KOSHY: This is Thomas Koshy. Let me  
8           try to explain a little bit. Historically in the days  
9           when we arrived at that time, it was primarily based  
10          on doing the FM chill maintenance activities so that  
11          we can maintain the availability of the power supply.

12          That was at the time considered necessary  
13          to do some of the FM chill maintenance while power can  
14          continue to remain. Over the years with our detailed  
15          study on grid capacity and also operating experience,  
16          we found we can still limit that time but we did not  
17          find any basis to reduce that time any further.

18          Essentially what we have done is our  
19          operating experience with the original dose that we  
20          have given for critical maintenance activities and  
21          over the years we are happy with those times that we  
22          have chosen, therefore we are choosing to prefer those  
23          limits as an upper-bound limit even though it can be  
24          indicated sooner than that to give us a reasonable  
25          level of confidence in safety.

1           MEMBER STETKAR: Two things, Tom. If you  
2 could, sit back from your mic a little bit because  
3 you're breaking up a little bit on this end. I think  
4 my whole question is is there -- what regulatory  
5 benefit is achieved from placing the specific  
6 numerical values of those times in this regulatory  
7 guide given the situation that we are in in 2011 where  
8 every plant has a set of technical specifications.

9           We do have generic technical  
10 specifications and plants are allowed to depart from  
11 technical specifications if they can justify it. And  
12 new plants under Part 52, as has already been noted,  
13 the technical specifications have yet to be  
14 solidified, if you want to call it that, because the  
15 designs in many cases have additional levels of  
16 redundancy that might justify broadly different LCO  
17 times.

18           The question is really why do we need the  
19 specific numbers in this regulatory guide which may  
20 perpetuate --

21           MR. MATHEW: Okay. Let me --

22           MEMBER STETKAR: -- which may perpetuate  
23 those numbers for another 36 years? I don't plan to  
24 be here for that review but, you know, Joy might.

25           MR. MATHEW: Let me try this. If we think

1 the time specified in the tech spec either in the  
2 standard tech spec or the plant specific tech spec is  
3 less conservative, we should have changed it in this  
4 reg guide. We have no reason to believe that we have  
5 to change any of the -- just like offsite power we  
6 said 72 hours.

7 Three days is reasonable to do maintenance  
8 or something needs to be done with one circuit  
9 inoperable. From a tech spec point of view the  
10 numbers haven't changed. Staff hasn't come across  
11 there's an issue that we need to revisit and change  
12 the time. We could take off all the numbers but it  
13 doesn't matter for operating reactors. All those  
14 numbers are the same. It's going to be plant  
15 specific.

16 MEMBER STETKAR: Right at the moment  
17 that's true. My concern is that we now have plant  
18 specific Tech Specs. We have generic Tech Specs. We  
19 have regulatory guides. If I take a snapshot right  
20 now all of those numbers are the same, I think. At  
21 least the Standard Tech Specs and the regulatory  
22 guide.

23 If anything changes, we'll have to reissue  
24 all of those things. We'll have to reissue a new  
25 version of this regulatory guide because somebody

1 decided that, well, it ought to be 18 hours rather  
2 than 24 hours for some condition, that that's a more  
3 reasonable time.

4 Or maybe 103 hours is more reasonable than  
5 72 hours. It comes back to why do we need the  
6 specific numbers in each document. What benefit do I  
7 have from those numbers in this Regulatory Guide given  
8 where we are in 2011, not where we were 36 years ago.

9 CHAIRMAN SIEBER: I think you can extend  
10 that thought a little bit, too, because none of this  
11 is risk-informed.

12 MEMBER STETKAR: None of this is risk-  
13 informed and I understand that.

14 CHAIRMAN SIEBER: None of this takes into  
15 account the station blackout coping times for  
16 different plants. They are different for different  
17 plants so the risk varieties and it's not clear to me  
18 that we are dealing with risk in a rational way when  
19 we set up discrete numbers based on somebody's  
20 judgment that doesn't have the experience of the 2004  
21 blackout, or even the experience that we have gained  
22 over overseas this year.

23 MR. CASE: If I can just add -- this is  
24 Mike Case. From a regulatory philosophy and a  
25 regulatory guide perspective it's almost always better

1 to write the number down because what it provides --  
2 a Reg Guide is to articulate the current staff  
3 position.

4 Although you're right it probably doesn't  
5 have as strong a technical basis as you want, you want  
6 to write down what the current staff position is so  
7 that when you get in requests that says, "I want to do  
8 it in 18 hours," it makes the staff focus on that and  
9 they can always relax the staff position but it makes  
10 them focus on it and it makes them write up the reason  
11 why so that's why you always want the Reg Guide to  
12 have the current staff position.

13 MEMBER STETKAR: Okay. Thanks. That  
14 helps me really understand it. Now I will ask the  
15 staff then to supply to at least me, if not the rest  
16 of the subcommittee, the technical justification for  
17 each of those times in writing, please.

18 MR. CASE: You will probably get something  
19 close to what Tom is talking about.

20 MEMBER STETKAR: I honestly want to  
21 understand --

22 MR. KOSHY: Our attempt is to give an  
23 upper-bounding value through this Reg Guide such that  
24 we can live with an acceptable level of availability.

25 MEMBER STETKAR: I understand the intent.

1 MR. KOSHY: Remember we recognize in some  
2 cases it may be liberal and some case may be limited.  
3 But over all the years we have learned that at this  
4 given window of time is reasonably adequate for most  
5 maintenance activities.

6 Ideally, we like to have these power  
7 supplies when all the power supply whenever the plant  
8 is operating. On the other hand, we have to do  
9 certain maintenance activities so the operational  
10 readiness can be preserved.

11 So in these two extremes having power  
12 always available and having some unavailability is a  
13 margin that we try to draw. So what you have needs to  
14 be seen as an upper-bounding value within which we  
15 think the operational safety is preserved.

16 MEMBER STETKAR: Okay. Thanks.

17 MR. KOSHY: So this is a guide number as  
18 an upper value so that the staff can say, "Okay, we  
19 long as you remain within limits, we consider it good  
20 enough."

21 MEMBER STETKAR: Okay. Thanks. I  
22 understand everything you just said and I do, on one  
23 level, understand the need for both applicants and the  
24 staff reviewers to have something, some specificity  
25 that you can form the review against. I understand

1       that.

2               All I'm asking for is a written summary of  
3       the technical bases because there must be some  
4       technical basis for those numbers. It can't just be,  
5       well, it seemed reasonable at the time and people can  
6       usually do the maintenance within these times.

7               I don't think we should regulate the  
8       nuclear industry based on somebody's idea that it  
9       seemed sort of reasonable that somebody might be able  
10      to do the maintenance within the time. There must be  
11      some documented technical basis for those numbers  
12      because they are very specific numbers.

13              They are as specific as saying I should  
14      not exceed a departure for nuclear boiling ratio of  
15      more than X. There are detailed analyses that are  
16      done to support those numbers that we use in terms of  
17      our review criteria. I understand the goals.

18              I understand in some sense the need for  
19      having specific numbers against which to perform the  
20      review. I'm asking now for the technical basis for  
21      those numbers. If there is a reasonable technical  
22      basis, I'll be quiet but I haven't seen it so I would  
23      like to see it.

24              MR. WAIG: This is Gerry Waig. I'm with  
25      the Tech Spec Branch. As you well know, all of the



1 LCO action statements have got completion times  
2 associated with them. Those identified in the NUREGs  
3 1430 through 1434 for the current Rev. 3 are  
4 primarily, if not all, deterministically based.

5 They have no risk-informed tech spec  
6 completion time that currently exist within the NUREG  
7 that has been specifically identified as a PRA grade  
8 completion time. Getting to your question, to come up  
9 with an engineering evaluation of why is this 24 hours  
10 and why is this 72.

11 Having started in the business back in  
12 '72, 1972, I can tell you that your assumption is  
13 correct that typically what was done was how long  
14 would it take to perfectly restore an aux feedwater  
15 pump RCS loop, an offsite power line, and what is the  
16 risk.

17 It wasn't the risk that we're talking  
18 about today, it's just an assumed risk, not a  
19 calculated risk of an event occurring, where you  
20 relied upon that function. That's where those numbers  
21 came from if you look through it.

22 I have not seen an engineering study or an  
23 evaluation that says that's how we got to the 72 hours  
24 where this number was evaluated under the criteria  
25 we're talking about today.

1                   It was really done more of a gut feel of  
2                   how long it would take to restore a system and some  
3                   reasonable ability of the licensee to complete that  
4                   time without having to shut down. I don't know if  
5                   that answers your question or not.

6                   MEMBER STETKAR: Well, it answers --

7                   MR. WAIG: It may not make you feel any  
8                   better with your question but that's --

9                   MEMBER STETKAR: Okay.

10                  MR. MATHEW: From a laboratory perspective  
11                  --

12                  MR. KOSHY: From our operating -- this is  
13                  Koshy again. From our operating experience in the  
14                  past years that time that we allocated is very  
15                  reasonable but we have only very rare requests for  
16                  asking for extension so that is an affirming  
17                  experience through which we feel confident that the  
18                  time that we are using at this time is very  
19                  reasonable.

20                  MR. MATHEW: One other point. I mean, if  
21                  you look at the regulatory requirement it's 50.36 and  
22                  50.36 says you have to have a limiting condition  
23                  operation and operating limits and safety limits,  
24                  things like that. We have NUREG 1734 -- 1434 through  
25                  different reactors where we have specified to meet

1 those requirements.

2 In this Reg Guide we are not changing the  
3 original basis of any of those. Still everything is  
4 the same except we thought from an available  
5 electrical power source because of the 2003 blackout  
6 in order to determine the offsite power availability  
7 operability you need to consider other things other  
8 than already specified in the original version. That  
9 is a main change.

10 MEMBER BROWN: So that's the inverters  
11 you're talking about?

12 MR. MATHEW: No.

13 MEMBER BROWN: That's the only other item  
14 that's listed under those six or seven items that you  
15 specified.

16 MEMBER STETKAR: They'll get to that.  
17 We'll talk about specifics, I think, in a little bit  
18 if I ever let you. I didn't go look at the tech spec  
19 NUREGs. I just didn't have time in preparing for this  
20 meeting. Back in the basis section of those Tech  
21 Specs are there any analyses referred to for the basis  
22 for those completion times?

23 MR. WAIG: No, it's deterministic in  
24 general. In fact, it does reference Reg Guide 1.93 in  
25 a number of those cases.

1                   MEMBER STETKAR: We have a self-fulfilling  
2 sort of loop that we are now perpetuating in the  
3 future.

4                   MR. WAIG: That's correct.

5                   MR. MATHEW: Most of them are engineering  
6 judgment, plant operating experience. All those  
7 things are factored, too.

8                   MEMBER STETKAR: I'd better let you  
9 continue now.

10                  MEMBER BROWN: Before they go on, could  
11 you answer me one basic question? When I was looking  
12 at this trying to see what the difference is from Rev.  
13 0 to Rev. 1 where you had a statement in Rev. 0  
14 relative to what was required under GDC 17 that  
15 differs from what's specified in Rev. 1 in your  
16 presentation.

17                  In Rev. 0 you quoted -- you didn't quote.  
18 Excuse me. You stated that GDC 17 required that each  
19 of your two physically independent offsite  
20 transmission networks should be continuously  
21 available, or claim that each can be made available  
22 within a few seconds.

23                  Note the word "each." In your quote here  
24 you say GDC 17 and now the new requirement is that  
25 only one is required to be available within a few

1 seconds. Has GDC 17 changed from Rev. 0 or is that a  
2 misstatement in Rev. 0?

3 MR. MATHEW: Let me clarify. This is not  
4 quoted verbatim. This is paraphrased.

5 MEMBER BROWN: In Rev. 0 or Rev. 1?

6 MS. RAY: It is paraphrased in Rev. 0.

7 MR. MATHEW: Yes. If you were to quote  
8 exactly what the GDC 17 is in a nutshell, you need two  
9 circuits for offsite power source. One of the  
10 circuits can be available within a few seconds. The  
11 other circuit can be delayed. It doesn't specify how  
12 much delay. That's the requirement in a nutshell for  
13 the offsite power source.

14 MEMBER BROWN: You substituted the words  
15 sufficient and time. All I was just trying to get to  
16 was GDC -- I was trying to figure it out. GDC 17 was  
17 just paraphrased incorrectly in Rev. 0 that each had  
18 to be available within a few seconds so that's what  
19 has been going on for 30 or whatever, 26 plus or 30  
20 years.

21 MR. MATHEW: It's the same but we can say  
22 it in a different form. I would say one circuit has  
23 to be immediately available and the other circuit can  
24 be a little bit delayed. The GDC 17 doesn't say how  
25 much delay you can have.

1                   MEMBER BROWN: All I'm saying is that the  
2 original Reg Guide said they both had to be like that  
3 and you're saying now they don't. I just wanted to  
4 make sure we were quoting the general design criteria  
5 as it is actually specified in 10 CFR 50, whichever is  
6 appropriate, Appendix I.

7                   MR. MATHEW: We'll make sure legally we  
8 are defining the same way.

9                   MEMBER BROWN: The reason I ask it looks  
10 like a relaxation. If you look at Rev. 0 and you go  
11 to what you are proposing now, it looks like a  
12 relaxation or a reduction in the standard that you're  
13 applying. That's why I was asking the question.

14                   I want to make sure exactly what were the  
15 criteria before and exactly what are they now. They  
16 should be the same. That's what you're telling me but  
17 that's not the way they read. I don't have a copy of  
18 that with me and, besides, the print is too small.

19                   MR. MATHEW: We will take back and make  
20 sure we captured it verbatim so people will not  
21 misunderstand or misinterpret. These are the exact  
22 words.

23                   MEMBER BROWN: Okay. I'll read what he  
24 gave me.

25                   MS. RAY: Okay. Next one, slide 10.

1 Revision 1 also includes a discussion on Grid-Risk-  
2 Sensitive Maintenance. To minimize risk, licensees  
3 should consider performing grid reliability  
4 evaluations as part of maintenance risk assessments  
5 per the Maintenance Rule 10 CFR 50.65(a)(4).

6 For example, if degraded grid conditions  
7 exist, licensees should consider rescheduling the  
8 maintenance. Otherwise, licensees can use equipment  
9 protection measures or compensatory measures to limit  
10 risk.

11 Next slide.

12 MEMBER STETKAR: Before you change this,  
13 and I apologize. I know I'm blindsiding you but  
14 that's okay. What's the grid?

15 MS. RAY: It is --

16 MEMBER STETKAR: Where does the grid start  
17 when I go out from a plant? Obviously the grid is not  
18 at the switchgear that's inside the plant but where  
19 does the grid start?

20 MS. RAY: It's the pressure breaker from  
21 the transmission lines. You also have the safety  
22 buses and that's where we monitor the whole thing.

23 MR. WAIG: Typically tech spec space  
24 starts at the high-side breaker of the step-down  
25 transfer.

1 MEMBER STETKAR: And that's the  
2 interpretation for this Reg Guide?

3 MS. RAY: Yes.

4 MR. WAIG: Yes.

5 MEMBER STETKAR: Good. I'm actually glad  
6 to hear that because I've seen people get very  
7 creative of saying the grid is the transmission lines  
8 that connect to my switchyard. That's the grid.  
9 That's the responsibility of the TSO or whoever is  
10 running the interconnected grid out there.

11 My responsibility as a licensee starts at  
12 the high-side breakers out in the switchyard. Who is  
13 responsible for the switchyard? Who is responsible  
14 for contingencies in the switchyard if I have a  
15 breaker-and-a-half scheme and I've got one of my  
16 switchyard buses out. Does the TSO run contingency  
17 analyses for that configuration under this Regulatory  
18 Guide?

19 MR. MATHEW: Let me go back.

20 MEMBER STETKAR: The answer is yes, I'm  
21 happy. That's all I needed to know.

22 MR. MATHEW: Yes.

23 MEMBER STETKAR: Okay. Thanks.

24 CHAIRMAN SIEBER: Only by agreement --

25 MEMBER STETKAR: I want to make sure there



1 is clear understanding that the TSO knows that he has  
2 to account for contingencies in my switchyard.

3 CHAIRMAN SIEBER: There's no legal  
4 requirement under NRC regulations for him to do so.  
5 The only requirement would be an agreement between the  
6 TSO and the plant operator that would require them to  
7 do that. I think those are in place in most utilities  
8 but I'm not sure it's in place in every one.

9 MR. KOSHY: This is Thomas Koshy. Let me  
10 add some thoughts to that. The NRC side comes from  
11 the controls and FERC has mandated a procedure through  
12 which the interaction with the operator have now  
13 become a requirement. We have worked with our friends  
14 in FERC to make that happen so that we have reliable  
15 information between the offsite power available to the  
16 site.

17 Now through this protocol that we have  
18 established from the NRC side and FERC side, there is  
19 full communication between the parties so that the  
20 contingency condition is identified, maintenance  
21 activities are shared and, therefore, we have a great  
22 confidence in the ability of the offsite power.

23 MR. WILSON: Tom, this is George Wilson.  
24 I'll add one thing.

25 In Generic Letter 2006-02 one of the

1 questions that was in that was also to ensure that  
2 they had a legal agreement with the grid operator to  
3 provide lots of stuff. That's further, just like Tom  
4 said, been amplified working with NERC and FERC on  
5 reliability standards. There is a standard called Nuc  
6 001 which requires a lot of that stuff. That is  
7 actually the reliability law back from the grid  
8 operators to the nuclear power plants.

9 MEMBER STETKAR: My only concern is to be  
10 absolutely clear that those agreements and the  
11 understanding of the grid operator is such that they  
12 understand that those contingencies extend all the way  
13 back to the high-side breakers of my plant.

14 For example, if I have -- if I've got a  
15 dual voltage switchyard and I've got a transformer out  
16 of service out there, or if I've got a breaker-and-a-  
17 half scheme, I've got one of my buses out of service,  
18 that is a contingency that the so-called grid operator  
19 knows that under these agreements they need to  
20 evaluate.

21 MR. WILSON: In addition -- this is George  
22 Wilson again -- it becomes the plant's responsibility  
23 to talk about if they are taking a battery or  
24 equipment back out to the grid operator to ensure that  
25 it's a two-way communication. That's there.

1                   MEMBER STETKAR: That's pretty well clear  
2 going out from the plant. There is at least one new  
3 plant design that is very creative about where they  
4 define their switchyards and what they define as their  
5 switchyards. That sort of led me to a bit of concern  
6 about a possible gap.

7                   MR. WILSON: It's confusing because  
8 generically it's been the FERC/NERC NRC interface  
9 point is the first disconnect after the transformers  
10 and that's actually defined as the FERC interface  
11 point that the industry came back and designed so it  
12 should be generic we know.

13                  MR. MATHEW: Actually, just to clarify,  
14 part of the maintenance rule action, everybody knows  
15 that maintenance rule, therefore, requires the  
16 licensees to assess the risk, manage the risk when  
17 they do maintenance, so that involves any grid work on  
18 the transmission side or switchyard on the grid side.

19                  If they are making changes or maintenance,  
20 they should inform the plant so they can assist the  
21 rest. Maintenance rule encouraged them to do it so  
22 there is a protocol to do that.

23                  Also, the maintenance rule Reg. Guide  
24 1.81, if you look at that it specify where is the  
25 boundary of the switchyard so it saves the first

1 breaker at the high-voltage site so everybody is clear  
2 what the jurisdictions are.

3 MS. RAY: Let me just add the standard  
4 that George was referring to, Nuc 001, is also  
5 referenced in this Reg. Guide. It's Rev. 2 of Nuc  
6 001.

7 MEMBER STETKAR: Good. Thanks. Thank  
8 you.

9 MS. RAY: Next slide, slide 11.  
10 Communication with Transmission System Operator. This  
11 is also included in Rev. 1 of Reg. Guide 1.93. A  
12 nuclear power plant operator should be aware of grid  
13 conditions that could affect operations and the  
14 operability of the offsite power system. The operator  
15 can also be informed of information from grid studies  
16 to manage risk.

17 Next slide, slide 12. Reg. Guide 1.93  
18 also includes information on passive designs. Passive  
19 designs may not have multiple power sources since they  
20 rely on passive systems for core cooling and  
21 containment integrity. But they can use nonsafety  
22 diesel generators if no offsite power is available.

23 However, efforts should be made to restore  
24 any inoperable diesel or offsite power source.  
25 Passive plants and evolutionary plant designs should

1 be evaluated on a case-by-case basis since they have  
2 different power sources.

3 Next slide, slide 13. Revision 0 and  
4 Revision 1 discuss operational restrictions. These  
5 restrictions are based on the intent of GDC 17 and are  
6 based on three assumptions. First, meeting the LCO.

7 Rev. 0 stated that in order to meet the  
8 LCO the LCO would be met when the sources were  
9 available per GDC 17. Rev. 1 states that the LCO is  
10 met when all LCO required sources are operable per  
11 Tech Specs.

12 Rev. 1 is also more specific in terms of  
13 voltage, capacity, and capability for the electric  
14 power sources.

15 Next slide, slide 14. For continued  
16 operations during the loss of required electric  
17 sources, licensees should evaluate the safety  
18 significance to prevent further degradation of  
19 electric power sources. Examples are continued power  
20 operation or immediate shutdown. This is similar to  
21 Rev. 0.

22 Next slide, slide 15. If compliance with  
23 the tech spec LCO is not restored within the  
24 completion time limits, the licensee should initiate  
25 an orderly shutdown. Rev. 1 makes minor

1 clarifications. The nuclear power plant can return to  
2 rated power if the tech spec LCO is restored during  
3 shutdown.

4 However, if grid conditions  
worsen, the licensee should consider a manual trip.

5 Next slide.

6 CHAIRMAN SIEBER: If the licensee  
7 determines the grid condition is not suitable, he's  
8 suppose to trip his plant? What does that do to the  
9 grid?

10 MR. MATHEW: They have to look at the tech  
11 spec for limited condition operation. If they don't  
12 have one circuit it will say to do certain actions.  
13 If they don't have two circuits, they will say whether  
14 your onsite power is available. It doesn't mean they  
15 have to immediately shut down. They have to follow  
16 the action statement in the tech spec.

17 CHAIRMAN SIEBER: You have to look at the  
18 effect of the licensee's plant on the rest of the grid  
19 to determine whether it will have emergency power to  
20 meet the plant's needs even with it shut down.

21 MR. MATHEW: Yes.

22 MR. WILSON: Yes. This is George Wilson.  
23 In addition, not only that we actually have a NOED  
24 process. In the NOED process we give notice of  
25 important discretion. It actually has a section

1 called Severe Weather.

2 We have granted in the past if the grid is  
3 actually stressed and in emergency action level, even  
4 if we have granted an extension and left the plant  
5 stay up on line until the grid recovered because we  
6 would not force the nuclear power plant to go down and  
7 then cause the grid to collapse upon itself so we  
8 worked very closely with NERC and FERC to answer your  
9 question.

10 We wouldn't make them shut down and then  
11 their offsite power not be there because it would  
12 cause the grid to collapse. There is a process that  
13 we would go back out and look at the emergency levels  
14 or action levels that the local grid was on by the  
15 transmission operator and evaluate that.

16 CHAIRMAN SIEBER: Well, that's an  
17 important consideration because if you require the  
18 nuclear power plant to shut down, or it does shut  
19 down, that places the grid itself in a much worse  
20 shape than it was in before. If the grid collapses  
21 because of that action, it affects the plant that  
22 actually shut down because it loses its supply for  
23 emergency services.

24 MR. WILSON: And that's one of the reasons  
25 that we have constant contact. There actually is grid

1 emergency with MOAs and MOUs that NERC will actually  
2 call HOO, the work headquarters operations officer,  
3 and we actually evaluate that. In fact, the  
4 electrical branch does a grid report Monday through  
5 Friday and evaluates the grid so we take into  
6 consideration. We look at that.

7 CHAIRMAN SIEBER: I think that needs to be  
8 coordinated. For example, if the grid stability is in  
9 question because of high-customer loads and, for  
10 example, you may be not able to maintain 60 cycles or  
11 voltages are low, all units are at their maximum  
12 capacity, you may want to reduce consumer load before  
13 you start cutting off generation because that really  
14 adds instability to the grid and will cause it to  
15 collapse.

16 MR. WILSON: Yeah, the grid operators  
17 following the emergency protections. They had talked  
18 about buying power and bringing it in. When you  
19 remove hard load or soft load there's a couple of  
20 terms --

21 CHAIRMAN SIEBER: In the Northeast  
22 blackout there were grid operators who did well and  
23 others who did not do as well.

24 MR. WILSON: I understand.

25 CHAIRMAN SIEBER: Fortunately we were the



1 ones that did well.

2 MS. RAY: Slide 16. This provides a  
3 comparison of levels of power system degradation.  
4 Rev. 0 defines 5 scenarios and Rev. 1 defines 7.

5 The first level in Rev. 0 one AC power  
6 source less than the LCO includes both one offsite  
7 source and also discusses the one onsite source less  
8 than LCO. This was separated and put as two levels in  
9 Rev. 1. Rev. 1 also adds one inverter less than the  
10 LCO.

11 MEMBER STETKAR: You're going to go  
12 through each of these individually?

13 MS. RAY: Yes. There is a slide on every  
14 single one of them.

15 Next slide, slide 17. The Regulatory  
16 Positions are to ensure that when electric power  
17 sources are less than the LCO, the nuclear power plant  
18 is in a safe operating mode. When Tech Specs allow  
19 continued power for operation during a specific  
20 degradation level, this is contingent on Tech Specs  
21 and the following:

22 The reliability, availability, and  
23 capability of remaining sources; that the required  
24 maintenance does not further degrade the electric  
25 power system or jeopardize safety; and there is

1 continued compliance with Tech Specs. Revision 1 also  
2 states that Tech Specs is a prevailing document if  
3 there are any inconsistencies between the Tech Specs  
4 and the Reg Guide.

5 Revision 1 also specifies coordination  
6 between the grid operator and the nuclear power plant.  
7 In addition, Revision 1 has a statement saying that  
8 the post-trip voltages shall be verified.

9 MEMBER STETKAR: So if I'm a new plant now  
10 and I don't -- I haven't really developed my technical  
11 specifications yet, I look at the generic Tech Specs  
12 and they say, okay, battery can be out for 24 hours  
13 and diesel can be out for 72 hours and so forth, that  
14 sounds pretty good to me.

15 My guys can probably do the maintenance  
16 within that time so I'll put those in my Tech Specs.  
17 Those now become my plant specific Tech Specs. There  
18 are obviously no inconsistencies between those and the  
19 numbers in this Reg Guide so everybody is happy. I  
20 haven't had to justify those numbers because they were  
21 in the generic Tech Specs. Everybody in the  
22 Regulatory accepts those numbers.

23 CHAIRMAN SIEBER: Deterministically.

24 MEMBER STETKAR: No. We already  
25 determined that there is no deterministic basis for

1       them. In an analytical sense because I don't have to  
2       justify as long as I adopt the generic Tech Specs,  
3       those numbers.

4               MR. MATHEW: So long as they are within  
5       that part.

6               MEMBER STETKAR: Okay. Thanks.

7               MR. KOSHY: This is Thomas Koshy. There  
8       is a technique and review process of the application  
9       in which we are looking at the design if they can  
10      follow those numbers and still have adequate safety.  
11      It is that initial technical review of the activity  
12      that the engineers became confident that we can live  
13      with the numbers.

14              Fortunately newer designs have only made things  
15      better. Therefore, this can remain valid and for the  
16      new generation of reactors, in fact, there may be some  
17      relaxation coming when the offsite power requirements  
18      are reduced for the passive designs. Those changes  
19      will happen but we are giving significant credit for  
20      the initial review of the design also to see that the  
21      proposed Tech Specs can remain valid.

22              MEMBER STETKAR: Well, if I'm a new design  
23      and I say my LCO for battery is 24 hours, everybody is  
24      happy and the reviewers don't question that because  
25      that is accepted.

1                   MR. KOSHY: I can give you an example. In  
2 fact, the Westinghouse Owners Group came for relaxing  
3 the DC power supply outage time. There was a staff  
4 review and they could not confirm that the logic  
5 system will put them in a decimal mode. We, in turn,  
6 denied that request for the Westinghouse Owners Group.

7                   MEMBER STETKAR: I understand if people  
8 come --

9                   MR. KOSHY: We had a process in place  
10 through which the technical people review and see  
11 those relaxations or extended time would remain  
12 suitable at the same time.

13                  MEMBER STETKAR: Okay. Thanks.

14                  MS. RAY: Slide 18, Scenario 1: When the  
15 available offsite AC power sources are one less than  
16 the LCO. When the offsite power system has no  
17 redundancy there is an associated risk for the loss of  
18 offsite power because the ability to quickly restore  
19 offsite sources would be lost.

20                  The remaining offsite circuit could be  
21 susceptible to the same issue. There is an increased  
22 consequential trip probability. And this would also  
23 affect the availability and capability of offsite  
24 system.

25                  The Regulatory Position states that power

1 operation may continue up to 72 hours. Revision 1  
2 eliminates details on the ramp-down rates and that the  
3 plant could provide reactive power up to 48 hours.

4 Revision 1 also states that a shutdown  
5 would be in accordance with Tech Specs. However, Rev.  
6 0 stated that a cold shutdown was needed within 36  
7 hours.

8 Next slide.

9 MEMBER STETKAR: Not quite yet. In the  
10 discussion the discussion serves to provide a bit of  
11 background information to justify these Regulatory  
12 Positions and the discussion says, "Operating  
13 experience indicates that availability and reliability  
14 are higher for typical offsite AC power sources than  
15 those of a typical onsite AC power source.

16 Thus, if risk is evaluated in terms of  
17 availability and capability, the risk associated with  
18 the loss of an offsite power source, the source with  
19 higher availability, would appear to be more severe.  
20 However, this apparent difference in severity is  
21 usually offset by easier maintenance of the offsite  
22 power source."

23 What's the actual operating experience to  
24 justify that? That is sort of the bases for why you  
25 feel about why the relative times for restoring an

1 offsite power source are what they are. I'm  
2 interested -- you know, this refers to actual  
3 operating experience. I would like to see what that  
4 is.

5 MR. KOSHY: This is Thomas Koshy. We have  
6 not kept the full statistics in my knowledge as to  
7 clearly validate those numbers. To give the historic  
8 perspective on this, diesel engines were originally  
9 designed for a small system. It was never designed to  
10 become a class for any power source.

11 What we have done we have put a turbo  
12 charger on it so that we can raise the power and  
13 essentially make it operable as a standby source.  
14 When you look at availability for the offsite power  
15 system, what we find historically is most of the out  
16 data are localized faults and generally even  
17 automatically isolated such that that regularly has  
18 become sooner than any problem associated with an  
19 emergency system.

20 The fact is that most emergency diesel  
21 generators wouldn't start only when there is a valid  
22 start attempt. There is no system to displace  
23 failures in the starting system. These are generally  
24 problems we have with diesels.

25 But at the same time, I should admit that

1 in all it has improved, but pretty often when you  
2 review the start data you are going to surprisingly  
3 find out if wouldn't start because something has  
4 failed in the starting system.

5 When you collectively evaluate this data,  
6 in fact, there is a full list of electrical related  
7 failures on diesels which I looked into about a year-  
8 and-a-half ago and that was a very big list. But when  
9 you compare that with the offsite power availability,  
10 it continues to be significantly superior.

11 But we can add some numbers reported even  
12 from the diesels failures are actual valid demands and  
13 we can get some numbers from the database. That is  
14 the only valid data that we have at this time.

15 MEMBER STETKAR: Okay. I just get a bit  
16 concerned when regulatory guidance cites operating  
17 experience and we can't actually find that operating  
18 experience to support this other than sort of the  
19 anecdotal information that we just heard.

20 MR. KOSHY: We do have that data on on-  
21 demand failures, yes. That is --

22 MEMBER STETKAR: I understand diesel data.  
23 What I'm questioning is the assertions that offsite  
24 power transmission lines, bus availability out in  
25 switchyards, transformers and so forth, are

1 unilaterally higher availability than diesel  
2 generators. Maybe they are.

3 I'm just asking since this cites operating  
4 experience, we must have that. We've got 104  
5 operating units and many of them have been operating  
6 for many years and they must keep information on their  
7 offsite power supply availabilities.

8 I'm not talking about total loses of  
9 offsite power here because we're not talking about  
10 station blackouts. I'm talking about the  
11 unavailability of one transmission line or a bus in  
12 the switchyard or transformer.

13 MR. KOSHY: We do not collect reports of  
14 that nature because we do not have a recording  
15 requirement. The only way we get that type of  
16 information is going to FERC and NERC and collecting  
17 some data which they may have because we have  
18 significantly relaxed the requirement about 15 years  
19 ago, I think. Sorry, maybe a little more than 15  
20 years ago.

21 That type of information aren't coming to  
22 us. We have to emphatically obtain if we have a very  
23 serious interrupt in that area. I have been living as  
24 a resident but the fact is the nuclear broke down more  
25 often than my lights flicker in my home. As a



1 resident in the neighborhood to say that my power  
2 supply was more available than the power from a  
3 nuclear station or the offsite power supply at the  
4 other site.

5 MR. MATHEW: One more clarification.

6 Actually, if you look at the offsite power, you recall  
7 offsite power is a preferred power source. The reason  
8 why it's a preferred power source it is a huge system.  
9 It's a grid with humongous power source coming in,  
10 transmission lines going. The availability of offsite  
11 power compared to onsite power which has only two  
12 diesels available for offsite power is more of a  
13 preferred type source.

14 MR. MILLER: This is Kenn Miller. Do we  
15 know was that change made to the current revision  
16 versus the old revision?

17 MS. RAY: There was additional discussion,  
18 yes.

19 MR. MILLER: We did add some more.

20 MS. RAY: Scenario 2, slide 19. This  
21 discusses a loss of redundancy of the onsite power  
22 source. Revision 1 adds the intent of GDC 17.  
23 Licensees should make efforts to restore an onsite AC  
24 source and verify the offsite source can accommodate  
25 shutdown.

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1           The Regulatory Position states that power  
2           operation may continue up to 72 hours if the redundant  
3           emergency diesel generator is tested or assessed  
4           within 24 hours.

5           Next slide.

6           MEMBER STETKAR: Thomas mentioned it. Why  
7           do we focus only on diesel generators? Two things.  
8           One, not all plants use diesel generators, especially  
9           newer plants. There is at least one design that uses  
10          gas turbines. I'm actually not concerned about it  
11          whether it's a gas turbine or a diesel generator.

12          What I'm concerned about is all of this  
13          seems to be based on the amount of time that is  
14          estimated to repair a diesel generator. There have  
15          been plants, for example, that have had fires, short  
16          circuits, mechanical failures that have impacted bus  
17          work where I had a relatively destructive amount of  
18          damage to a bus.

19          That's also one of my onsite power  
20          supplies. I'm concerned why we focus only diesel  
21          generators. Why does the world revolve around repairs  
22          and failures of diesel generators and not consider a  
23          broader scope of onsite power sources.

24          MR. KOSHY: This is Thomas Koshy. We have  
25          addressed the possibility of losing all AC through an

1 SBO. What we are saying is all the years we found out  
2 there could be certain vulnerabilities. Even if we  
3 have two redundant planes, there are certain distinct  
4 possibilities in which these two could become  
5 unavailable. That is the problem that we solved with  
6 the SBO.

In most designs you have to put  
7 redundant planes. We are assuming if, at all, there  
8 is a catastrophic failure that causes a bus failure,  
9 it will be seen as a single failure and the redundant  
10 plane will be able to deal with the accident.

11 In other words, the total collapse of the  
12 safety system is addressed through SBO. The random  
13 events that could take out one is addressed through  
14 redundancy so we solved that problem in two different  
15 ways. I hope that answers your concern.

16 MEMBER STETKAR: I'm not sure that it does  
17 but I'll have to think about it a little bit. This  
18 scenario, too, basically says I can go in and throw a  
19 crow bar across the phases of one of my safety buses,  
20 thereby vaporizing both the bus and the crow bar. I  
21 can continue operation for 72 hours in that  
22 configuration because I've determined that 72 hours is  
23 a reasonable time frame to repair a diesel. Is that  
24 correct?

25 MR. KOSHY: But what we are saying is this

1 time relevance is given for dealing with reasonably  
2 manageable problems. Like you said, vaporizing of the  
3 copper and failing we expect much more prompt action.  
4 In fact, Waterford had a failure of that nature and  
5 they opted to react.

6 I'm expecting some reasonable judgment in  
7 that case. Maintenance can recall that activity and  
8 all other systems are fine and you have off power  
9 available belonging to that window, it's reasonable.

10 We need to make a judgment call and we  
11 have our resident inspectors for the government and  
12 our managers who periodically look at these actions to  
13 see if we are addressing an issue on hand  
14 appropriately.

15 MR. CASE: This is Mike Case. There is  
16 another LCO on the availability of not the sources but  
17 the AC distribution so if you lose a bus, you're in  
18 the distribution LCO and that is probably more  
19 restrictive than -- you don't go to the availability  
20 source.

21 MEMBER STETKAR: Thank you.

22 MR. MATHEW: All the support systems are  
23 also affected.

24 MEMBER STETKAR: That's probably it.

25 Thank you very much.

1 MS. RAY: Slide 20. This is Scenario 3:  
2 When the offsite system is not available or there is  
3 inadequate capability but the onsite system is still  
4 available.

5 The Regulatory Position states that power  
6 operation may continue up to 24 hours. If one source  
7 is restored, Level 1 is applicable. However, if no  
8 offsite source is restored, the plant could be in Mode  
9 3 within six hours. Rev. 0 has stated that cold  
10 shutdown or the lowest pressure temperature state was  
11 needed within 36 hours.

12 Next slide, slide 21. Scenario --

13 MEMBER BLEY: Can I ask a question about  
14 shutdowns? Occasionally you mentioned tripping the  
15 reactor but can you explain the difference between  
16 immediate shutdown and an orderly shutdown? I can see  
17 the difference between a trip and orderly shutdown.  
18 I would think if you were doing an immediate shutdown  
19 you would also do an orderly shutdown. I was just  
20 confused as I read through this.

21 MR. WAIG: Typically the immediate reactor  
22 shutdown is implied in Tech Specs as an orderly  
23 shutdown. It isn't implied as being immediate as in  
24 pushing the reactor trip or scram push button.

25 MEMBER BLEY: But you seem to make a

1 distinction between the two and I don't know what that  
2 distinction is between immediate shutdown and orderly  
3 shutdown.

4 MR. WAIG: It could be misinterpreted from  
5 someone in the general public who read this. I think  
6 for most licensees the immediacy of it is based on the  
7 Tech Spec requirement to be in a mode in a certain  
8 period of time, in this case six hours.

9 Generally the six hours. Generally it  
10 takes four hours to get the plant from 100 percent  
11 power down to Mode 3 so that gives them two hours on  
12 the front end to prepare for it, making notifications,  
13 and four hours to shut down.

14 MEMBER BLEY: But then what you just said,  
15 you could call that either an immediate shutdown or an  
16 orderly shutdown.

17 MR. WAIG: It could be implied.

18 MEMBER BLEY: I'll pull out a couple of  
19 these places where I think you've made a distinction  
20 and I don't get it. I don't know what is  
21 distinguished between the two.

22 MEMBER STETKAR: Thirty-six years ago --  
23 well, 30 years ago there were plants that interpreted  
24 immediate shutdown that if you had eight hours, when  
25 it was seven hours, 58 minutes, and 30 seconds the

1 operator was posed above the manual trip button and  
2 your power was 100 percent. That was the  
3 interpretation of an immediate shutdown compliance  
4 with the Tech Specs. I don't know whether that --  
5 that may have changed.

6 CHAIRMAN SIEBER: The licensees didn't do  
7 that.

8 MEMBER BLEY: There were some, Jack.

9 MEMBER STETKAR: Maybe we're one for two.

10 MR. MATHEW: Shutdown we are referring to  
11 in this section you follow the cool down rate  
12 specified in the Tech Specs. You follow all of those.  
13 It's consistent with the Tech Spec terminology and the  
14 rest of the action statements.

15 MEMBER BROWN: That is a difference from  
16 Rev. 0. If you look at Rev. 0 it says in roughly 36  
17 hours you have to go and achieve a cold shutdown rate  
18 for a number of these circumstances within 36 hours.  
19 That was deleted from all. There were several in Rev.  
20 0 also said ramp down rate should be considered. That  
21 was deleted from Rev. 1 also.

22 There was a considerable reduction in what  
23 I call operational detail in terms of getting from  
24 point A to point B and they only really addressed the  
25 time you could consider to operate. After that it was

1 go shutdown in accordance with your Tech Specs.

2 Not being a commercial operator, that's  
3 different from the naval nuclear plants the way we did  
4 things. I didn't have a context but it was a  
5 deletion. It was just a significant difference  
6 between Rev. 0 and Rev. 1, just a change in how to you  
7 get from power to nonpower. It also allows us to sit  
8 at very low powers in Rev. 0 which were also deleted  
9 from Rev. 1. I think they were all deleted.

10 MS. RAY: That's correct.

11 MEMBER BROWN: Okay. That's one of the  
12 significant differences between 0 and 1.

13 MS. RAY: Slide 21, Scenario 4: When there  
14 is a loss of redundancy in the onsite and offsite  
15 power systems. The Regulatory Position states that  
16 power operation may continue for up to 12 hours if  
17 there is sufficient capacity and voltage on the  
18 offsite system and there is an ability to restore one  
19 source within 12 hours.

20 If one source is restored, either Level 1  
21 or Level 2 is applicable. Revision 1 eliminates the  
22 provision for staying at a minimum power level for 12  
23 hours if conditions for a continued power operation  
24 cannot be met.

25 Next slide.



1 MEMBER STETKAR: Nope. Not quite.

2 MS. RAY: Sorry.

3 MEMBER STETKAR: The text for both  
4 Scenario 3 and Scenario 4 -- in Scenario 4 you've kind  
5 of paraphrased it. For Scenario 3 it says, "If the  
6 available offsite AC power sources are two less than  
7 the LCO, power operation may continue for 24 hours or  
8 for the time period specified in plant specific  
9 specifications if it appears likely that at least one  
10 of the offsite sources can be restored within that  
11 time."

12 For position 4 it says, "If the available  
13 offsite non-site AC power sources are each one less  
14 than the LCO, power operation may continue for 12  
15 hours if it appears highly likely that at least one of  
16 the affected sources can be restored within 12 hours  
17 and if the electric grid system capacity and voltage  
18 is such that a subsequent single failure would not  
19 cause a total loss of offsite power."

20 I had to finish the sentence. Who  
21 determines (a) what is likely, and (b) what the  
22 appearance of likelihood is, and what is the  
23 difference between appearing likely and appearing  
24 highly likely. Those are now words that appear in  
25 regulatory guidance so --

1                   MR. KOSHY: This is a case -- This is Tom  
2                   Koshy again. This is a case where we will be checking  
3                   the essential conditions through our FERC and NERC  
4                   friends who will essentially share with us, for  
5                   example, conditions like flooding, some which may have  
6                   affected some transmission towers and we find that to  
7                   be a bad situation, that is what we will consider to  
8                   be a very bad situation where we lack confidence that  
9                   it can be recovered --

10                  That will be a case specific evaluation  
11                  where we need to engage other parties who have  
12                  knowledge of the wider area natural rather than just  
13                  licensee's own word. That is where I'm sure our  
14                  office will come in the picture and operations will  
15                  collect the valid data and make a relevant judgment.  
16                  This will likely be a decision based on other  
17                  information available to us.

18                  MEMBER STETKAR: Tom, is that collective  
19                  decision -- when you say us, is it made with NRC staff  
20                  or is it simply something that the licensee and the  
21                  TSO make that determination? In other words, who  
22                  makes this determination that, indeed, it's highly  
23                  likely that power will be restored or it's not very  
24                  likely that power will be destroyed? Is the staff  
25                  involved in that decision making?

1 MR. KOSHY: We reach them and they will  
2 get in touch with the headquarters for the collective  
3 knowledge based on that.

4 MEMBER STETKAR: Let Tom finish because  
5 it's important to get on the record.

6 Can you repeat that?

7 MR. CASE: It's a licensee decision.

8 MR. MATHEW: It's the licensee given the  
9 feedback from the grid operator what the conditions  
10 are. However, we verify that, whether that is true or  
11 not.

12 MEMBER STETKAR: After the fact. My  
13 question is is there a requirement --

14 MR. KOSHY: While it is happening.

15 MEMBER STETKAR: Well, that's what I was  
16 asking. Is there a requirement that the licensee  
17 contact the region or that the region contact  
18 headquarters at least getting the region involved in  
19 this situation when they make this determination?

20 In other words, suppose everybody is the  
21 internal optimist and everybody knows that we are  
22 going to get power back and 24 hours expires and  
23 everybody discovers that they're wrong. Is that  
24 decision, is that judgment collectively -- does the  
25 staff, through the region at least, have input to that

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1 decision?

2 MR. CASE: It's a licensee decision. We  
3 have enormous operational awareness by having the  
4 resident there and all the other ways that we are  
5 informed of what the plant is doing. It's basically  
6 a licensee decision. We would become involved because  
7 it would be unusual at best they could do this without  
8 NRC operational awareness.

9 CHAIRMAN SIEBER: But if it's in the  
10 middle of the night and the resident is not there, it  
11 could happen.

12 MR. WILSON: It could happen but, like I  
13 said -- this is George Wilson again. It could happen  
14 but we followed up on the grid situation. The  
15 residents come in and they didn't like what they read.  
16 We've called the actual local transmission operators  
17 and got the exact status. If that would be the case,  
18 we would come back and challenge the licensee in their  
19 decision. I know that is after the fact.

20 MEMBER STETKAR: That's after the -- yeah.  
21 That's like 12 hours which could happen.

22 MR. WILSON: It wouldn't be good for the  
23 licensee if we challenged their fact and had it --

24 MEMBER STETKAR: Okay.

25 MR. MATHEW: The point I was trying to

1 make is let's say they have 24 hours they had to take  
2 some action. They think they need more time so the  
3 process they use is enforcement description, NOED  
4 process. That process --

5 MEMBER STETKAR: I understand. That's  
6 extending it. What this says is that I'm the licensee  
7 and something happens. A bus vaporizes out in the  
8 switchyard and I call up my TSO and I say, "Okay, run  
9 your contingency analysis or give me or contingency  
10 analysis that you've already run for this condition."

11 They say, "It's pretty likely that we'll  
12 hang in there for 12 hours." I decide, fine, I'm  
13 going to stay operating. If the TSO says, "Ah, gee.  
14 It's the hottest day in the summertime. We just lost  
15 a transmission line."

16 It's 50 miles from your site but because  
17 the way the grid works it looks like you might lose  
18 the other bus, then I have to shut down according to  
19 this. It's not coming to the staff and saying, "I  
20 need four or five more hours." It's making that  
21 determination that I can, indeed, remain operating.

22 MR. MATHEW: You're right. Usually the  
23 licensee makes a decision and if the resident  
24 inspectors have concerns over NRR electrical events  
25 getting more, they can still take enforcement action.

1           They still want to make sure the offsite  
2 power is operable. In some cases we may find that  
3 they are not forwarding the Tech Spec per Region I  
4 which clearly says that you have to communicate with  
5 the TSO and make sure your duties are reliable and  
6 operable.

7           MR. KOSHY: This is Thomas Koshy again.  
8 If it is bad news, it spreads fast. Or if there is  
9 something very unusual, it moves very fast and we get  
10 elevated attention on it.

11           If it trips or the transmission line came  
12 down, those things we consider to be discoverable in  
13 a reasonable amount of time. For example, if it is in  
14 the peak of summer load or if something happened, it's  
15 made known to our regional staff who will in turn be  
16 consulting with the Electrical Branch for making a  
17 good decision.

18           Generally speaking, if you didn't hear  
19 about it, we will think that it was a minor problem  
20 that could be managed within the outage time and the  
21 judgment would be fine and we have a way of looking at  
22 it through our staff to see if the call made by the  
23 licensee was reasonable. The sooner we hear about it,  
24 we will be better prepared to deal with it.

25           MS. RAY: Slide 22.

1 CHAIRMAN SIEBER: Let's continue on.

2 MEMBER BROWN: Go back on the nuances just  
3 to follow up on John's comment. That was one of the  
4 interesting things relative to differences. If you  
5 look at Rev. 0 Scenario -- I don't know which one it  
6 was, both offsite power, less than two offsite.

7 The offsite power are two less than the  
8 LCO. That's 3. There you use the term if it appears  
9 likely. In Rev. 0 you also did the same thing for  
10 Scenario 4 which is one offsite and one onsite. You  
11 used likely again.

12 Rev. 1 you have now changed 4 to say  
13 highly likely as opposed to just likely. There is a  
14 nuance change in one scenario to the next. I guess  
15 that was one thing that I didn't quite understand.  
16 Why change it at all if you are going to maintain  
17 continuity?

18 MR. WAIG: When I was reading this, I read  
19 it as being more restrictive in that you have a  
20 comfort level that is going to be highly likely that  
21 they will get the line restored prior to reaching your  
22 --

23 MEMBER BROWN: That's in Scenario 4.

24 MR. WAIG: Right. So likely, highly  
25 likely --

1                   MEMBER BROWN: I understand. After 30  
2 years of one thing and the exact same condition, now  
3 we're getting less comfortable with the words. It  
4 seems that when the previous basis for sticking with  
5 these is based on operational experiences, we're  
6 comfortable with the performance times and everything  
7 else.

8                   The changes are interesting. That's one  
9 point. I understand your point. I don't want to  
10 belabor that. It's just something to think -- it just  
11 got me thinking. I don't know what to do with that  
12 right now.

13                  MR. WAIG: In think to put it in practical  
14 terms, if you have a real actuation you lose a line.  
15 It's pretty easily restored likely. If the tower goes  
16 down on that line, it's not going to be easily  
17 restored or likely that it's going to be restored  
18 within that CT, that Tech Spec completion time.

19                  MEMBER BROWN: Okay. Now, the second  
20 question was relative to the deletion of all the 36  
21 hours from power down to shutdown condition, whatever  
22 the circumstances were where you deleted all those.

23                  I presume the licensees because of the  
24 guidance in Rev. 0 would have positioned their Tech  
25 Specs to be consistent with what is in here. Now



1 that's gone so instead of 36 hours they may choose to  
2 achieve a shutdown condition in 48.

3 MR. WAIG: Typically they --

4 MEMBER BROWN: There is no guidance now.  
5 It just says you should shut it down with a few  
6 exceptions where you use the word promptly.

7 MR. WAIG: Because we followed the  
8 Standard Tech Spec format. After 24 hours had  
9 expired, there would be an LCO 303 which has that  
10 shutdown sequence clearly identified within the LCO  
11 303 so rather than just regurgitate the 303  
12 requirements, we just said follow the Tech Specs after  
13 the 24 hours so we deleted that 36 out of there.

14 MEMBER BROWN: But weren't those -- An LCO  
15 303 -- is that a naval nuclear propulsion emergency  
16 operation system? I have no idea what you're talking  
17 about. I'm just looking for where they go to find  
18 these to develop the LCO 303. Is that the Reg Guide  
19 and that's why it reads that way?

20 MR. WAIG: That's their standard text.

21 MEMBER BROWN: Yes, but it was probably  
22 based on this. Right?

23 MEMBER STETKAR: A 303 is when you get out  
24 of your --

25 MEMBER BROWN: They probably got the

1 numbers from these guidance documents.

2 MR. WAIG: That's where it came from.

3 CHAIRMAN SIEBER: Why don't we try to move  
4 along.

5 MEMBER BROWN: Let's go on. Deleting them  
6 was questionable. There was no basis for deleting the  
7 numbers. That's all.

8 CHAIRMAN SIEBER: We have five more slides  
9 to go and four minutes to do them in.

10 MEMBER BROWN: You're going to manage this  
11 better than I did the last one. Right, Jack?

12 CHAIRMAN SIEBER: Yes, I am.

13 MEMBER BROWN: Thank you for being blunt.

14 MS. RAY: Scenario 5: When the onsite  
15 sources are two less than the LCO. The Regulatory  
16 Position states that power operation may continue for  
17 two hours unless one source is restored in which case  
18 Level 2 is applicable. Otherwise, a shutdown is  
19 needed for Tech Specs.

20 As stated, Rev. 0 had the statement that shutdown is  
21 needed within 36 hours.

22 Next slide, Scenario 6: When the available  
23 onsite DC sources are one less than the LCO. The  
24 Regulatory Position states that power operation may  
25 continue up to two hours. If one source is restored,

1       there are no restrictions. Otherwise, a shutdown is  
2       needed for Tech Specs.

3               Rev. 0 had stated a shutdown is needed  
4       within the next 36 hours. Rev. 1 also includes a  
5       statement for passive reactors where the battery  
6       should be monitored so they can perform functions for  
7       long duration.

8               Next slide. Scenario 7 is new to Rev. 1  
9       This is when there is a lack of required redundancy in  
10      the inverters. Regulatory Position states that power  
11      operation may continue for 25 hours. When one  
12      inverter is restored there are no restrictions.  
13      Otherwise, a shutdown is needed for Tech Specs.

14              MEMBER STETKAR: What an inverter?

15              MS. RAY: It is --

16              MEMBER STETKAR: I know it makes AC out of  
17      DC but this generically applies to inverters. Now  
18      I've seen plants that have inverters that supply very  
19      smooth AC power for instrumentation. Those are old  
20      designs. I've seen plants that have inverters that  
21      supply AC power for all protection and safeguards  
22      functions.

23              They are, in fact, the surrogates for the  
24      DC batteries in the new plant designs. It strikes me  
25      that the effects from having one or the other of those

1       inverters out of service could be quite different.  
2       Yet, there is no distinction.

3               Any inverter is apparently an inverter and  
4       it's okay to have an inverter out of service for 24  
5       hours because all generic inverters are generically  
6       the same and they all provide the same function.

7               I was curious because this is something  
8       that's new. This is one of the few things -- this is  
9       newly new. It's not the missing combination of one  
10      onsite power source being available that was missed in  
11      Rev. 0.

12              This is the only new electrical thing in  
13      this entire Regulatory Guide. I was curious now since  
14      this is 2011 and we really understand things, what is  
15      the basis for the 24 hours for any generic converter  
16      regardless of what function it provides in any plant  
17      design?

18              MR. MILLER: Can you say again what were  
19      the two examples?

20              MEMBER STETKAR: In old plant designs --  
21      and I have to be careful because I get trapped in the  
22      same genericism that we all do. In most older  
23      existing plant designs inverters were used to power  
24      instrumentation divisions where you needed a nice  
25      smooth reliable source of power. You have an

1 alternate backup supply and things like that.

2 In some new plant designs their protection  
3 and safeguards actuation functions are, in fact, AC  
4 powered. They are not DC powered. They are AC  
5 powered from inverters. The batteries exist in the  
6 plant but the batteries exist to provide two  
7 functions.

8 There are some actual DC fired squib  
9 valves or DC motor operated valves that need DC power  
10 but the DC batteries from a protection and safeguards  
11 actuation function only power the inverters. Those  
12 inverters now are not -- they are different than  
13 instrument inverters in the old plants. You follow  
14 me?

15 CHAIRMAN SIEBER: If they're powering the  
16 protection system and they fail, the protection system  
17 actuates and shuts down the plant.

18 MEMBER STETKAR: For a reactor trip that's  
19 true from that division. For a safeguards actuation  
20 that's false because the safeguards actuation is  
21 energized to actuate so you lose that division of  
22 safeguards actuation.

23 CHAIRMAN SIEBER: Right. And there's more  
24 than one inverter.

25 MEMBER STETKAR: That's right but in that

1 case that inverter is functionally equivalent to a  
2 battery in an older plant design.

3 MR. WILSON: These inverters we're talking  
4 about from the safety-related batteries need either  
5 the 120 or the 125 volt safety-related buses. That's  
6 these specific inverters that we're talking about.

7 MEMBER STETKAR: Okay. Those are  
8 the --

9 MR. WILSON: Those are your safety-related  
10 inverters that go from your safety batteries and  
11 transfer power.

12 MEMBER STETKAR: But what do -- what are  
13 the loads from those safety-related AC buses, bus  
14 instrumentation or --

15 MR. MATHEW: This is Vital 120 power for  
16 typical power plant. It feeds controlled power  
17 instrumentation of circuits. This is not part of the  
18 RPS instrumentation.

19 MEMBER STETKAR: In new plants it is. Yes  
20 it is.

21 MR. MATHEW: We're talking about the  
22 specific section of the Tech Spec which is currently  
23 -- I don't know what the Tech Spec section is. There  
24 is a section called Vital AC. These are the inverters  
25 they are talking about.

1 MR. CASE: It's a specific section that  
2 addresses the inverters for the standard plant for  
3 Tech Specs -- Standard Tech Specs. I don't know if it  
4 includes what you're referring to or not.

5 MS. RAY: It may be helpful to include a  
6 finished --

7 MEMBER STETKAR: The first -- when I read  
8 this I understand this in the context of currently  
9 operating plants and the Standard Tech Specs. I  
10 understand this. I am aware of at least one new plant  
11 design, and I don't recall off the top of my head if  
12 there is more than one that, indeed, has offered their  
13 protection as fast reactor trip.

14 I'm not worried about reactor trip as Jack  
15 mentioned. Downpowering that is good but -- well,  
16 it's the safe direction. The safeguards actuation if  
17 I lose power, if that inverter is out, I've lost that  
18 entire division.

19 Plus, indeed, if you pick up the  
20 instrumentation, I've lost everything associated with  
21 that division. If the intent of this is to target the  
22 scope of inverters as it's understood for currently  
23 operating plants, it may require a bit of  
24 qualification because this Regulatory Guide explicitly  
25 does apply for new plants also.

1 MR. WILSON: This is George Wilson again.  
2 We need to be careful. There is also a catch-all Tech  
3 Spec, it's either 305 or 306, which causes you to  
4 cascade down. If you're going to look at a new plant  
5 design, you have to look at the distribution system  
6 for that plant design.

7 As you had asked the question earlier, we  
8 said there was LCOs for the distribution system.  
9 Well, there is also LCOs for other systems. If you  
10 look at a new plant design, this is generic for the  
11 Standard Tech Specs.

12 If you look at the new plant design, as an  
13 SRO or an operator of that plant, I have to look and  
14 if I take this down what are the other LCOs I'm in.  
15 If this is performing an additional function and a new  
16 plant design, not only will they be in this LCO for  
17 the inverter but they will be in another associated  
18 LCO for the other function which might be more  
19 limiting.

20 If the LCOs don't cover it, you cascade  
21 down through the LCOs. There's actually a catch-all  
22 LCO, I think it's 305 or 306, which forces the cascade  
23 down through different Tech Specs if it's not  
24 addressed and that is a catch-all that would handle  
25 the situation that you're talking about.



1                   MR. WAIG: I think, too, in the very first  
2 paragraph of the Reg Guide they refer to this Reg  
3 Guide applies to single and multi-unit plants and it  
4 is consistent with the Standard Technical  
5 Specifications which is the standard plant design that  
6 this is derived from.

7                   MEMBER STETKAR: Currently operating  
8 nuclear power plants, not new designs.

9                   MR. MILLER: The ones that match are CE,  
10 Westinghouse, GE, Babcock & Wilcox. That's what all  
11 the Standard Tech Specs are based on.

12                  MR. MATHEW: If it's a new reactor which  
13 is not a standardized type reactor, then I had to come  
14 up with the new LCO.

15                  MEMBER STETKAR: This comes back around to  
16 my concern about specifying times because if I look at  
17 Scenario 6 where I have one battery out, I continue  
18 operation for two hours.

19                  If I have a new plant design and I have  
20 one of my inverters out which, indeed, is worse than  
21 having a battery out from a plant, I can continue  
22 operation for 24 hours. According to this Regulatory  
23 Guidance published in 2011 that applies for new plants  
24 and existing plants.

25                  MR. KOSHY: This is Thomas Koshy. I

1 mentioned before that if there is a new design coming,  
2 our design review process looks into the availability  
3 of the Tech Spec. I mentioned the case where  
4 Westinghouse Owners Group came and asked for extension  
5 for the specified time.

6 The staff denied it because of the pump  
7 for the logic system that they are relying on for  
8 certain actions. In fact, what I recall is requesting  
9 production of the pump to containment would have  
10 helped the situation. Staff, in turn, denied that  
11 request.

12 MEMBER STETKAR: That was --

13 MR. KOSHY: The review process in which we  
14 are going to ascertain if it is suitable to give an  
15 extension of the time and at the same time if the  
16 existing time can apply to this new design.

17 MEMBER STETKAR: The second part is what  
18 I'm interesting in hearing. The first part is I'm an  
19 applicant and I'm not asking to extend beyond 24  
20 hours. I'm just invoking the Standard Tech Specs.  
21 I'm going to keep my inverter out of service for 24  
22 hours -- 23 hours, 59 minutes, 58 seconds, and not  
23 shut down my plant because that is consistent with the  
24 regulatory guidance. That is accepted regulatory  
25 guidance.

1           MR. KOSHY: In that case, the staff will  
2 be reviewing if that will be a risk or not before  
3 approval.

4           MEMBER STETKAR: How and when do they  
5 review that? I'm not aware of the Tech Spec reviews  
6 looking at risk or challenging any of these standard  
7 times.

8           MR. KOSHY: Okay. When initially when the  
9 applicant submits it, and also before the approval the  
10 staff is making a well-informed decision for the  
11 design that we are giving a license with the Tech  
12 Specs that is generally acceptable. That is part of  
13 the licensing review process.

14          MR. MATHARU: They, Tom. This is Singh  
15 Matharu of the Technical Branch. Just to emphasize  
16 what we're discussing here, I think we are preparing  
17 the LCO for the battery system which is typically two  
18 hours. Then we are saying that the LCO for the  
19 inverter which is supplied from the battery and may be  
20 more critical is now 24 hours.

21               I think what we need to clarify here is  
22 the basic assumption that we started from that you  
23 have inverters that are used for control logic. Then  
24 you have inverters that are used for protective  
25 functions which is the RPS, and maybe the plant action

1 system as they are called in some cases.

2 Essentially the standard design for the  
3 pressurized and for the boiling water is logical in  
4 order for trade. The typical design has boiling water  
5 for the protection aspect where we energize to  
6 actuate. Then for the control function there is a  
7 little separate set of inverters that I use.

8 Because of the redundancy in the water  
9 system, we are allowing more time, whereas in the DC  
10 system in the existing design can only be two  
11 batteries, one for each train. That is why the  
12 electrician in the LCO use the inverter.

13 CHAIRMAN SIEBER: Could I ask you, sir, to  
14 state your name and affiliation, please, for the  
15 record?

16 MR. MATHARU: Yes. My name is Singh  
17 Matharu and I work in the Electrical Branch, NRR.

18 CHAIRMAN SIEBER: Okay. Thank you.

19 MR. KOSHY: I have specific background in  
20 BWR design. In that case the motor function  
21 essentially in the RPS system and in the later designs  
22 inverters were needed for the ECCS situation part  
23 also.

24 The difference between inverter given more  
25 relaxation than the battery because once the system

1 has actuated, the logic made up and then, for example,  
2 ECCS motors can continue to run even if inverters are  
3 not available.

4           Whereas the diesel system is needed for  
5 assist to be made and also for operating the control  
6 system for the breakers even for operators to take  
7 manual controls. The absence of inverters can  
8 compensate during the accident investigation phase for  
9 directly manually controlling ECCS once the situation  
10 has began.

11           What I'm saying is inverters can produce  
12 more relaxation than DC power sources because of the  
13 further capability in manual assistance being  
14 continuously available. This I'm speaking in the  
15 light of the BWR design that I'm familiar with.

16           CHAIRMAN SIEBER: Does that answer your  
17 question?

18           MEMBER STETKAR: No, but that's okay.

19           CHAIRMAN SIEBER: Well, why don't we move  
20 on then.

21           MR. MATHEW: I think the short answer is  
22 if it's not a standard design, we have to review it as  
23 part of the technical review whether 24 hours  
24 mentioned here is conservative or not.

25           MR. WILSON: And this is George Wilson.

1       What I was trying to emphasize, I have to look at the  
2       form fit function of what design does.  It's not a one  
3       catch all because I might have -- if I take out a  
4       system and it affects another system, I might be in  
5       multiple LCOs.

6               That's what I'm talking about case effect.  It's  
7       the same effect if my design is different and I take  
8       out a piece of equipment and it takes out multiple  
9       pieces of equipment.

10               Unless it specifically states like with  
11       cooling water for a diesel that I'm both in the diesel  
12       and the cooling water, then it's the responsibility of  
13       the licensed operator to cascade through the Tech  
14       Specs and see what all is affected and enter the  
15       appropriate Tech Spec at that place and that's what  
16       they're trained to do.

17               MEMBER STETKAR:  I'm looking at the Tech  
18       Specs for a new plant design and they have two hours  
19       for a battery and they have 72 hours for an inverter  
20       and their inverters provide power to both their  
21       reactor protection and their safeguards actuation.  It  
22       happens to be a boiling water reactor.  We can go on.

23               MS. RAY:  Slide 25.  We received comments  
24       letters from four organizations and the majority of  
25       the comments were incorporated.  There were six

1 comments on Section D, the Implementation Section.

2 There were two comments to use the  
3 terminology "Offsite Circuit."

4 The terminology "Offsite Power System" is used in this  
5 Reg Guide and consistent with GDC 17.

6 There was one comment to address those  
7 plants that may have variations or subtle differences  
8 in the Standard Tech Specs. The last bullet includes  
9 the wording that was included in Rev. 1.

10 Next slide. There was three comments  
11 stating that the nuclear power plant may not have  
12 access to the grid analysis tool and the transition  
13 system operator can verify the post-trip voltages and  
14 communicate this information into the nuclear power  
15 plant.

16 The wording in Section C (Regulatory  
17 Position) was revised as shown in the first bullet.  
18 The second bullet includes the revised wording in Rev.  
19 1, Regulatory Position 1.

20 It was revised for consistency between  
21 Regulatory Position 1 and Regulatory Position 4. In  
22 summary Reg Guide 1.93 discusses the staff positions  
23 for when alternate power sources are less than the  
24 LCO.

25 CHAIRMAN SIEBER: Thank you.

1 MS. RAY: That's all I have.

2 CHAIRMAN SIEBER: Any questions? If there  
3 are no questions, why don't we take a 15-minute break  
4 until 3:30.

5 (Whereupon, at 3:13 p.m. off the record  
6 until 3:29 p.m.)

7 CHAIRMAN SIEBER: We will continue with  
8 the second section of this subcommittee meeting which  
9 is Regulatory Guide 1.218, Condition-Monitoring  
10 Techniques for Electric Cables Used in Nuclear Power  
11 Plants.

12 MR. BURKE: We have a new cast of  
13 presenters. Darrell Murdock is here to present this  
14 one from Brookhaven National Lab. Mike helped Darrell  
15 put this together.

16 Darrell, it's all yours.

17 MR. MURDOCK: Good afternoon. As you  
18 mentioned, my name is Darrell Murdock and I'll be  
19 presenting Regulatory Guide 1.218, Condition-  
20 Monitoring Techniques for Electric Cables Used in  
21 Nuclear Power Plants.

22 The purpose of this Regulatory Guide is to  
23 provide the essential elements of a condition  
24 monitoring program and a list of condition monitoring  
25 techniques.



1           This Regulatory Guide was generated in  
2           response to industry's request for guidance on  
3           condition monitoring techniques that the energy staff  
4           finds acceptable.

5           This Regulatory Guide applies to all  
6           cables within the scope of 10 CFR 50.65 which is the  
7           Maintenance Rule.

8           CHAIRMAN   SIEBER:  That includes  
9           underground cables that might be subject to water  
10          intrusion and so forth, plus cables in cable trays  
11          inside the plant.

12          MR. MURDOCK:  Yes.

13          CHAIRMAN SIEBER:  All cables.

14          MR. MURDOCK:  Any cable within the scope  
15          of the Maintenance Rule.

16          CHAIRMAN SIEBER:  Okay.

17          MR. MURDOCK:  Next slide, please.

18          Based on operating experience, the number  
19          of cable failures show an increasing trend with plant  
20          age.  These cable failures have resulted in plant  
21          transients and shutdowns, loss of safety functions,  
22          entries into LCOs, and challenges to plant operators.

23          Some of the NRC generic communication that  
24          document cable failures are Information Notice 89-63,  
25          Information Notice 2002-12, Generic Letter 2007-01,

1 and Information Notice 2010-26.

2 This upward trend in cable failures has  
3 increased the need for condition monitoring to ensure  
4 operational readiness of cables relied upon for  
5 accident mitigation and avoiding unnecessary  
6 operational transients.

7 The NRC staff was able to gather more than  
8 200 records of cables that were severely degraded and  
9 that have failed from the licensees response to  
10 Generic Letter 2007-01 which was reviewed by the ACRS.

11 Based on that information that we gather  
12 from Generic Letter 2007-01 we were able to come up  
13 with two basic graphs that shows an increasing trend  
14 in cable failure with plant age.

15 This first graph shows the numbers of failures as a  
16 function of year in service.

17 Next slide.

18 CHAIRMAN SIEBER: Do you have a comment on  
19 the number of -- the limited number of cables in the  
20 30 to 40 year range?

21 MR. MURDOCK: Yes.

22 MR. KOSHY: This is Thomas Koshy. I may  
23 be able to comment on that. In some plants where the  
24 cable failures are predominant they need gross  
25 replacement. Once a ground cable fails from moisture

1 intrusion, rather than taking a chance of another one  
2 failing, they replace all underground cables that may  
3 have a problem.

4 Such widespread replacement happened in  
5 about four or five plants where this type of failure  
6 happened a few times. That is why you'll see the  
7 number came down in the 31-40 period because of those  
8 replacements that many plants have done.

9 CHAIRMAN SIEBER: Have you taken the time  
10 or the effort to put this data in terms of percentages  
11 of failures for the number of cables that are in these  
12 various categories?

13 MR. MURDOCK: Yes.

14 MR. KOSHY: This is again Thomas Koshy.  
15 Let me put it slightly differently. These failures  
16 did happen during normal operating conditions. This  
17 was an indication for us the cables are failing  
18 contrary to our expectations that cables are good for  
19 a long time.

20 What we are trying to answer is if this  
21 many cables failed under normal operating conditions,  
22 under design basis events the number of failures could  
23 be higher. We are trying to reach this problem from  
24 a preventive perspective. In a sense, we want to  
25 manage this cable failure well ahead or it becomes a

1 serious problem when we have potential design basis  
2 events.

3 During design basis events, power will be  
4 lower, current demand will be higher, and the duration  
5 of operation will be more challenging than what has  
6 happened during this span of normal operational  
7 activities. That is a problem that we are trying to  
8 solve by trying to get ahead of the curve.

9 CHAIRMAN SIEBER: Okay. So --

10 MR. KOSHY: That is the reason we took  
11 this approach when we saw this trend increasing from  
12 the data we collected in the Generic Letter.

13 CHAIRMAN SIEBER: Okay. So the answer to  
14 my question is no, you don't have data in terms of  
15 percentages.

16 MR. KOSHY: That is correct which is the  
17 reason we proceeded with the limited information.

18 MR. MATHEW: Let me clarify some more.  
19 Actually, we issued a summary report in 2008 which is  
20 available publicly. This has more graphs and more  
21 data which summarizes all the data in regard to part  
22 of the General Letter response.

23 The bottom line is we are seeing an  
24 increase in the failure rate. To answer your question  
25 why the 31 to 40 years the graph looks smaller,

1 because not all the plants are in that range. As  
2 regard to data, certain number of plants were in that  
3 group so that is why it's a small percentage.

4 MR. MURDOCK: Specifically in 2007 when  
5 the Generic Letter was issued only 40 percent of the  
6 plants were within that age group of 31 to 40.

7 CHAIRMAN SIEBER: Okay. Now, that's a new  
8 Reg. Do you know the number?

9 MR. MURDOCK: I can give you the ML  
10 number. The summary report was issued in November 12,  
11 2008. This report is available publicly. The ML  
12 number is 082760385.

13 MS. ANTONESCU: Can you send that to us,  
14 please?

15 MR. MURDOCK: Yes.

16 MEMBER BLEY: Does that show this kind of  
17 statistics against the number of plants in operation  
18 that fall within the category?

19 MR. MURDOCK: I'm sorry. What was the  
20 question?

21 MEMBER BLEY: Okay. These are growing  
22 with age but also we have a number of plants that are  
23 quite old. Then we have plants, quite a number of  
24 them, that are middle-aged plant. From a picture like  
25 this you can't tell -- do you have one against age of

1 the plant at the time of cable failure instead of this  
2 by calendar year which doesn't tell us very much  
3 except there are more of them now than there were  
4 yesterday?

5 MR. MATHEW: We have a curve that shows  
6 number of failures versus years in service.

7 MEMBER BLEY: Okay.

8 MEMBER STETKAR: It's in that reference.

9 CHAIRMAN SIEBER: We'll get the reference.

10 MR. MATHEW: We wrote up good information  
11 in this report.

12 MEMBER BLEY: Great.

13 MR. MATHEW: For the purpose of the time  
14 we didn't capture all the slides here.

15 CHAIRMAN SIEBER: We'll get the reference  
16 and read it.

17 MEMBER RYAN: You mentioned there cables  
18 that are wet versus cables that are not wet. Do you  
19 have failure data on cables that are wet versus not  
20 wet? I'm interested in underground cables that are in  
21 the saturated zone or in the zone of water  
22 fluctuation.

23 MR. MATHEW: No. The Generic Letter we  
24 didn't ask specific questions like that. We said any  
25 which is covered under the maintenance rule of the

1 scope. The failures include both cables that are wet  
2 but we could find out --

3 MEMBER RYAN: How do you know that they  
4 include both if they are not separated into two  
5 groups?

6 MR. MATHEW: Right. So if you look at the  
7 report we have the cause of failure, contributing  
8 cause. You can look at that and see what caused the  
9 cable to fail. Some of them will say moisture  
10 intrusion or submerged.

11 MEMBER RYAN: Okay. So it's not exactly  
12 explicit that it's under water but if it's submerged  
13 --

14 MR. MATHEW: If it is submerged, then most  
15 likely contributing cause is going to be moisture.

16 MEMBER RYAN: That's fine. So there is  
17 some data to that effect.

18 CHAIRMAN SIEBER: For the purposes of  
19 trying to figure out what is the best test as sort of  
20 a side issue and why don't we just move on to that.  
21 Slide 7.

22 MR. MURDOCK: To have an effective  
23 condition-monitoring techniques licensee should chose  
24 a technique or combination of techniques based on  
25 plant-specific installations, applications, operating

1 conditions, and operating experience.

2 CHAIRMAN SIEBER: Okay.

3 MR. MURDOCK: The condition-monitoring of  
4 cables may be limited to a representative sample of  
5 cables based on operating condition and operating  
6 experience. The frequency at which licensees due  
7 condition monitoring may be adjusted based on  
8 demonstrated plant specific cable test results and  
9 operating experience.

10 CHAIRMAN SIEBER: I presume you do this in  
11 the same kind of way that you do with other in-service  
12 inspections? For example, steam generator tubes. You  
13 start with a small sample size, you find some  
14 failures, you expand the sample size, and increase the  
15 frequency at which you test. Is that correct?

16 MR. MURDOCK: Similar to that, yes.

17 CHAIRMAN SIEBER: Okay. Thank you.

18 MR. MURDOCK: Some of the most commonly  
19 used condition-monitoring techniques are very low  
20 frequency test, visual inspection, dielectric loss-  
21 dissipation factor or tan delta, partial discharge  
22 test, and time domain reflectometry.

23 Next slide, please. For plants entering  
24 their relicensing period, the generic aging lessons  
25 mandates that these plants perform some condition



1 monitoring. Aging Management Program XI.E1, XI.E2,  
2 and XI.E3 address cables condition monitoring.

3 Specifically, XI.E3, which is the  
4 inaccessible power cables not subject to 10 CFR 50.49  
5 Environmental Qualification Requirements. Under  
6 Detection of Aging Effects, it states that the first  
7 tests for license renewal are to be completed prior to  
8 the period of extended operation with subsequent test  
9 performed at least every six years thereafter.

10 The applicant can assess the condition of  
11 the cable installation with reasonable confidence  
12 using one or more of the condition monitoring  
13 techniques. The draft guide version of Reg Guide  
14 1.218 is referenced in AMP XI.E3. Also, Regulatory  
15 Guide 1.218 can be an effective tool that licensees  
16 can use to fulfill the monitoring requirement put  
17 forward by the Generic Aging Lessons Learned.

18 CHAIRMAN SIEBER: Could I presume that  
19 since this appears in the GALL report that there is no  
20 requirement for plants that are not undergoing license  
21 renewal?

22 MR. MURDOCK: Well, the idea with this, or  
23 what I was trying to convey, is that even plants that  
24 are beyond the 40-year life also require to do  
25 condition monitoring and licensees can use Regulatory

1 Guide 1.218 as a tool.

2 MEMBER STETKAR: If I have a currently  
3 operating plant and I've been operating for --

4 CHAIRMAN SIEBER: Three years.

5 MEMBER STETKAR: -- 15 years. I was going  
6 to use that as an example.

7 CHAIRMAN SIEBER: Okay.

8 MEMBER STETKAR: -- 15 years, I don't need  
9 to implement this cable monitoring program until I  
10 reach the age of slightly before 40. Is that correct?

11 MR. MATHEW: Yes.

12 MEMBER STETKAR: This does apply prior to  
13 the period of extended operation or slightly before.

14 MR. MATHEW: I think what Darrell was  
15 trying to say is if they have to test the cables for  
16 aging management part of the license renewal phase,  
17 right now the license renewal in our Aging Management  
18 Program says you have to test the cables but it  
19 doesn't say what kind of test and what kind of  
20 techniques to use.

21 You could use this Reg Guide. There is no  
22 requirement. This is just a guidance licensees could  
23 use. This is a guidance to choose if they want to use  
24 any of the matters.

25 CHAIRMAN SIEBER: On the other hand, if I

1 go back to Slide 5 and add those three up, 190, 198  
2 failures total shown on this graph on Slide 5.

3 MR. MATHEW: If you look at the summary  
4 report, you will see the breakdown of how many  
5 failures. If I'm not mistaken, there are about 268  
6 failures reported. These failures are not really the  
7 exact numbers because many of the licensees when they  
8 start operating the plant, they haven't had much of a  
9 database for tracking failures. We think that they  
10 may have more failures than really reported but this  
11 is the information that is part of the Generic Letter.

12 CHAIRMAN SIEBER: This Reg Guide doesn't  
13 address plants that aren't in license renewal?

14 MR. BURKE: No, not directly.

15 MR. MATHEW: Not directly.

16 MR. BURKE: Under the maintenance rule you  
17 do have to do some type of performance monitoring for  
18 all of your systems in the maintenance rule.

19 CHAIRMAN SIEBER: Yeah, but you could just  
20 measure the cable and that wouldn't match any of the  
21 recommended surveillance that's in this Reg Guide.  
22 Right?

23 MR. WILSON: This is George Wilson. I  
24 want to clarify something. The licensees have to show  
25 that their systems will perform the function just like

1 the maintenance rule. To answer your question, let's  
2 say that the cables are in a wetted environment, or  
3 there is a test that they know that they are not  
4 testing a characteristic.

5 There have been violations already written  
6 in the field by the different regions for the failure  
7 to test the cables properly. We've already written  
8 violations against the industry on this.

9 The reason that the Reg Guide came out is  
10 we wanted the industry to know that there's different  
11 types of tests that are out there and the  
12 characteristics. To answer your question, an existing  
13 plant they are not committed to this. This is a brand  
14 new Reg Guide.

15 CHAIRMAN SIEBER: Right.

16 MR. WILSON: But have violations been  
17 written for inadequate corrective actions? Not having  
18 the testing criterion XI? Yes. there have been  
19 several violations against cables in the operating  
20 plants.

21 CHAIRMAN SIEBER: Violations based on QA  
22 program?

23 MR. WILSON: That is correct.

24 CHAIRMAN SIEBER: Yeah, I remember those.

25 MR. WILSON: So, to answer your question,

1 yes, they won't be required to commit to this  
2 regulatory guide but they do have to ensure that their  
3 cables can perform their functions and there have been  
4 several violations.

5 CHAIRMAN SIEBER: Okay. Move on.

6 MR. MURDOCK: Next slide, please. On of  
7 the documents that serves as a basis for Regulatory  
8 Guide 1.218 was NUREG/CR-7000 which is the essential  
9 elements of an effective cable condition monitoring  
10 program.

11 This NUREG lists the essential elements  
12 for an effective cable condition monitoring program,  
13 industry guidance and standards, and the experience  
14 and observations of others who have studied or  
15 conducted electric cable condition monitoring in  
16 qualification testing.

17 This NUREG also provides guidance on the  
18 following technical aspects; the selection of cables  
19 to be included in the program, characterization and  
20 monitoring of cable operating environments and  
21 stressors, selection of the most effective and  
22 practical condition monitoring techniques,  
23 documentation and review of cable condition monitoring  
24 testing and inspection results, periodic review and  
25 assessment of cable condition and operating

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1 environments.

2 MEMBER REMPE: When I looked at the Reg  
3 Guide it said like a representative number of cables  
4 should be selected. What's the thought behind what  
5 makes representative. Is it a 10th or one out of 100  
6 or what?

7 MR. MURDOCK: It should be based on the  
8 operating condition in which the cable is in and the  
9 operating condition and operating experience for that  
10 cable.

11 MR. KOSHY: This is Thomas Koshy. What we  
12 are attempting to clarify there is let's say the  
13 cables that go to a storage pump room has about 20 of  
14 them and they are new cables. Even though there is a  
15 moisture condition, they believe that a cable will be  
16 good for 10 or 15 years.

17 But if you sample one or two and make sure  
18 that your measurements are consistent and it doesn't  
19 show any conditions of degradation, they can proceed  
20 to go with that feeling in a sense, reduce of  
21 frequency of testing.

22 As soon as they find that the readings are  
23 going down, they should take a wider sample and take  
24 more drastic action. What we are saying in that  
25 particular type of cable and in the range of

1 environment, don't try to test all of them but sample  
2 studies are practically achievable and can be achieve  
3 reasonable confidence.

4 MR. BURKE: We're not as prescriptive as,  
5 say, the ASME code would be for ISI on typing.

6 CHAIRMAN SIEBER: Right.

7 MEMBER STETKAR: Has any guidance been  
8 developed? Not necessarily regulatory guidance but  
9 I'm thinking EPRI guidance or any I guidance? Have  
10 any of those organizations developed guidance about  
11 how you perform that selection process or sampling  
12 process? It is a valid question. If you just say,  
13 well --

14 MR. KOSHY: This is in an evolving stage  
15 in the sense the EPRI has found their first generation  
16 for cable testing and they did not ask for an  
17 endorsement. They have put out a document and I think  
18 they are trying it out in the field. I'm hoping that  
19 in the coming years they may come up with some better  
20 recommendations on which we may be able to endorse or  
21 maybe do some generic reviews on. This time it is  
22 still evolving and we do not have an EPRI document  
23 that we can endorse.

24 MEMBER STETKAR: Okay. I was just  
25 thinking, you know, there is guidance and it's even in

1 GALL Rev. 2, for example. When I think of buried  
2 piping, for example, you know, there's guidance that  
3 if I have this type of material and this type of  
4 environment, I need to do this many samples.

5 If I have these other types of materials  
6 in a different type of environment, I should perform  
7 a different number of samples. Quite a bit of thought  
8 and effort went into that guidance. It allows you to  
9 relax the number of samples that you take depending on  
10 experience or it tells you that you should increase  
11 the number of samples. I was just curious in the  
12 cable regime whether there was a similar effort. I  
13 guess what we heard is maybe EPRI is doing something  
14 but --

15 MR. VILLARAN: This is Mike Villaran from  
16 Brookhaven Laboratory. There have been several  
17 documents that came out with guidance as far as cable  
18 testing and, as you said, testing under different  
19 environments you require different types of tests and  
20 more increased frequencies of tests and so forth.  
21 Several of those references are in the NUREG CR-7000.  
22 It is Sandia Report 0344. It's IEEE standard. I  
23 think it's 1205 that has information on testing --

24 MEMBER STETKAR: But that's the selection  
25 of --



1 MR. KOSHY: But that's not sampling. That  
2 is testing technique only.

3 MEMBER STETKAR: That's right. I was  
4 going to make that point.

5 MR. KOSHY: There is no sampling guide  
6 available at this time for various environments that  
7 a nuclear plant is subjected to.

8 MEMBER STETKAR: You know, the example of,  
9 well, I have about 20 cables going to this location  
10 and it probably makes sense to sample a couple of  
11 them. I'm not using couple in the sense of two. It's  
12 in the sense of sort of a vague notion. The sampling  
13 program can be an important element of this testing  
14 and monitoring function.

15 MR. MATHEW: Maybe in the future if we  
16 have guidance in that area, we will put it in the  
17 future revisions probably. Right now I understand  
18 there are statistical sampling that is available that  
19 is industries choose to use it, they can use it.

20 Right now the focus is to characterize in  
21 a percentage sampling basis versus environment. We  
22 have, let's say, we have an environment which is a  
23 mild environment. You select certain samples. Maybe  
24 a statistical approach may be a better approach for  
25 now. That's what we envision.

1 MR. MURDOCK: Next slide, please, Slide  
2 No. 10. Regulatory Guide 1.218 has three Regulatory  
3 Positions, the first of which is essential elements of  
4 a condition-monitoring program. These elements which  
5 are listed are consistent with the ones that are  
6 listed in NUREG CR-7000.

7 Next slide, please. Regulatory Position  
8 No. 2 states that the NRC staff considers the use of  
9 appropriately selected combinations of typical cable  
10 condition-monitoring techniques to be an acceptable  
11 method for satisfying the regulations to assess the  
12 continuity of the systems and the conditions of their  
13 components.

14 The condition monitoring techniques  
15 selected should be based on plant-specific design,  
16 installation, and operating conditions and operating  
17 experience related to the cables used in nuclear  
18 plants.

19 Next slide, please, Slide No. 12.  
20 Regulatory Position No. 3 states that the cable  
21 condition monitoring should be augmented under these  
22 conditions for selected cables when the facility has:

23 Experienced failure of cables connected to  
24 critical equipment; operational history indicates  
25 failure of cables; there is a locally adverse

1 operating environment; industry operating experience  
2 with similar conditions and equipment configuration to  
3 those at the licensed facility indicate a need for  
4 augmented monitoring.

5 Next slide, please, Slide No. 13. Direct  
6 Guide 1240 was issued for public comments on June 13,  
7 2010, and the comment period expired on August 13,  
8 2010.

9 A large number of the public comments  
10 received pertain to weaknesses associated with a  
11 number of condition monitoring techniques. The staff  
12 responded to these comments by modifying the  
13 discussion of the condition monitoring technique as  
14 appropriate.

15 Next slide, please, Slide 14. In summary,  
16 Regulatory Guide 1.218 provides guidance on the  
17 essential elements of a condition monitoring program  
18 and a list of condition monitoring techniques that the  
19 NRC staff finds acceptable.

20 Next slide, please.

21 CHAIRMAN SIEBER: Do any members have any  
22 additional questions they would like to ask?

23 MEMBER STETKAR: One simple one. This is  
24 a good list of possible testing programs and benefits  
25 and definities for each one. Do you expect to update

1 this Reg Guide at a frequency that is more frequent  
2 than typical 25 to 30 year Regulatory Guidance updates  
3 to keep abreast with things that are being learned?

4 There are several of these testing  
5 techniques that are still fairly new, if you will.  
6 Show promise but, you know, the jury is still out  
7 about how effective they may be for different types of  
8 cable configurations.

9 MR. CASE: Where we are headed with the  
10 Reg Guide program is, you're right, 25 years is a way  
11 long time to revise them so we set up in the  
12 management directive a five-year program so we'll  
13 revisit all the Reg Guides within five years.

14 Hopefully a lot of them won't need  
15 updating. We can focus on ones like this where we  
16 want to get new information in. Quite frankly, the  
17 folks in License Renewal have GALL set up that way.  
18 They have got a good five-year program where they come  
19 back and they take a look.

20 MEMBER STETKAR: I was thinking some of  
21 the experience that we've seen in the license renewals  
22 where it's an evolving process. Many times the  
23 applicants will come in and say, "Look, you are asking  
24 us to commit to things that sound good on paper but we  
25 don't really have any real definite experience to

1       apply.

2                   Whether it's cable monitoring or whether  
3       it's examination of socket welds or underground piping  
4       there are a few of these issues that are evolving.  
5       I'm glad to hear there is a plan to keep a breast of  
6       the developments.

7                   CHAIRMAN SIEBER:  What I think will happen  
8       there is sort of a parallel with between electrical  
9       cable and the steam generator tubes.  For example,  
10      when steam generator tubes started to get faults and  
11      degradation and so forth, all of a sudden came new  
12      probes, new techniques, new ways of analyzing new  
13      inspection requirements, expanding scope and so forth.

14                  I suspect that as these failures increase,  
15      if I can interpret these tables correctly, that there  
16      is going to be pressure in this area to develop new  
17      examination techniques, frequencies, ways to improve,  
18      and so forth, which I think should be the subject of  
19      IEEE codes.

20                  I would encourage the staff to encourage  
21      the IEEE to take a look at this issue because, you  
22      know, as plants age, and every one of them is aging --  
23      there's none that escape that as plants age -- there  
24      is going to be additional attention needed in this  
25      area.

1 MR. MATHEW: Actually, from our side, the  
2 Electrical Branch in NRR, we are actively involved  
3 with a lot of industry groups, internationally, too,  
4 with NEA, IEC. Actually, we are helping them to write  
5 some condition monitoring guides. We will release all  
6 this information. If there is any new lessons learned  
7 or operating experience coming out of that, we'll  
8 factor in the future revisions.

9 CHAIRMAN SIEBER: Okay.

10 MR. BURKE: One of the things that Mike  
11 mentioned earlier was some of us are up here because  
12 Satish Agrawal retired and he's not -- he's the one  
13 that wrote this but he's not around anymore to present  
14 it, but he's still IEEE chairman. He's interested in  
15 this issue. I would suspect he will want those IEEE  
16 standards developed that apply to this.

17 CHAIRMAN SIEBER: I think that the agency  
18 has told all of us that we had to retain the knowledge  
19 base as the agency ages and the people in it age and  
20 are replaced. I think I've seen some good examples  
21 where research has already done that. I encourage  
22 that here in particular because we are all getting  
23 older and we need to maintain the knowledge that we  
24 have in the agency so that it can continue to  
25 function.

1 MR. MATHEW: We need an Aging Management  
2 Program.

3 MEMBER STETKAR: We already have aging  
4 management.

5 MR. KOSHY: This is Thomas Koshy. We have  
6 conducted some research at South Carolina University  
7 and they are developing a new technique which is a  
8 combination of two existing techniques. That appears  
9 to be promising.

10 We have genuine research happening. Also  
11 the LIDAR technology is being further tested. Pretty  
12 soon I hope that we may have one single test which  
13 would be applicable for various types of cables.

14 If those things become more promising and  
15 we have actual verified evidence that one test is good  
16 for all, we could soon consider endorsing that  
17 approach when the industry has matured enough to gain  
18 confidence in that approach.

19 CHAIRMAN SIEBER: Thank you. I would like  
20 to ask the members if they have any additional  
21 questions or --

22 MEMBER BLEY: Oh, questions. Okay.

23 CHAIRMAN SIEBER: Yes. Go ahead.

24 MEMBER BLEY: I thought you were coming  
25 for comments but questions, I do. Is there an

1 associated SRP or some new guidance for your reviewers  
2 for how to -- this lays out lots of different  
3 programs, tells how they all work and what they --  
4 doesn't tell how they work, tells what they do and  
5 what you can tell by them.

6 Guidance to help your reviewers look over  
7 a licensee's plan to determine whether they think that  
8 plan may include several of these different test  
9 methods is really adequate for the kind of problems  
10 they are having.

11 MR. MATHEW: Right now we don't have  
12 anything. Maybe in the future.

13 MEMBER BLEY: Do you think you need it or  
14 do you think this is enough?

15 MR. MATHEW: This is enough. I mean, any  
16 reviews staff always looks at applicable Reg guides or  
17 any other documents like IEEE documents. Those are  
18 all given. Inspectors they look at in terms of  
19 license and basis so what is licensee committed to.

20 MEMBER BLEY: I guess what's guiding me  
21 here is we've seen these in license renewals. We've  
22 seen the stuff on wetted cables and that's really  
23 related to this and the problem there and that there  
24 were no specific requirements associated with wetted  
25 cables.



1           They have been urged to put together a  
2           program using these kind of methods to look to the  
3           future. That's a program that requires judgment on  
4           the part of you folks to decide, or the NRR folks, to  
5           decide if what is being proposed is adequately  
6           implementing a combination of these things. I'm just  
7           wondering how do we make those decisions.

8           MR. MATHEW: That's being done through  
9           various inspection arena. Say, for instance, there is  
10          a design inspection, DCBI inspections. They look at  
11          the design and they look at the component. If the  
12          cable is selected, they look at that aspect.

13          In the licensing review we focus on  
14          regulatory requirements. For a cable typically they  
15          had to follow the GDC 17 requirements and they had to  
16          follow the requirements. In the licensing phase we  
17          look at whether they meet the regulatory requirements  
18          and the applicable regulatory guides staff looks at  
19          those.

20          From an inspection perspective they have  
21          enough guidance to look at what is adequate  
22          surveillance, what is adequate maintenance, what  
23          current testing they need to do.

24          MEMBER BLEY: Okay. Well, it hadn't  
25          sounded that way when we heard people talk about it,

1 especially with respect to wetted cables. Maybe it is  
2 here. It seems you have a good tool here for people  
3 to use if they really know how to go from this catalog  
4 to a program. I'm just wondering where that comes up.

5 MR. MATHEW: Matt has --

6 MEMBER BLEY: Good judgment is, of course,  
7 it but there's a lot of stuff there.

8 MR. McCONNELL: My name is Matthew  
9 McConnell --

10 PARTICIPANT: This is --

11 CHAIRMAN SIEBER: One at a time, please.

12 MR. McCONNELL: This is Matthew McConnell.  
13 I'm with the Electrical Engineering Branch. I'm  
14 responsible for reviewing a lot of the cable issues  
15 that come across our path. I've been supporting  
16 license renewal on several of these issues including  
17 what you're referring to as wetted cables.

18 I wanted to make sure there is  
19 clarification between what is considered a wetted  
20 cable and a submerged cable. We consider those  
21 different. We don't think any of the techniques that  
22 are provided even in this Reg Guide are going to  
23 justify continued submergence.

24 What they are suppose to do is it  
25 considers that you have a cable that is installed in

1 its environment that it's actually qualified to, or  
2 designed to is actually a better word. There is no  
3 cure for having a cable or permitting a cable to  
4 continue to be submerged. I want to make sure that's  
5 clear.

6 As Roy was saying as far as having  
7 guidance or SRP guidance with respect to the  
8 reviewers, I think it's just general understanding  
9 that we would review and take any document that was  
10 available to us as far as IEEE documents, NUREGs, Reg  
11 Guides, manufacturer recommendations. We always  
12 bundle those things and take everything into  
13 consideration as we review.

14 MEMBER BLEY: But as to your first  
15 comment, I understand it's never a good thing. I also  
16 understand that we'll probably never get a way from  
17 the fact that various conditions will probably lead to  
18 these things being flooded again in the future. I was  
19 hoping to get something that integrates us together.

20 CHAIRMAN SIEBER: There are cable designs  
21 that are suitable for submerged operation.  
22 Unfortunately, none of them are in power plants that  
23 I'm aware of.

24 MR. McCONNELL: I think there are some in  
25 the Florida plants. There are some that their local

1 requirements actually specify that they have to have  
2 lead sheathed cables and the cables have to be  
3 submerged and able to survive.

4 CHAIRMAN SIEBER: The Atlantic cable that  
5 was laid 100 years ago and operated for many, many  
6 years.

7 MEMBER STETKAR: In the license renewal  
8 process when an applicant comes in with an Aging  
9 Management Program, right now this particular issue is  
10 admittedly an evolving issue but in principle as we go  
11 forward, an applicant will come in and say, "I'm going  
12 to apply a particular Aging Management Program for  
13 this set of cables and I will do that by performing  
14 this type of cable monitoring and testing."

15 One from column A and two from column B  
16 kind of stuff. Who reviews -- back to Dennis'  
17 question, who and when are the reviews of the details  
18 of those programs? Who does that?

19 MR. McCONNELL: That's our license renewal  
20 folks. I would like to defer to Cliff Douth. They go  
21 out to these sites and perform audits but I think  
22 Cliff would be a better --

23 MEMBER STETKAR: So they are the folks who  
24 actually make the determination that, indeed, that  
25 particular combination is appropriate.

1                   MR. McCONNELL: Absolutely. We make sure  
2 we are in constant communication as we are  
3 participating. I think, as Roy was saying, ICC is the  
4 insulating conductor committee of IEEE that is  
5 actually part of the 400 standards documents, or  
6 series of documents, that we are endorsing with this  
7 Reg Guide. Anytime there is an update or something to  
8 be learned, we make sure we keep them informed.

9                   MEMBER STETKAR: But at that level -- and  
10 maybe the license renewal folks would like to weigh in  
11 on this. At that level it's really not an inspection  
12 function, is it? It's part of the staff's review of  
13 the license renewal application. Isn't it?

14                  MR. DOUTT: I'll give it a shot. Cliff  
15 Dutt, License Renewal. Run it by me again, sir.

16                  MEMBER STETKAR: The question is who  
17 performs the type of assessment that Dennis was  
18 talking about that said an applicant for a license  
19 renewal -- I'm thinking going forward now that we have  
20 some regulatory guidance that gives you a list of  
21 possible monitoring and testing techniques.

22                  An applicant going forward will commit to  
23 implement some combination of those techniques in  
24 principle for different cables in their plant. Who in  
25 the staff reviews that list and says, "Yes, indeed.

1 This seems to be a reasonable set of techniques for  
2 the particular cables that you're proposing."

3 Is it done during the license renewal? In  
4 other words, is it done during the license renewal  
5 review or is it left to the regional inspectors after  
6 the license is renewed?

7 MR. DOUTT: As we did in GALL 2, you can  
8 tell we were leading so some of the things are  
9 similar. In ours we list some test techniques. We  
10 don't have them select them.

11 MEMBER STETKAR: Okay.

12 MR. DOUTT: Basically we're just saying  
13 you're committing to a program. It will be  
14 implemented at some point. As time goes on depending  
15 on the cable type condition, or whatever, it depends  
16 on the test.

17 In some cases we are very limited on what  
18 test we can run at this point. It's not shielded  
19 power or something like that. That selection  
20 depending on that program may not have selected it  
21 yet. We're just saying the program is in place.

22 At some point in time, and this has been  
23 a question we had when we were doing GALL 2, is what  
24 test would be appropriate. One of the ACRS comments  
25 at the time was the same thing we just got here was

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1 where is that table with cable type and material and  
2 whatever and what test would you run.

3 We're not there yet. We essentially use  
4 the draft Reg Guide as a reference as well and we're  
5 somewhat in sync. The Reg Guide doesn't say these are  
6 things that might work depending on where you're at.  
7 That determination is evolving, just like you said.

8 MEMBER STETKAR: But in principle --

9 MR. DOUTT: Time frame.

10 MEMBER STETKAR: Yeah. If I have a plant  
11 that goes into the period of extended operation next  
12 year, for example, they will have in principle a  
13 testing -- you know, a monitoring and testing program  
14 that will specify procedures and frequencies and  
15 sampling and so forth.

16 MR. DOUTT: Well, one thing, sampling for  
17 us we've already determined the cables so from a E-3  
18 point of view we already know the cable so it's not a  
19 sampling per se. Now, the overall cable monitoring  
20 program may include license for no cables but our  
21 cables are specific.

22 E-1, which is a visual inspection, is  
23 sampled but it doesn't involve testing. E-2 is  
24 testing but, again, specific cables are identified.  
25 We came up with the sampling like for piping or

1 whatever is an E-6 or E-4. That's where we end up.

2 MEMBER STETKAR: I understand that but, as  
3 was noted earlier, this monitoring and testing program  
4 applies to the full scope of all cables that are under  
5 the maintenance rule. I guess my question then, if I  
6 expand it back out to that, is the determination of  
7 adequacy of the program made simply by inspection,  
8 regional inspection.

9 MR. MATHEW: Actually, let me -- I think  
10 there is a procedure in the license renewal phase  
11 meaning 40-year plus. This is 71003, right? The  
12 proposed license renewal inspection that needs to be  
13 done at all plants. Then follow that procedure to see  
14 how the program was implemented. Part of that all  
15 these questions will come.

16 MEMBER STETKAR: And that's an inspection  
17 program. That's handled through the regions or --

18 MR. DOUTT: You're looking at once people  
19 went back and looked at the program. We've also in  
20 the process of going to 60 and 80 discussions is to  
21 what answer is effective, how they've been working,  
22 what test and things have been shown to be effective.

23 That is going on as well. A specific  
24 answer like saying, okay, this cable type or this  
25 configuration in this environment what test if



1 effective. There are programs usually in place at the  
2 plant.

3 I mean, existing program I knew but  
4 generally there is a test implementation there that  
5 they have either shown to be effective currently and  
6 they have gotten good results as far as relatively  
7 easy to implement. In some cases with certain cable  
8 types we are very limited as to what we can look at  
9 and that is an issue going forward.

10 MEMBER STETKAR: Okay. Thanks.

11 CHAIRMAN SIEBER: And the type of service  
12 that the cable is in is very important also.

13 MR. DOUTT: Right.

14 CHAIRMAN SIEBER: Whether it is  
15 continuously operating or not and what loads are on  
16 it.

17 MR. DOUTT: Right. Our major concern has  
18 been meeting voltage and lower voltage power. That's  
19 where our testing concerns are. This Reg Guide is  
20 much broader still.

21 CHAIRMAN SIEBER: Right. Okay. Thanks.

22 MR. McCONNELL: If I could just add one  
23 more thing. This is Matt McConnell again. There is  
24 a general expectation in the requirements for  
25 condition-monitoring techniques to be applicable

1 today. We've already specified that in 10 CFR 50.65  
2 so that would be more of a regional type instruction.

3 CHAIRMAN SIEBER: Right.

4 MR. McCONNELL: As far as cables go  
5 because they have such a heightened interest lately,  
6 we are in constant communication with our regional  
7 counterparts.

8 CHAIRMAN SIEBER: Yes. But even though  
9 the regions have responsibility for inspecting it,  
10 they do it in the course of the inspection. The  
11 inspection manual really needs guidance from you, sir,  
12 to do it, and NRR.

13 MR. McCONNELL: Okay.

14 CHAIRMAN SIEBER: As I see it.

15 Okay. Are there any other comments from  
16 the staff that they would like to make at this time?

17 If not, thank you very much for your  
18 presentation. It's well done. The meeting is not  
19 over until 5:30 believe it or not so I want to use  
20 that time effectively to determine what it is we need  
21 to do. This is the Subcommittee of the Regulatory  
22 Policies and Practices. I'm not even on that  
23 subcommittee but I'm glad to be here.

24 There are a number of things that we can  
25 do. We will need to advise the full committee as to

1 what our intentions are on Friday and the alternatives  
2 that we have we can write a memorandum or full ACRS  
3 letter that says, "Issued these regulatory guides" as  
4 you have developed them at which time the staff will  
5 cheer.

6 Or we can decide if we will either hold an  
7 additional subcommittee meeting if necessary, or take  
8 it to a full committee meeting sometime in the  
9 relatively near future. If we take that course of  
10 action, we have to have a reason for doing so. What  
11 I want to do is I want to individually look at each  
12 Reg Guide so we are going to go around the room twice.

13 MEMBER STETKAR: Is this on the record or  
14 do you want to close the meeting?

15 CHAIRMAN SIEBER: I don't know. Should we  
16 do it on the record? I was going to use the  
17 transcript to figure out what everybody says.

18 MEMBER STETKAR: You're the chairman.

19 CHAIRMAN SIEBER: Let me keep it on the  
20 record with this caveat. The caveat is that what we  
21 say now represents a preliminary opinion of each of  
22 the individual members which may change as we think  
23 about it some more because we've only had basically  
24 our prep time plus three-and-a-half hours to think  
25 about it while we're here.

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1           This doesn't represent a final opinion but  
2           it will help guide me as to what course of action we  
3           will take and what will be the elements of content in  
4           that course of action. What I want to do is go around  
5           the room for each one of the Regulatory Guides.

6           I'm going to start with 1.93 and I'm going  
7           to ask, first of all, do you think that we can issue  
8           a memo to the staff that says this Regulatory Guide is  
9           okay as it now exist for final issue. The answer to  
10          that is yes or no. If not, what needs to be changed.

11          I think, Joy, I'll start with you.

12          MEMBER REMPE: Okay. I guess I would say  
13          no because I would really like to see some of the  
14          comments raised at the meeting addressed before it's  
15          issued. There were a lot of issues raised about where  
16          do the hours come from for continued operation. The  
17          description of an inverter, I think, needs to be  
18          clarified.

19          There are a lot of other items that were  
20          brought up by different members. I think it doesn't  
21          need to be lengthy but just having a letter going to  
22          John saying what the basis of the hours is isn't  
23          enough.

24          I think that ought to somehow be -- even  
25          if it's not a great basis ought to be put in the Reg

1 Guide so that when it's updated five years from now  
2 that people know, "Well, that needs to be changed."

3 CHAIRMAN SIEBER: Okay.

4 Charlie.

5 MEMBER BROWN: Okay. The no means what  
6 and the yes means what?

7 (Laughter)

8 CHAIRMAN SIEBER: No means we write a  
9 letter.

10 MEMBER BROWN: Okay. What does yes mean?

11 CHAIRMAN SIEBER: Yes means that we send  
12 them a memo.

13 MEMBER BROWN: My side would be yes, send  
14 a memo. I paged through Rev. 0 and Rev. 1 item by  
15 item and list by list. The changes between the two  
16 were minimal. Roughly equivalent to separating the  
17 old position one into two and adding the inverters.

18 The second point being that the basic  
19 times at which the plants were operating stayed the  
20 same. The only thing deleted were the times to  
21 achieve a shutdown position. Yet, you referenced tech  
22 specs and those are fairly standard tech specs that  
23 people are using.

24 I just don't see where a formal letter  
25 would add anymore. I understand Joy's concern about

1 where is the basis for the times. John brought it up  
2 but they were developed 40 years ago based on  
3 experience. I tend to go with the point that  
4 experience has been validated to be relatively  
5 satisfactory.

6 CHAIRMAN SIEBER: The program is, not to  
7 argue with you --

8 MEMBER BROWN: Well, you can.

9 CHAIRMAN SIEBER: -- but four years ago  
10 there was not experience.

11 (Laughter)

12 MEMBER BROWN: Not to argue with you but  
13 --

14 CHAIRMAN SIEBER: The only experience is  
15 the one commercial plant that I happen to work at.

16 MEMBER BROWN: Oh, come on. No. I don't  
17 necessarily agree with that. There is a lot of  
18 operating experience with other types of facilities  
19 relative to backup power and all that type of stuff  
20 that people were able to draw on in whatever  
21 experience they had. In general I think that has  
22 probably been validated. My opinion is, yes, we go  
23 with the memo.

24 CHAIRMAN SIEBER: We will argue. Thank  
25 you.

1 MEMBER BROWN: Next time you won't ask.

2 CHAIRMAN SIEBER: I like to argue.

3 John.

4 MEMBER STETKAR: Surprisingly enough  
5 somewhere in between I think that we should not issue  
6 a memo. I think that --

7 CHAIRMAN SIEBER: Okay.

8 MEMBER STETKAR: The reason for that is  
9 despite my badgering, if you will, of the staff  
10 regarding the basis for the numbers, a lot of my  
11 concern was primarily the fact that we already have  
12 the technical specifications and there was a lot of  
13 discussion about each plant having it's own technical  
14 specifications or, for whatever reason, adopting  
15 generic technical specifications which, in principle,  
16 they need to provide a basis for.

17 My bigger concern was perpetuating these  
18 numbers in a regulatory document that doesn't serve a  
19 plant specific purpose. They are simply generic  
20 numbers. Yet, it said the plant specific technical  
21 specifications always trump this and for new designs  
22 they are developing their own technical specifications  
23 so we need to consider those separately.

24 The question is why perpetuate the numbers  
25 in this particular Regulatory Guidance when, indeed,

1 the numbers in the plant specific technical  
2 specifications, either for an existing plant or a new  
3 plant going forward, regardless of whatever Tech Specs  
4 they adopt, will be the operative guidance for LCOs.

5 This being the Regulatory Guidance doesn't  
6 have any merit. It does, indeed, from a reviewer's  
7 perspective prompt you to look at the different types  
8 of contingencies and configurations.

9 It explicitly does prompt you to make sure  
10 that there is an agreement in place with the grid  
11 operator and that agreement does look at different  
12 contingencies. There is a lot of useful guidance in  
13 there. It's just the numbers themselves.

14 It's apparently somewhat of a fundamental  
15 difference of opinion. For that reason, I would say  
16 I would like to see whether the staff has any feedback  
17 based on our discussions before we issue anything one  
18 way or the other.

19 CHAIRMAN SIEBER: Okay. We'll do that at  
20 the very end.

21 Ordinarily the chairman gets to not  
22 express an opinion but I'm going to anyway. I think  
23 no, we shouldn't issue a memo and that we need to go  
24 further. One of the things that bothers me is the  
25 numbers also because I don't see any big effort to try



1 to risk inform those numbers.

2 I think that after 40 years of operating  
3 experience with 100 plants that we ought to be able to  
4 do something from that operating record about what the  
5 risk really is.

6 Maybe risk information will tell us something  
7 different than arbitrary selections that were made 30  
8 years ago when there wasn't a lot of data. On the  
9 other hand, if we tell them that, that is a setback  
10 for several more years probably in the issuance of  
11 this.

12 Does it make any difference when Rev. 0  
13 was in 1974 and the first revision was in 2011? Maybe  
14 37 years of elapsed time isn't bothersome. On the  
15 other hand, when I look at the differences between  
16 Rev. 0 and Rev. 1, they are not great.

17 MEMBER STETKAR: I think the only  
18 substantive -- if you cast the inverters aside, the  
19 only substantive difference is to put in the  
20 Regulatory Guidance the information from the Generic  
21 Letter that basically says you do need to provide  
22 assurance that you have in place the agreements with  
23 the offsite grid operator such that contingencies out  
24 in the grid how they affect you, you are aware of  
25 them, and contingencies in your power plant how they

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1 may affect the grid are communicated. That's a  
2 difference that I do see.

3 CHAIRMAN SIEBER: There is another aspect  
4 to that that I think is my own personal opinion. I  
5 think different grid operators do different things.

6 Again, there is no risk information but  
7 they can look at things like stability, power factor,  
8 degradation, the chance of losing additional units  
9 which can cause the whole system to crumble. Or their  
10 system operator willingness to shed non-essential  
11 loads to save the rest of the system. If you know --

12 MEMBER STETKAR: And they know that.

13 CHAIRMAN SIEBER: -- the Northeast  
14 blackout, PJM was not a part of that. There's a bunch  
15 of nuclear reviews on the PJM systems. On the other  
16 hand, they are very solidly connected to their  
17 northern power group. In my judgment one system  
18 operator did a little better than another one in  
19 making the quick decisions that's necessary in a  
20 deteriorating grid situation.

21 I don't think agreements and analysis and  
22 that kind of stuff can overcome some of these emergent  
23 operating issues. I don't have the world's greatest  
24 faith in the ability to rely totally on system  
25 operator's risk analysis.

1           As I recall, to run -- and it's been a  
2 while, you know. I'm back in old computer days when it  
3 took several hours to do a stability run. I don't  
4 know whether you can do that in a very rapid fashion  
5 but in the days when I worked with it, it took a while  
6 in order to be able to determine whether the system  
7 was stable or not.

8           I think that there has to be some margin  
9 in there that the plants will protect themselves if  
10 necessary and make sure that they are in pretty good  
11 shape.

12           I wouldn't place 100 percent faith on the  
13 instant ability of the most skilful operation of a  
14 system. It's very complex and has a lot of self-  
15 initiating devices in there that will take action away  
16 from the operator to do it.

17           Sam, would you like to comment first on  
18 whether we ought to issue a memo, yes or no?

19           MEMBER BROWN: By memo you still mean just  
20 a memo --

21           CHAIRMAN SIEBER: We don't issue it.

22           MEMBER ARMIJO: Basically the question the  
23 way I understand it is should the full committee hear  
24 this presentation and should we issue a memo.

25           CHAIRMAN SIEBER: Yes.

1                   MEMBER ARMIJO: I think this is not my  
2                   area. There are people with a lot more -- that no  
3                   this area, yourself and John, Dennis, Charlie. There  
4                   is a divergence of opinion and unless we are -- and so  
5                   I think with that much divergence I would say the full  
6                   committee ought to hear it.

7                   CHAIRMAN SIEBER: Okay. Well, you know,  
8                   from what I've heard so far even though we come up  
9                   with different answers, the opinion is not that  
10                  divergent. I think we all sort of know what's going  
11                  on.

12                 MEMBER ARMIJO: What I'm trying to say is  
13                 that unless we want to recommend significant changes  
14                 in the Reg Guide defer the issuance of the Reg Guide.  
15                 Normally I would not recommend the full committee  
16                 hearing it but it sounds like there's some significant  
17                 changes that John or yourself see that is needed.  
18                 I'll leave it at that. There are people who know a  
19                 hell of a lot more about this than I do so I want to  
20                 put it through the whole committee.

21                 CHAIRMAN SIEBER: The other consideration  
22                 is if we right a letter and say you ought to risk  
23                 inform this and make all these changes, how many years  
24                 will it be until --

25                 MEMBER ARMIJO: That's a point. Some of

1 the things we're talking about it gets into regulatory  
2 space rather than a Regulatory Guide. The rules ought  
3 to be strengthened so I don't know.

4 CHAIRMAN SIEBER: I don't know the answer  
5 to this for sure but I think everybody has Tech Specs  
6 to tell them when to do what. The Regulatory Guide  
7 really doesn't do much.

8 Dennis.

9 MEMBER BLEY: Except for a couple of  
10 things I would go with just a memo, but the couple of  
11 things I think could be important. I would like to  
12 see us write a letter on this because I think it's a  
13 significant Reg Guide. The way it lays out the seven  
14 cases is important to speak on from our point of view.

15 I might agree with John if I understand  
16 what he's saying, but I do agree with the concept that  
17 the LCOs belong in the Tech Specs where they can get  
18 handled. They ought to be referred to here. Maybe we  
19 want to say something about later doing something  
20 towards the lines of what Jack said.

21 I would recommend getting this out very  
22 soon with only a few minor things maybe being done to  
23 it. I think it links to other work we're involved in  
24 and we probably need to speak on this and later we'll  
25 probably connect it with other things we're doing by

1 some of our other larger committees, subcommittees.  
2 I would go for a letter but I think it might have some  
3 recommendations for the future in it to complement  
4 this current document.

5 CHAIRMAN SIEBER: Mike.

6 MEMBER RYAN: I defer to Dennis and Sam  
7 and John and others that are more expert on this than  
8 I am. I was pleased to hear the clarification about  
9 the underground cables and wetting versus submerge and  
10 those kind of issues. This is the first Reg. Guide.

11 MEMBER STETKAR: This is the first one.  
12 The one that you weren't here for. We're going to go  
13 back to the second one.

14 MEMBER RYAN: Never mind. Thank you.

15 CHAIRMAN SIEBER: You'll get your turn in  
16 another 12 minutes.

17 MEMBER STETKAR: You can go first on  
18 1.218.

19 CHAIRMAN SIEBER: That's not a bad idea.  
20 The criteria for your response is the same as it was  
21 for 1.93 which is should we send a memo that says  
22 issue it now, you know, it's okay with us. Or, if  
23 not, then the full committee should hear it. If you  
24 are recommending the full committee hear it, then what  
25 are the issues that you think we need to focus our

1 attention on.

2 MEMBER RYAN: Again, my interest in the  
3 second Reg Guide was a very narrow one on the wetted  
4 cables and the underground and submerged cables and  
5 how they age perhaps differently than other cables and  
6 how they behave in failure modes versus operational  
7 modes and so on. I guess the fact that has been  
8 addressed satisfies me. Like I say, it's not my area  
9 of expertise in the broader picture so if others think  
10 it needs a letter, that's fine by me.

11 CHAIRMAN SIEBER: You think a memo telling  
12 them to issue --

13 MEMBER RYAN: In my narrow range of  
14 interest in the topic that would satisfy me.

15 CHAIRMAN SIEBER: Okay.  
16 Dennis.

17 MEMBER BLEY: We've written letters while  
18 unrelated aspects closely related to this Reg Guide  
19 several times in the last few years. I would like to  
20 see us attempt to write a short letter on this one  
21 agreeing with it, recommending it be published. I  
22 think we ought to speak on it.

23 CHAIRMAN SIEBER: Okay. Could you tell us  
24 what areas we should speak on?

25 MEMBER BLEY: I think we should speak to

1 its value. I think we should speak to its catalogue.  
2 I think we should promptly say that we think -- we  
3 would like somewhere to see some guidance on how to  
4 look at an ensemble program that uses these things.  
5 Not that it belongs in here but I've heard the stories  
6 of how it's done.

7 It sounds pretty good. It sounds very diffuse  
8 and I'm not sure if I were a reviewer, and maybe if I  
9 were a reviewer I'd have enough understanding of the  
10 diverse ways this is handled that it wouldn't be a  
11 problem for me. As a guy sitting here it's not  
12 completely clear.

13 CHAIRMAN SIEBER: Okay.

14 Sam.

15 MEMBER ARMIJO: I think this Regulatory  
16 Guide is ready to go. I think a memo would be just  
17 fine.

18 CHAIRMAN SIEBER: Okay. I will offer my  
19 own opinion at this time. I also think a memo would  
20 probably be appropriate. If there is a weakness, I  
21 would say the weakness is not enough attention to the  
22 details of what the tests are and what they accomplish  
23 were there to be a flood.

24 Now, maybe this Reg Guide isn't the place  
25 for that. Maybe a code or a standard is the place for



1 that. I'm not aware that there are codes and  
2 standards other than instructions as to how to do some  
3 of these tests and what they mean.

4 John.

5 MEMBER STETKAR: I'm really torn. I think  
6 I tend to agree with Dennis' opinion that this has  
7 been -- this topic has been a visible element of our  
8 letters on several license renewal applications.

9 I think that the committee's issuing a  
10 letter with regard to this Regulatory Guidance is  
11 probably an appropriate -- I'm not trying to prejudice  
12 anything -- an appropriate element of closure of that  
13 topic rather than just simply a memo saying go forth  
14 and prosper. I think in that sense a short letter  
15 would be appropriate.

16 CHAIRMAN SIEBER: You sound like a  
17 volunteer.

18 MEMBER STETKAR: I said I was following  
19 Dennis's opinion.

20 (Laughter)

21 CHAIRMAN SIEBER: We have two volunteers.  
22 Write that down.

23 Charlie.

24 MEMBER BROWN: I think a memo is  
25 satisfactory for the circumstance. This is a

1 relatively narrow Reg Guide which effectively just  
2 talks about available techniques for doing testing.  
3 It does not really establish a broad range program.

4 I amplifies or kind of answers a question  
5 that we had asked in previous meetings about how do  
6 you go about doing this testing and what are the  
7 available methodologies and that is fundamentally a  
8 catalogue of methodologies. You can argue whether you  
9 can add one or subtract one or maybe a combination but  
10 I just think a memo would be satisfactory and let it  
11 go ahead and go out.

12 CHAIRMAN SIEBER: Okay.

13 Joy.

14 MEMBER REMPE: Well, I'm going to go with  
15 taking it to the full committee because, again, it  
16 would come back to us in a month as a subcommittee  
17 with some modifications to address a bit more  
18 explicitly what is considered an adequate number of  
19 tables and adequacy of the program selected.

20 Even if it's referring to other guidance  
21 I would be happier with it but I just don't see -- if  
22 you issue a memo you don't have that opportunity. I'm  
23 hoping if we do go to a full committee when it comes  
24 back to us that there will be some amplification in  
25 the discussion.

1 CHAIRMAN SIEBER: Okay. Well, I would  
2 like to thank all the members for their opinion and  
3 also the staff for their presentations and for all the  
4 work that has gone into this. I'm impressed by the  
5 over 30 years of work on the first one. I think of  
6 the two the 1.218 is a little simpler but it is, I  
7 think, needed.

8 I think simpler is always in the eye of  
9 the beholder, however, but it has the same kinds of  
10 threads in it in timing and techniques as other kinds  
11 of ISI programs. All of them have the same general  
12 format. This will not be a surprise to the licensees  
13 and it certainly is not a surprise to me.

14 What I understand from the data, even  
15 though I would have arranged it a little bit  
16 differently on my own, I think that the conclusions  
17 that the staff draws match fairly well with the data.  
18 You have to ask yourself is it worth the effort to get  
19 the data in a perfect kind of shape that illustrates  
20 it even better when you can deduce that from the data  
21 that we already have and the way it's presented.

22 I think what I will do at the full  
23 committee meeting is to go through these issues and  
24 how we felt, keeping the Reg Guide separate.  
25 Therefore, the full committee will decide whether they

1 want to hear it or not, even though for this meeting  
2 we have probably a majority.

3 So I would like to thank the staff. I  
4 don't know if our telephone participants are still  
5 there but I would like to thank you for your input.  
6 I would also like to thank Christina for her  
7 preparatory work and also the members for your  
8 attention and your honest opinions.

9 With that, I would like to adjourn the  
10 meeting.

11 (Whereupon, at 4:44 p.m. the meeting was  
12 adjourned.)

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# **Regulatory Guide 1.218: Condition-Monitoring Techniques For Electric Cables Used In Nuclear Power Plants**

ACRS Briefing Meeting: September 7, 2011

Darrell Murdock

**Division of Engineering**

**Office of Nuclear Regulatory Research**

## PURPOSE

- To provide the essential elements of a condition monitoring program and a list of condition monitoring techniques.
- This Regulatory Guide was generated in response to industry's request for guidance on condition monitoring techniques that the staff finds acceptable
- Regulatory Guide applies to all cables within the scope of 10 CFR 50.65 (The Maintenance Rule).

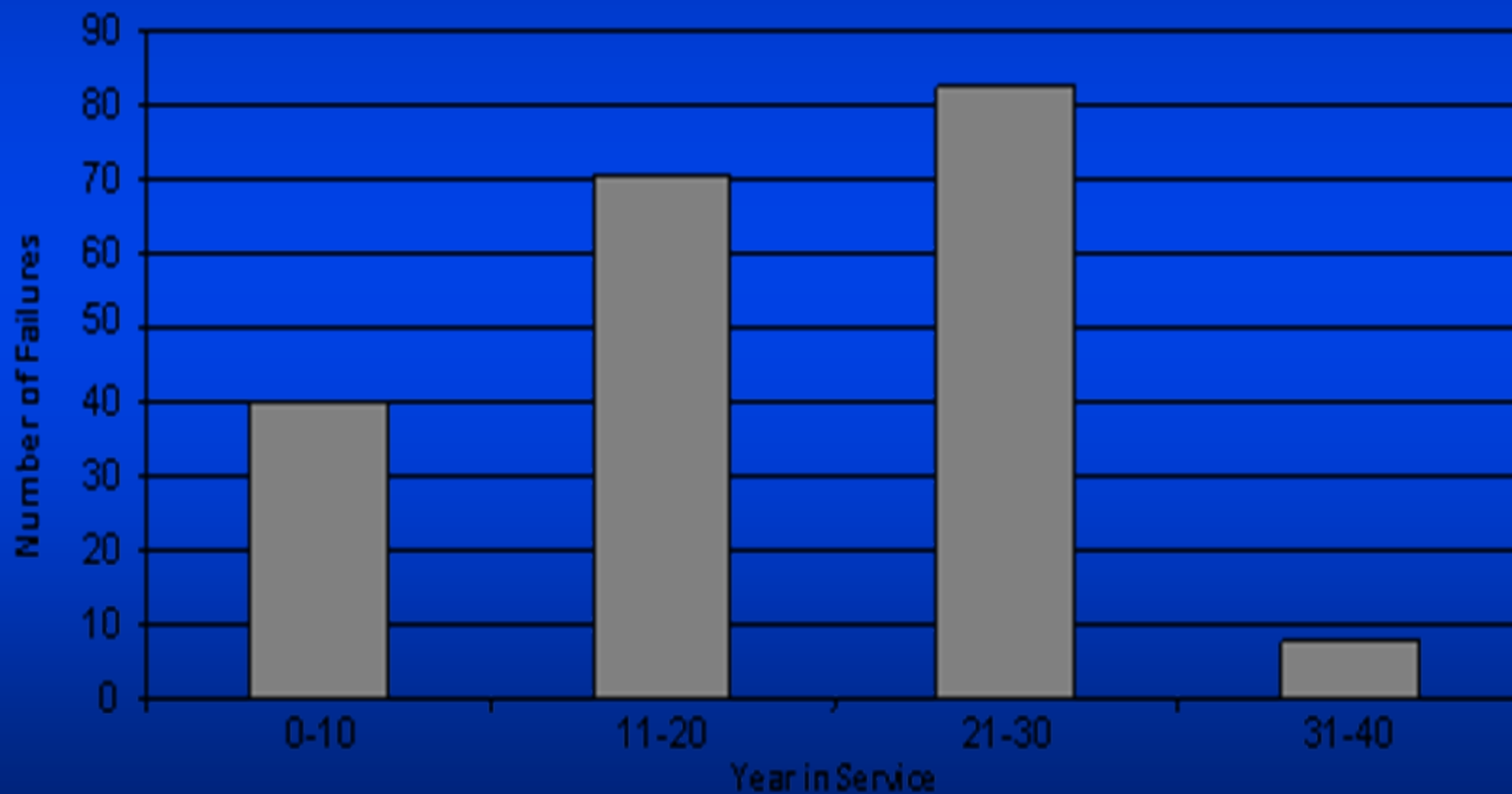
### ❑ Operating Experience

- Number of Cable failures show an increasing trend with plant age.
- Cable failures have resulted in:
  - Plant Transients and Shutdowns
  - Lost of Safety Functions and Redundancy
  - Entries into Limiting Condition for Operation
  - Challenges to Plant Operators
- NRC Issued Documentation Regarding Cable Failures
  - IN 89-63 Possible Submergence of Electrical Circuits Located Above the Flood Level
  - IN 2002-12 Submerged Safety Related Electrical Cables
  - GL 2007-01 Inaccessible or Underground Power Cable Failures that Disable Accident Mitigating Systems or Cause Plant Transients
  - IN 2010-26 Submerged Electrical Cables

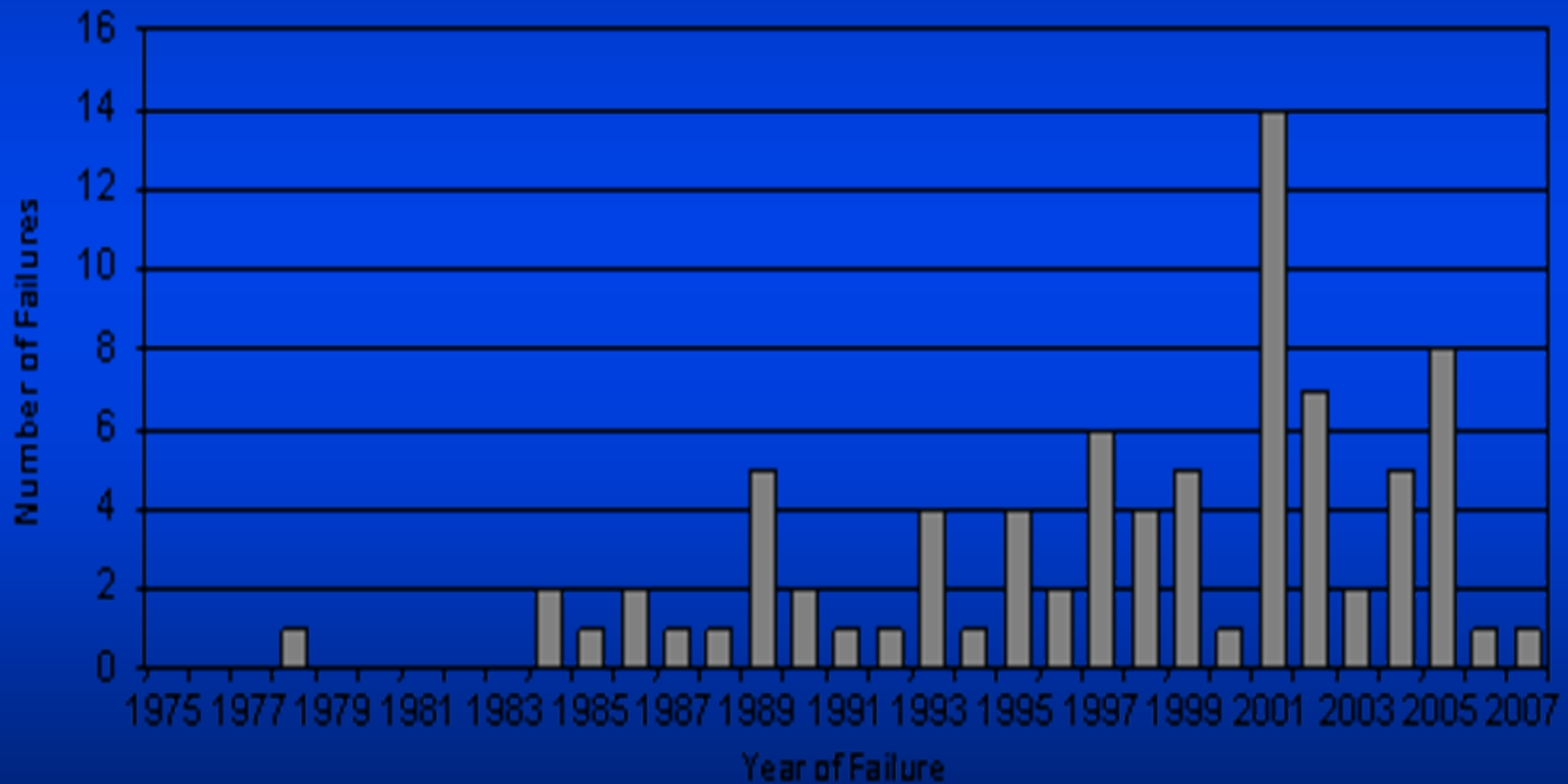
- The increasing trend in cable failures gave greater importance to the need for condition monitoring to ensure operational readiness of cables relied upon for accident mitigation and avoiding unnecessary operational transients.
- As a result of Licensees response to Generic Letter 2007-01, the staff identified approximately 200 records of failed or degraded cables.



### United States Data (Generic Letter 2007-01)



## United States Data (Generic Letter 2007-01)



- The condition monitoring techniques chosen by licensees should be based on plant-specific installations, applications, operating conditions and operating experience
- Condition monitoring of cables may be limited to a representative sample of cables
- Frequency of condition monitoring may be adjusted based on demonstrated plant specific cable test results and operating experience.
- List of Commonly Used Condition Monitoring techniques included are:
  - Very Low frequency Test
  - Visual Inspection
  - Dielectric Loss-Dissipation Factor (Power Factor or tan delta)
  - Partial Discharge Test
  - Time Domain Reflectometry

- Aging Management Programs X1.E1, X1.E2, and X1.E3 address cables condition monitoring.
- XI.E3 INACCESSIBLE POWER CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS
- Detection of Aging Effects  
The first tests for license renewal are to be completed prior to the period of extended operation with subsequent test performed at least every 6 years thereafter.

## **NUREG/CR – 7000 (Essential Elements of an Electric Cable Condition Monitoring Program)**

- NUREG/CR-7000 list the essential elements for an effective cable condition monitoring program, industry guidance and standards, and the experience and observations of others who have studied or conducted electric cable condition monitoring and qualification testing.
- The program methodology presented in NUREG/CR 7000 provide guidance on the following technical aspects:
  1. selection of cables to be included in the program,
  2. characterization and monitoring of cable operating environments and stressors,
  3. selection of the most effective and practical condition monitoring techniques,
  4. documentation and review of cable condition monitoring testing and inspection results,
  5. periodic review and assessment of cable condition and operating environments.

- I. Elements of an acceptable Condition Monitoring Program:
  - a) Select cables to be monitored.
  - b) Develop database for monitored cables.
  - c) Characterize and monitor service environments.
  - d) Identify stressors and expected aging mechanisms.
  - e) Select condition-monitoring techniques suitable to monitored cables.
  - f) Establish baseline condition of monitored cables.
  - g) Identify cable characteristics and aging effects being monitored by each selected condition-monitoring technique.
  - h) Perform test and inspection activities for periodic condition monitoring of cables.
  - i) Periodically review and incorporate plant and industry experience.
  - j) Periodically review, assess, and trend the condition of monitored cables.
  - k) Identify degraded conditions and take prompt corrective actions.

- II. The NRC staff considers the use of appropriately selected combinations of typical cable condition-monitoring techniques, to be an acceptable method for satisfying the regulations to assess the continuity of the systems and the conditions of their components. The condition monitoring techniques selected should be based on plant-specific design, installation, and operating conditions and operating experience related to the cables used in nuclear plants.

III. Cable condition monitoring should be augmented under these conditions for selected cables when the facility has:

1. Experienced failure of cables connected to critical equipment
2. Operational history indicates failure of cables
3. There is a locally adverse operating environment
4. Industry operating experience with similar conditions and equipment configuration to those at the licensed facility indicate a need for augmented monitoring



- The DG-1240 was issued for public comments on June 13, 2010, and the comment period expired on August 13, 2010
- A large number of the public comments received pertain to weaknesses associated with a number of condition monitoring techniques. The staff responded to these comments by modifying the discussion of the condition monitoring technique as appropriate.

- Regulatory Guide 1.218 provides guidance on the essential elements of a condition monitoring program and a list of condition monitoring techniques that the NRC staff finds acceptable.

# **QUESTIONS?**



# **Regulatory Guide 1.93**

## **Availability of Electric Power Sources**

**ACRS Subcommittee Meeting**  
**September 7, 2011**

Sheila Ray  
Division of Engineering  
Office of Nuclear Regulatory Research

## Background

- Regulatory Guide (RG) 1.93, Rev. 0 was issued in December 1974.
  - Limiting Conditions for Operation (LCOs) Actions and Completion Times were incorporated into the Standard Technical Specifications (STS) (NUREG 1430-1434)
- RG 1.93 was revised for the following reasons:
  - To incorporate lessons learned from the 2003 Northeast Blackout and Generic Letter (GL) 2006-02, “Grid reliability and the impact on plant risk and the operability of offsite power.”
  - To address the impact of deregulation and its influence on offsite power
  - To include information regarding passive reactors

## Background

- On August 14, 2003, the largest power outage in U.S. history occurred in the Northeastern United States and parts of Canada.
  - Nine U.S. NPPs tripped. Eight of these lost offsite power, along with one NPP that was already shut down.
  - The length of time until power was available to the switchyard ranged from approximately one hour to six and one half hours.
  - Although the onsite emergency diesel generators (EDGs) functioned to maintain safe shutdown conditions, this event was significant in terms of the number of plants affected and the duration of the power outage.

## Background

- Generic Letter (GL) 2006-02, “Grid reliability and the impact on plant risk and the operability of offsite power”
  - The staff identified issues as a result of considering the August 14, 2003, blackout event.
  - The staff was concerned that several conditions associated with assurance of grid reliability may impact public health and safety and/or compliance with applicable regulations.

## Background

- Issues considered in GL 2006-02, as a result of the August 14, 2003 blackout:
  - use of long-term periodic grid studies and informal communication arrangements to monitor real-time grid operability,
  - the use of transmission load flow analysis tools (analysis tools) by TSOs to assist NPPs in monitoring grid conditions to determine the operability of offsite power systems under plant technical specifications (TSs)
  - use of protocols between the nuclear power plant (NPP) and the transmission system operator (TSO), independent system operator (ISO), or reliability coordinator/authority (RC/RA)
  - potential shortcomings in grid reliability evaluations performed as part of maintenance risk assessments,
    - use of NPP/TSO protocols and analysis tools by TSOs to assist NPPs in monitoring grid conditions for consideration in maintenance risk assessments
  - lack of preestablished arrangements identifying local grid power sources and transmission paths
    - offsite power restoration procedures in accordance with Section 2 of NRC Regulatory Guide (RG) 1.155, “Station Blackout”



## Background

- Staff began revising RG 1.93 to clarify the staff position for acceptable operating procedures and restrictions if the available electric power sources are less than the limiting conditions for operation (LCO).
- DG-1244 was issued in September 2010 for public comment.

## Scope

- Applicable to single and multiple unit plants
- Consistent with STS

## Regulatory Basis

- General Design Criterion 17, “Electric Power Systems” requires:
  - Two physically independent circuits shall supply electric power from the offsite transmission network to the onsite electric distribution system. Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current (ac) power supplies and the other offsite electric power circuits. One of these circuits shall be designed to be available within a few seconds following a loss-of-coolant accident.
  - The licensee shall provide redundant onsite ac power supplies.
  - The licensee shall provide redundant onsite direct current (dc) power supplies.
  - An onsite electric power system and offsite electric power system shall be provided to permit functioning of structures, systems, and components (SSCs) important to safety. The safety function of each system (assuming the other system is not functioning) shall provide sufficient capacity and capability to ensure that (1) specified fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated design-basis events.

## GDC 17

- Design Criteria for onsite and offsite electrical power systems
- For NPPs not licensed in accordance with GDC in Appendix A of 10 CFR Part 50, the applicable design criteria are provided in the updated final safety analysis report.
  - Added to RG 1.93, Rev 1

## Revisions to Rev. 1 – Part B, Discussion

- Grid-Risk-Sensitive Maintenance
  - Grid reliability evaluations should be performed as part of maintenance risk assessment, as required by 10 CFR 50.65(a)(4), “Maintenance Rule”
  - If degraded grid reliability conditions exist or are forecasted to exist, during maintenance activities, licensees should consider rescheduling such activities to limit the risk.
  - If there is an overriding need to perform the maintenance, licensee should consider alternate equipment protection measures and compensatory actions to minimize the risk.

## Revisions to Rev. 1 – Part B, Discussion

- Communication with TSO
  - Allows NPP operator to understand changes in the grid that can affect plant operations and the operability of the plant's offsite power system
  - Enables NPP operator to obtain up-to-date information on existing and projected grid conditions to maintain a current and valid risk assessment and manage possibly changing risk

## Revisions to Rev. 1 – Part B, Discussion

- Passive Plant Designs
  - May not require multiple power sources since passive safety-related systems are used for core cooling and containment integrity
  - If offsite power is not available, nonsafety-related diesel generators should be available for plant functions.
  - If offsite power or a diesel generator is inoperable, the licensees should make every effort to restore one of them within a reasonable time frame.

## Revisions to Rev. 1 – Part B, Discussion

- Operational Restrictions

1. Meeting the LCO

- Rev 0 – when all electric power sources required by GDC 17 are available
- Rev 1 – when all LCO-required electric power sources are determined to be operable in accordance with TS, at required voltage and capacity as well as capable of withstanding N-1 contingency



## Revisions to Rev. 1 – Part B, Discussion

- Operational Restrictions

### 2. Period of Continued Operation

- Rev 1 includes conditions during loss of required electric sources that operation at power can continue for a limited time, not to exceed completion time per TS rather than implement an immediate shutdown
- Decisions should be based on evaluation of safety significance
  - Prevent further degradation of electric power system or jeopardize plant safety
- Continue operation at power
  - Use period of continued operation to restore power sources and prepare for orderly shutdown
- Immediate Shutdown
  - Commence shutdown in parallel with efforts to restore inoperable power sources

## Revisions to Rev. 1 – Part B, Discussion

- Operational Restrictions

### 3. Orderly Shutdown

- Rev 1 allows for termination of the shutdown and return to rated power if the TS LCO is restored during the shutdown
- Rev 1 added a caution that if grid conditions worsen, a manual or automatic trip is desirable.
- If compliance with TS LCO not restored within completion time, initiate orderly shutdown
- Licensee should take all actions to improve the inoperable or degraded condition, if the resources are available

## Revisions to Rev. 1 – Part B, Discussion

- Levels of Power System Degradation
  - Rev 0 defines 5 scenarios and Rev 1 defines 7 scenarios

Number of Sources Less than LCO	
Rev 0	Rev 1
One AC power source	One Offsite AC power source
	One Onsite AC power source
Two Offsite AC power sources	Two Offsite AC power sources
One Offsite and One Onsite AC power sources	One Offsite and One Onsite AC power sources
Two Onsite AC power sources	Two Onsite AC power sources
One Onsite DC supply	One Onsite DC power source
	One Inverter

## Regulatory Positions

- To ensure that NPP is in safe operating mode whenever the available electric power sources are less than TS LCO.
- Continued power operation contingent on TS and the following:
  - Reliability, availability, and capability of remaining sources
  - Required maintenance activities does not further degrade the power system or jeopardize plant safety
  - Continued compliance with required actions in TS
- New to Rev 1:
  - If there is any inconsistency between RG and TS, the TS shall be used
  - Coordination between NPP operators and transmission entities
  - Accuracy and conservatism of post-trip voltages predicted by online grid analysis tools should be determined after each actual trip

## Scenario 1: Available Offsite AC Power Sources are one less than LCO

- Offsite Power system has no redundancy
- Risk associated with loss of offsite power is compounded by:
  - Ability to quickly restore offsite sources would be lost
  - Remaining offsite circuit could be susceptible to the same cause
  - Consequential trip probability of a number of generating units would be higher.
  - Availability and capability of offsite power system could be affected
- Potential common cause failure, as a result of fire, ice storm, or similar event
- Regulatory Position
  - Power operation may continue up to 72 hours, provided that subsequent single failure would not cause total loss of offsite power
  - Otherwise, shut down in accordance with TS

## Scenario 2: Available Onsite AC Power Sources are one less than LCO

- Loss of redundancy of onsite power source to mitigate effects of an event
- One emergency diesel generator (EDG) is inoperable or available onsite supply does not have sufficient capacity
- GDC 17 intent (added to Rev 1):
  - Avoid risk associated with immediate shutdown
  - Minimize risk by limiting exposure time
- Regulatory Position
  - Power operation may continue up to 72 hours, provided that redundant EDG is tested/assessed within 24 hours to be free from common-cause failure or verified operable per TS
  - Otherwise, shut down in accordance with TS

## Scenario 3: Available Offsite AC Power Sources are two less than LCO

- Offsite power system is not available or has inadequate capability
- Onsite AC system remains available and is not degraded
- Regulatory Position
  - Power operation may continue up to 24 hours if it appears likely that at least one of the offsite sources can be restored within 24 hours
  - If one offsite source is recovered within 24 hours, power operation may continue and not exceed 72 hours, as per Level 1
    - If no offsite source is restored within the first 24 hours, within 6 hours bring unit to hot shutdown for BWR (Mode 3) and hot standby for PWR (Mode 3) or as specified in TS

## Scenario 4: Available Offsite and Onsite AC Power Sources are each one less than LCO

- Loss of individual redundancy in both offsite and onsite AC power sources
- Susceptibility of power system to single bus or switching failure could cause all emergency power to be unavailable
- Regulatory Position
  - Power operation may continue up to 12 hours if it appears likely that at least one of the affected sources can be restored within 12 hours and the grid capacity and voltage are such that a subsequent single failure would not cause a loss of offsite power
  - If either source is recovered within 12 hours, power operation may continue and not exceed 72 hours, as per Level 1 or 2
    - If no source is restored within the first 12 hours, the unit should be shutdown



## Scenario 5: Available Onsite AC Power Sources are two less than LCO

- Two EDGs inoperable or insufficient capacity to mitigate the effects of an event in one unit and safely shutdown other units
- Licensees should evaluate the risk associated with continued operation and immediate shutdown (grid instability and LOOP)
- Coordinate with TSO to accommodate plant shutdown
- Regulatory Position
  - Power operation may continue up to 2 hours
  - If only one onsite AC source is recovered within 2 hours, power operation may continue and not exceed 72 hours, as per Level 2
    - If no source is restored within the first 2 hours, the unit should be shutdown per TS

## Scenario 6: Available Onsite DC Power Sources are one less than LCO

- Available DC power sources do not have required redundancy
- Subsequent degradation in onsite AC or DC system could jeopardize plant safety
- Passive designs depend heavily on DC power systems – 72 hour batteries; licensee should critically monitor required functions
- Regulatory Position
  - Power operation may continue up to 2 hours
  - If affected DC source is restored, unrestricted operation may resume
    - If not, shutdown the unit per TS
  - Licensee should monitor required functions and take necessary actions (cross connect a supply or shed optional load) to ensure safe shutdown

## Scenario 7: Available Inverters are one less than LCO

- Available inverters do not have required redundancy
- Subsequent single failure of another inverter could cause a reactor trip
- Regulatory Position
  - Power operation may continue not to exceed the 24 hour time period specified in the TS
  - If affected inverter is restored, unrestricted operation may resume
    - If not, shutdown the unit per TS

## Response To Public Comments

- Received comment letters from 4 organizations
- 6 comments on Section D (Implementation)
- “Offsite Power System” is used in this RG and is consistent with GDC 17. “Grid” is not within the scope of TS
- To address plants that may vary with STS, the following was added in Part C (Regulatory Position):
  - “If there is any inconsistency with respect to completion times between this regulatory guide and the plant-specific technical specifications, the plant-specific technical specification should be used.”

## Response To Public Comments

- Revision in Section C (Regulatory Position)
  - “The accuracy and conservatism of the post-trip voltages predicted by the online grid analysis tool should be determined after each actual trip.”
- Revision in Section C, Regulatory Position 1
  - “If the available offsite ac power sources are one less than the LCO, power operation may continue for a period that should not exceed 72 hours if the electric grid system capacity and voltage are such that a subsequent single failure would not cause a total loss of offsite power. Subsequent single failure to be considered is a trip of the unit’s generator and related offsite power failures (e.g., ice storm, forest fire, etc.).”



# QUESTIONS?