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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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REGULATORY POLICIES & PRACTICES SUBCOMMITTEE

+ + + + +

TUESDAY

SEPTEMBER 18, 2012

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear  
Regulatory Commission, Two White Flint North, Room  
T2B1, 11545 Rockville Pike, at 8:30 a.m., William J.  
Shack, Chairman, presiding.

SUBCOMMITTEE MEMBERS:

WILLIAM J. SHACK, Chairman

HAROLD B. RAY, Member

JOHN W. STETKAR, Member

1 NRC STAFF PRESENT:

2 QUYNH NGUYEN, Designated Federal Official

3 BRIAN LEE, NRR/DSS/SCVB

4 BRUCE LIN, RES/DE/CIB

5 STU RICHARDS, RES/DE

6 GEORGE THOMAS, NRR/DE/EMCB

7 ANTONIO ZOULIS, NRR/DRA/APOB

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

8:29 a.m.

CHAIRMAN SHACK: This meeting will now come to order.

This is a meeting of the Regulatory Policies and Practices Subcommittee. I am Bill Shack, Chairman of the Subcommittee.

ACRS members in attendance are John Stetkar and Harold Ray.

Quynh Nguyen of the ACRS staff is the Designated Federal Official and Lead Cognizant Engineer for this meeting.

The purpose of this briefing is for the staff to discuss Revision 1 of Reg Guide 1.163, Performance-Based Containment Leak-Test Program. NEI guidance, staff bases for acceptance of previous risk-informed interval extensions, and staff considerations on whether there are any negative implications for the testing interval changes will be discussed.

We will hear presentations from representatives from the Office of Nuclear Regulatory Research and Nuclear Reactor Regulation. The Subcommittee will gather information, analyze relevant issues and facts, and formulate a proposed position and action, as appropriate, for deliberation by the

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1 full Committee, if necessary.

2 The rules for participation in today's  
3 meeting were announced as part of the notice of this  
4 meeting, previously published in The Federal Register  
5 on September 12th, 2012. The meeting will be open to  
6 public attendance with the acceptance of portions that  
7 may be closed to protect information that is  
8 proprietary, pursuant to 5 USC 552(c)(4).

9 We have received no written comments or  
10 request for time to make oral statements from members  
11 of the public regarding today's meeting.

12 A transcript of the meeting is being kept  
13 and will be made available, as stated in The Federal  
14 Register notice. Therefore, we request that  
15 participants in this meeting use the microphones  
16 located throughout the meeting room when addressing  
17 the Subcommittee. Participants should first identify  
18 themselves and speak with sufficient clarity and  
19 volume, so they can be readily heard. Please silence  
20 all phones.

21 We will now proceed with the meeting, and  
22 I call upon Stu Richards from the Office of Nuclear  
23 Regulatory Research to make introductory remarks.

24 MR. RICHARDS: All right. My name is Stu  
25 Richards with the Division of Engineering in the

1 Office of Research. We are just glad to be here  
2 today. Thank you for the opportunity to come and talk  
3 about Reg Guide 1.163, and we look forward to your  
4 questions. It is an interesting topic.

5 CHAIRMAN SHACK: I guess it is a little  
6 strange that this is Reg Guide that is going to  
7 endorse -- I guess we have already got 75 reactors  
8 doing 15-year test intervals on a one-time basis. So,  
9 the Reg Guide essentially now lets them do that  
10 permanently.

11 MR. RICHARDS: Yes, it will.

12 CHAIRMAN SHACK: On their risk-informed  
13 with their submissions.

14 One other thing I had a question about in  
15 the Reg Guide, it refers back to the RIS. The RIS  
16 says it is going to take a license amendment to get  
17 longer than the 15 years, but I don't see the words  
18 "license amendment" anywhere in the Reg Guide. What  
19 is the controlling document in this case?

20 MR. RICHARDS: I would have to defer to  
21 our NRR colleagues.

22 CHAIRMAN SHACK: Okay.

23 MR. THOMAS: Yes, I am George Thomas, and  
24 I am in the Division of Engineering.

25 Actually, Appendix J, Option B, it

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1 requires you to include by reference the implementing  
2 document in the plan, technical specifications. That  
3 is done through a license amendment.

4 With regard to the risks, the risks were  
5 meant to, you know, they should provide an NRC staff  
6 position, to discourage frivolous requests for  
7 extensions beyond 15 years by a few months. We have  
8 had requests for extensions within three months to 15  
9 months, and many of those didn't have proper  
10 justification for this. So, this was meant to  
11 discourage that.

12 The staff position is that it will be  
13 approved only if there is a very compelling  
14 unforeseen --

15 CHAIRMAN SHACK: But it is a license  
16 amendment still?

17 MR. THOMAS: Yes, it requires license  
18 submittal.

19 CHAIRMAN SHACK: Okay. That was what I  
20 wanted --

21 MR. THOMAS: But the Topical Report allows  
22 you only 15 years as a maximum.

23 MR. LIN: Okay. Thank you, Stu. Again,  
24 thank you for inviting us to brief you on Reg Guide  
25 1.163.

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1 I am Bruce Lin. I work in Research,  
2 Division of Engineering. We are up here, George  
3 Thomas, Division of Engineering; Brian Lee in our  
4 Division of Safety Systems, and Antonio in our  
5 Division of Risk Assessments.

6 I think we already touched on the  
7 objectives. I am not going to brief you at this time.  
8 This is the outline of what we are going to talk  
9 about. I will just briefly go over some background  
10 and why we are updating the Reg Guide, and George and  
11 Brian are going to go over the guidance in NEI 94-01,  
12 which is the industry guidelines for implementing the  
13 performance-based --

14 CHAIRMAN SHACK: Oh, that is one other  
15 clarification. The copy of the Reg Guide that we have  
16 talks about Revision 2, and you have already got an SE  
17 on Revision 3. So, I assumed that, in reality --

18 MR. LIN: In reality, we will be endorsing  
19 Rev. 3A. And I sent a markup to Quynh.

20 MR. NGUYEN: Yes, in the Status Report it  
21 does reflect 3A.

22 CHAIRMAN SHACK: It does 3A?

23 MR. NGUYEN: Yes.

24 CHAIRMAN SHACK: Okay. In the Status  
25 Report. I just kept reading the old one.

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1 MR. LIN: The containment leak test  
2 requirements are specified in 10 CFR Part 50, Appendix  
3 J. There are two options in Appendix J. Option A is  
4 prescriptive, and Option B is performance based.

5 There are three types of testing that are  
6 required: Type A test, or also called Integrated  
7 Leakage Rate Test. Basically, it measures an overall  
8 containment leakage. And Type B and Type C tests are  
9 called Local Leak Rate Tests. Type B tests are  
10 intended to measure the leakage of penetrations, and  
11 Type C tests are intended to measure the leakage for  
12 containment isolation valves.

13 Option B was issued in 1995. Basically,  
14 Option B allowed the licensees to replace the existing  
15 Option A requirements with testing requirements based  
16 on performance history.

17 And the technical basis for the Option B  
18 rulemaking provided in NUREG-1493 and, also, the EPRI  
19 report on "Risk Impact Assessments of Revised  
20 Containment Leakage Rate Test Intervals". Basically,  
21 both reports concluded that the risk associated with  
22 extending the periodicity is insignificant.

23 I would also like to point out that in The  
24 Federal Register notice that added Option B, the  
25 supplementary information described the NRC staff

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1 rationale for settling on 10 years for Integrated  
2 Leakage Rate Tests and five years for the Type C,  
3 Local Leak Rate Test as "a cautious, evolutionary  
4 approach as data are compiled to minimize" the  
5 uncertainties.

6 Concurrent with the Option B rulemaking,  
7 in 1995, NEI issued Topical Report 94-01, providing  
8 Industry Guideline for Implementing Performance-Based  
9 Option of 10 CFR, Appendix J.

10 And also in 1995, NRC issued Reg Guide  
11 1.163, "Performance-Based Containment Leak-Test  
12 Program," which endorsed NEI 94-01, Revision 0, with  
13 limitations and conditions.

14 As George pointed out, Appendix J, Option  
15 B, required that the implementing document used by  
16 licensees to develop a performance-based leakage  
17 program must be included in the plant Technical  
18 Specifications.

19 CHAIRMAN SHACK: What is the particular  
20 implication of that? I guess I am not quite sure why  
21 that is important. Doesn't this approval give them a  
22 50.59 approach to doing this?

23 MR. LIN: I think they still have to come  
24 in with a license amendment to update.

25 MR. THOMAS: Yes, this is George Thomas.

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1           Basically, the reason they have to come in  
2           for a license amendment is because the implementing  
3           document is in the Tech Spec. So, any change to the  
4           Tech Spec has to be done through a license amendment.

5           CHAIRMAN SHACK: Okay. They come in for  
6           the license amendment, so that they can, then, go to  
7           the risk-informed program, but they still keep that  
8           particular document that they used to justify that in  
9           the Tech Spec? So, if they wanted to change to a  
10          different document, they would have to come back  
11          for --

12          MR. THOMAS: The document used to  
13          implement will be in the Tech Spec, yes.

14          CHAIRMAN SHACK: Okay.

15          MR. LIN: Now, after Appendix J was issued  
16          in 1995, industry accumulated more testing data. So,  
17          in August 2007, NEI issued Revision 2 to the Topical  
18          Report. In Revision 2, they included provisions for  
19          extending the performance-based ILRT interval to 15  
20          years and incorporated all the regulatory positions in  
21          Reg Guide 1.163. The risk impact assessment of  
22          extending the interval was provided in an EPRI Report  
23          1009325, which Antonio is going to talk about in a  
24          later slide.

25          The NRC reviewed both the EPRI report and

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1 the NEI Topical Report and issued a Safety Evaluation  
2 in June 2008. And NEI issued Revision 2A, which is a  
3 separate version of the NEI report, which included  
4 Safety Evaluations, in October 2008.

5 So, in 2009, the staff developed Draft  
6 Guide 1220 to endorse NEI Topical Report 94-01,  
7 Revision 2A, subject to the limitations provided in  
8 NRC Safety Evaluation.

9 Now, after we issued the Draft Guide 1220,  
10 NEI submitted Revision 3 to their report in June 2011.  
11 Revision 3 included guidance for extending Type C  
12 Local Leak Rate Test intervals from 60 months to 75  
13 months.

14 CHAIRMAN SHACK: I am still confused here  
15 a little bit. Now, after you approved Rev. 2A, which  
16 allowed them to go to 15 years --

17 MR. LIN: Yes.

18 CHAIRMAN SHACK: -- why do they only get  
19 a one-time extension to 15 years? When they  
20 incorporate Rev. 2A into their licensing basis, why  
21 doesn't that mean they can go to 15 years?

22 MR. LIN: I think that one-time approval  
23 was before they sent in Revision 2, right?

24 MR. THOMAS: This is George Thomas.

25 The one-time approval was given to

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1 licensees that had Reg Guide 1.163, Rev. 0, as the  
2 implementing document, which endorsed NEI 94-01, Rev.  
3 0.

4 CHAIRMAN SHACK: Oh, but why didn't they  
5 just come back in for a license amendment to  
6 incorporate Rev. 2 as the implementing document?

7 MR. THOMAS: Yes, in fact, three licensees  
8 did come in, and they got approval using NEI 94-01,  
9 Rev. 2A, as the implementing document.

10 MEMBER RAY: You mean license renewal?

11 MR. THOMAS: No.

12 MEMBER RAY: You said relicense --

13 CHAIRMAN SHACK: License amendment.

14 MR. THOMAS: License amendment.

15 MEMBER RAY: Huh?

16 MR. THOMAS: License amendment.

17 MEMBER RAY: Okay. I thought he referred  
18 to relicensing.

19 MEMBER STETKAR: George, you said three  
20 licensees did that?

21 MR. THOMAS: Three licensees, actually.

22 MEMBER RAY: He said "three licensees"  
23 rather than "relicensing".

24 MR. THOMAS: Yes.

25 MEMBER STETKAR: Okay.

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1 CHAIRMAN SHACK: Close.

2 (Laughter.)

3 MEMBER STETKAR: All right.

4 MR. THOMAS: So, they have an extension of  
5 ILRT interval to 15 years, as long as acceptable  
6 performance is maintained.

7 CHAIRMAN SHACK: Why only three?

8 MEMBER STETKAR: You don't need to push  
9 that?

10 CHAIRMAN SHACK: Okay.

11 MEMBER STETKAR: These are on all the  
12 time. That is a new button.

13 (Laughter.)

14 MR. THOMAS: But I am sure more licensees  
15 will come in.

16 MEMBER STETKAR: But three licensees came  
17 in in what time period? I mean, back in --

18 MR. THOMAS: Between October --

19 MR. LIN: No, after the --

20 MEMBER STETKAR: After Rev. 2A.

21 MR. LIN: No, after October 2008.

22 MR. THOMAS: Most of them will come in  
23 later because they are --

24 CHAIRMAN SHACK: Well, now three will give  
25 them more, yes.

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1 MR. THOMAS: Yes. We already have a one-  
2 time approval and they have time to do that.

3 CHAIRMAN SHACK: It just wasn't clear to  
4 me, with the 2A, why the one-time approval came into  
5 the picture.

6 MR. LIN: I think the one-time approval  
7 was prior to Revision 2A.

8 Yes, the NRC reviewed Revision 3 and  
9 issued a Safety Evaluation approving Rev. 3 in June of  
10 this year, and NEI issued Rev. 3A in July of this  
11 year. So, Draft Guide 1220, the proposed one of Reg  
12 Guide 1.163, will endorse NEI Topical Report 94-01,  
13 Revision 3A, subject to the limitations provided in  
14 NRC Safety Evaluations for both Rev. 2 and Rev. 3.

15 And now, I turn it over to George and  
16 Brian to talk about the guidance in 94-01.

17 MR. THOMAS: Yes, I am George Thomas from  
18 NRR Division of Engineering.

19 I will provide an overview of the Topical  
20 Report NEI 94-01, Rev. 3A, for Type A testing and  
21 original examinations. And then, Brian Lee will  
22 continue the presentation related to Local Leak Rate  
23 Test.

24 Essentially, NEI 94-01, Rev 3A, delineates  
25 a performance-based approach for determining Type A,

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1 B, and C containment leakage testing frequencies. The  
2 justification for extending intervals is based on  
3 performance history and risk insights.

4 The Topical Report includes guidance for  
5 extending performance-based Type A test intervals up  
6 to a maximum of 15 years and Type C test intervals up  
7 to 75 months. Also, the Topical Report incorporated  
8 regulatory positions in Revision 0 of Reg Guide 1.163.

9 MEMBER RAY: John, are you going to pursue  
10 the risk insights part of that?

11 MEMBER STETKAR: Yes.

12 MR. THOMAS: Now the Topical Report makes  
13 reference to industry standard ANSI/ANS 56.8, the 2002  
14 edition, for specific details of testing methods and  
15 techniques.

16 With regard to Type A tests, the Type A  
17 test intervals can be extended from the initial 48-  
18 month interval in the Topical Report up to a maximum  
19 of 15 years, based on acceptable performance history  
20 and a supporting plant-specific confirmatory risk  
21 assessment that establishes the risk impact is small.

22 MEMBER STETKAR: George, should we hold  
23 questions about the kind of technical basis for this  
24 until you get through with the kind of regulatory  
25 issue part of it?

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1 MR. THOMAS: Yes.

2 MEMBER STETKAR: Okay.

3 MR. THOMAS: And there will be a  
4 presentation on the risk proposal, right, by Antonio,  
5 in more detail.

6 MEMBER STETKAR: Okay.

7 CHAIRMAN SHACK: Chomping at the bit.

8 (Laughter.)

9 MR. THOMAS: Acceptable performance  
10 history is defined as successful completion of two  
11 consecutive periodic Type A tests where the calculated  
12 performance leakage rate was less than 1.0 times La.  
13 La is expressed in percent rate for 24 hours, is the  
14 maximum allowable leakage rate at the test pressure of  
15 Pa, as specified in the Tech Spec. And the test  
16 pressure Pa is the calculated peak containment  
17 internal pressure related to a design-basis loss-of-  
18 coolant accident, also specified in the Tech Spec.

19 A Type A test failure report, the guidance  
20 requires corrective action, followed by a successful  
21 Type A test prior to resuming operation. Another  
22 successful periodic Type A test must be completed  
23 within 48 months in order to reestablish performance  
24 before the test interval can be again extended to 15  
25 years.

1           The Topical Report also specifies pretest  
2 and supplement visual inspection requirements to  
3 provide continuing supplemental means of identifying  
4 potential containment degradation.

5           MEMBER STETKAR: George, let me ask you a  
6 non-risk question, but it will help me understand  
7 something later. What is the shortest-possible  
8 interval for these two consecutive successful tests  
9 under this program?

10          MR. THOMAS: That is 24 months.

11          MEMBER STETKAR: Twenty-four months. So,  
12 a test at time zero, let's call it, has a success.  
13 Twenty-four months later, has a success. And now, I  
14 can extend it to 15 years?

15          MR. THOMAS: Yes, but, normally, the  
16 interval specified is 48 months. But it cannot be  
17 shorter than 24 months.

18          MEMBER STETKAR: But the shortest interval  
19 -- I am thinking a new plant, for example. I read a  
20 little bit of the background.

21          MR. THOMAS: Right.

22          MEMBER STETKAR: And for a new plant, I  
23 can do essentially a pre-op test that satisfies it.

24          MR. THOMAS: Yes.

25          MEMBER STETKAR: Twenty-four months later,

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1 do my first interval, and I am good to go for 15  
2 years?

3 MR. THOMAS: It has to be a periodic test  
4 after pre-operation. For a new reactor, for example,  
5 they would have a pre-operational Type A test. Then,  
6 they would do another one within 48 months. And then,  
7 they would need to do a second one in the next 48  
8 months to establish --

9 MEMBER STETKAR: Oh, okay. I thought I  
10 understood it that they could take credit for the pre-  
11 op test.

12 MR. THOMAS: They could take credit for  
13 the pre-op test in certain situations. For example,  
14 if the licensee performed a pre-op Type A test, and  
15 they did not go operational for more than three years  
16 before the plant went operational. In that situation,  
17 they would have to do a second pre-op test just before  
18 going operational, and then followed by a 48-month  
19 test. In that situation, the second pre-op test could  
20 be justified as Type A test.

21 MEMBER STETKAR: But not if they do an  
22 initial, what is called an initial pre-op test and  
23 enter operation six months after that test?

24 MR. THOMAS: Then, that is not considered  
25 a periodic test.

1 MEMBER STETKAR: But the second pre-op  
2 test, in your later example where they do a pre-op  
3 test and then sit around for three years, that next  
4 pre-op test is, then, considered a periodic test?

5 MR. THOMAS: In that situation, it could  
6 be.

7 MEMBER STETKAR: It could be?

8 MR. THOMAS: Yes.

9 MEMBER STETKAR: Who decides whether it is  
10 or isn't? And how is that decision made? I mean, it  
11 sounds like -- I want to understand this because I am  
12 trying to understand timelines here.

13 MR. THOMAS: The pre-op test is used as a  
14 periodic test, that test to be justified by the  
15 licensee in their documentation. For example, if they  
16 did a pre-op test and within a month they went into  
17 operation, that would not be counted as a periodic  
18 test.

19 MEMBER STETKAR: Okay, that one I got.

20 MR. THOMAS: Yes. So, they would do  
21 another one within 48 months. That would count. And  
22 then, they have do a second one in the following 48  
23 months.

24 MEMBER STETKAR: Yes. And that second  
25 time interval in that case could be as short as 24

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1 months?

2 MR. THOMAS: Yes.

3 MEMBER STETKAR: So, essentially, six  
4 years into the operating life of the plant, they could  
5 then justify going out to --

6 MR. THOMAS: Yes.

7 CHAIRMAN SHACK: Well, even the first one,  
8 could they do in 24 months instead of 48?

9 MEMBER STETKAR: Yes.

10 CHAIRMAN SHACK: So, they could do 24 and  
11 24. So, they would do four years and then go --

12 MEMBER STETKAR: Yes, I guess that is  
13 right. There is nothing saying that they have to wait  
14 until 48.

15 CHAIRMAN SHACK: Wait until the 48. They  
16 just have to do it within the 48.

17 MR. THOMAS: Right.

18 CHAIRMAN SHACK: So, it could be as short  
19 as four years, and then you extend?

20 MEMBER STETKAR: From time of initial  
21 operation?

22 MR. THOMAS: Yes.

23 MEMBER STETKAR: Okay. It could be as  
24 short as four years.

25 Now, let's talk about the second example

1 you had where they do, let's call it, a pre-pre-op  
2 test, sometime in history, and then, for whatever  
3 reason, they sit around for an extended period of time  
4 and do another, and I will call it a test, before they  
5 go into operation. How does one justify that pre-  
6 going-into-operation test as a periodic test under  
7 those conditions? How do you know that the status of  
8 the valves and the containment and the systems has not  
9 changed during that intervening period between those  
10 two pre-time-zero tests?

11 MR. THOMAS: Well, the second pre-op test  
12 would have to look into all those again.

13 CHAIRMAN SHACK: Yes, I mean, the  
14 environments and everything would not necessarily be  
15 those of an operating plant. Or you are saying that  
16 is something you would have to justify in order to  
17 make that case --

18 MR. THOMAS: Right, right.

19 CHAIRMAN SHACK: -- that that could be  
20 accepted, that somehow it wasn't an environment  
21 similar to what it would have experienced? So, that  
22 would be part of the demonstration you would have to  
23 do?

24 MR. THOMAS: Right. Yes. Yes, the  
25 Topical Report, we generally say that it is a pre-op

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1 test, that it needs to be used as a periodic test.  
2 The licensee will have to justify that in their  
3 documentation.

4 MEMBER STETKAR: But in that case, they  
5 could do that test, go into operation, two years later  
6 do their second test, and after two years in operation  
7 they could get justification for extending the 15  
8 years, is that correct?

9 MR. LEE: Yes.

10 MEMBER STETKAR: Okay. Thanks.

11 MR. THOMAS: With that, we show  
12 examinations. Appendix J, Option B, requires a  
13 general visual inspection of accessible interior and  
14 exterior containment surfaces for structural  
15 deterioration that could affect leak-tight integrity  
16 be conducted prior to each Type A test and at periodic  
17 intervals between the tests.

18 To satisfy this, NEI 94-01 specifies  
19 general visual examinations of accessible interior and  
20 exterior surfaces to be conducted prior to each Type  
21 A test and during at least three other outages before  
22 the next Type A test if the interval has been extended  
23 15 years.

24 To avoid duplication and/or omissions, NEI  
25 94-01 recommends that these visual examinations be

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1 performed in conjunction or coordinated with the ASME  
2 Code Section XI, Subsection IWE and IWL examinations  
3 required by 10 CFR 50.55a.

4 The guidance requires deficiencies  
5 identified be entered into the plant's corrective  
6 action program to determine cause and appropriate  
7 corrective actions.

8 MEMBER STETKAR: George, I hate to keep  
9 dragging you back to this, but we certainly have ample  
10 time here. So, I was just trying to draw myself a  
11 little timeline. I will bring you back to this two  
12 pre-time-zero tests.

13 If they do an initial pre-op test and it  
14 fails, and then they wait some period of time before  
15 they go into operation, and then they do the second  
16 pre-op test and it passes, can that be considered a  
17 periodic test?

18 MR. THOMAS: No.

19 MEMBER STETKAR: It can't?

20 MR. THOMAS: It can't.

21 MEMBER STETKAR: Okay. Thank you.

22 MR. THOMAS: Because the first one failed.

23 MEMBER STETKAR: Because the first one  
24 failed. Okay. Thank you.

25 MEMBER RAY: Well, John, my takeaway from

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1 all of that is what I guess Bill says, which is, why  
2 should the second pre-op test ever qualify as a  
3 periodic test?

4 MEMBER STETKAR: Yes, I am trying to  
5 understand how that, what conditions classify that or  
6 qualify it as a periodic test in the same sense of a  
7 periodic test once the plant is actually operating at  
8 power with the environment, temperatures, you know,  
9 pressure/temperature transients that the containment  
10 normally goes through.

11 MEMBER RAY: And I think what I heard, but  
12 it was a little confusing, was to ever use a pre-op  
13 test as a periodic test requires specification --

14 MEMBER STETKAR: That is what I heard,  
15 yes.

16 MR. THOMAS: Now 10 CFR 50.55a requires a  
17 containment In-Service Inspection program to be  
18 developed and implemented of Class MC/Class CC  
19 containment pressure-retaining surfaces in accordance  
20 with the applicable editions and addenda of the ASME  
21 Code, Section XI, Subsection IWE and IWL. That is  
22 incorporated by reference in 50.55a and subject to  
23 certain regulatory conditions.

24 Subsection IWE requires general visual  
25 examinations of 100 percent of accessible Class MC

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1 pressure-retaining surfaces and metallic liners of  
2 Class CC containments, as well as the moisture  
3 barriers, to be performed three times during a 10-year  
4 ISI interval. The ISI interval in Section XI is  
5 usually 10 years. This amounts to about four  
6 examinations over a 15-year ILRT interval.

7 Subsection IWL requires general visual  
8 examination of accessible Class CC concrete pressure-  
9 retaining surfaces to be performed every five years.  
10 This would correspond to approximately three  
11 examinations over a 15-year ILRT.

12 Suspect areas identified during these  
13 inspections are subject to more detailed/augmented  
14 examinations and evaluations and, if necessary,  
15 repair/replacement to correct.

16 The staff found the guidance in Topical  
17 Report NEI 94-01, Revision 2A, as with 3A, acceptable  
18 for referencing in the Tech Spec to extend the Type A  
19 test to up to 15 years, provided the following  
20 limitations and conditions are satisfied in the  
21 license amendment request:

22 The first condition is that, for  
23 calculating the Type A leakage rate, the licensee  
24 should use the definition in the Topical Report NEI  
25 94-01 in lieu of that in ANSI/ANS Standard 56.8.

1 Basically, the ANSI standard defines performance  
2 leakage rate of the sum of the measure Type A test at  
3 the confidence limit and, as left, the minimum Type A  
4 leakage rate from all Type B and C pathways isolated  
5 during the test.

6 The NEI 94-01 definition is more specific  
7 and more inclusive and considers leakage that takes  
8 place during performance of the test. Basically, it  
9 defines performance leakage rate as the sum of the  
10 Type A upper confidence limit leakage and the minimum  
11 pathway leakage for all Type B and C pathways that  
12 were in service, isolated, or not lined up in the test  
13 position prior to performing the Type A test. In  
14 addition, leakage pathways that were isolated during  
15 the performance of the test because of leakage must be  
16 factored into the performance determination.

17 The second condition is that the licensee  
18 submits a schedule, an approximate schedule, of  
19 containment inspections to be performed prior to and  
20 between Type A tests. This condition is essentially  
21 to make sure that the licensee is implementing the  
22 general visual examination performance properly.

23 CHAIRMAN SHACK: Now, with the new Reg  
24 Guide and the new SER, will they still have to submit  
25 that schedule or they will just have to have a

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1 schedule that you could go look at?

2 MR. THOMAS: Usually, they provide a  
3 typical schedule for 15 years, an approximate, in the  
4 maximum amendment list, just as an example, you know.

5 CHAIRMAN SHACK: That is for a typical 15-  
6 year then, not the specific 15-year?

7 MR. THOMAS: Correct. And it could  
8 change. It is just, you know, we review this  
9 application only one time when they come in, just to  
10 make sure that they are implementing their inspection  
11 programs appropriately.

12 The third condition is that licensees  
13 address areas of containment structure potentially  
14 subjected to degradation. Essentially, this condition  
15 is for licensees to identify any degradations in  
16 several areas in their containment and the operating  
17 experience, especially with regard to inaccessible  
18 areas. It is also meant to encourage licensees to  
19 proactively explore and consider new NDE technologies  
20 for inspection of inaccessible areas, although fully  
21 recognizing that such techniques are not commercially-  
22 viable at this time, but that is to encourage  
23 licensees to look into newer technologies which could  
24 be used in the future.

25 The fourth condition is that licensees

1 address any tests and inspections performed following  
2 major modifications to the containment structure.  
3 This can be shown essentially to ensure that the  
4 licensees understand that any major modification of  
5 containment, such as creation and restoration of an  
6 opening for steam generator replacement or reactor  
7 head replacement or replacement of large penetrations,  
8 must be followed by a Type A test or an equivalent  
9 sort of test that would demonstrate both structural as  
10 well as leak-tight integrity.

11 The fifth condition is that the normal  
12 Type A test interval should be less than 15 years.  
13 This condition was basically to discourage frivolous  
14 requests for extension beyond 15 years. The staff  
15 position is that the 15 years is an upper-bound  
16 performance-based-consistent interval, and any  
17 extension beyond that should be infrequent and only  
18 under compelling, unforeseen emergency conditions.  
19 This staff position has been clarified in RIS 2008-27.

20 CHAIRMAN SHACK: I guess that comes back  
21 to my original question. Why not just include that  
22 language in the RG instead of referring back to the  
23 RIS?

24 MR. THOMAS: Actually, we have a  
25 condition, right, in the first one?

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1 MR. LIN: Yes.

2 MR. THOMAS: That language has been  
3 included as the first regulatory provision.

4 CHAIRMAN SHACK: But it just takes it back  
5 to the RIS again in the first regulatory -- at least  
6 in the version I am looking at. I may not have the --

7 MR. LIN: It does refer back to the RIS.

8 CHAIRMAN SHACK: Right, but why not just  
9 include the RIS language that says this will be a  
10 license amendment right in the Reg Guide, rather than  
11 have them refer back to the RIS. I mean, I always  
12 think of RIS as somehow less permanent than a Reg  
13 Guide. You know, the Reg Guide is the authoritative  
14 guidance.

15 MR. THOMAS: The RIS is a little more  
16 voluminous.

17 CHAIRMAN SHACK: Right, but as far as the  
18 restriction that you really want, you know, this is  
19 it; you have to have good reasons and you have to come  
20 in for a license amendment if you want to change it.  
21 It seems to me something that I would like to see  
22 right in the Regulatory Position No. 1.

23 MEMBER STETKAR: It certainly would  
24 provide clarity in the document that --

25 CHAIRMAN SHACK: It would certainly

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1 provide clarity.

2 MEMBER STETKAR: -- people will directly  
3 refer to.

4 MR. LIN: Yes, I think we have the same  
5 interface with Regulatory Position 1, which is the  
6 same statement that is in here, that the normal test  
7 interval should be less than 15 years. NRC staff  
8 considers 15 years as the upper-bound limit. And  
9 then, we refer to the RIS for more detailed  
10 discussion, but I guess we can --

11 CHAIRMAN SHACK: You could add one more  
12 sentence that says it is going to take a license  
13 amendment to get beyond this. That would make me  
14 happier.

15 MEMBER STETKAR: Good takeaway.

16 MR. THOMAS: And the last condition is a  
17 general one for new reactors. It says that for plants  
18 licensed under Part 52, applications requesting  
19 permanent extension of the ILRT surveillance interval  
20 to 15 years should be deferred until after  
21 construction and testing of containments for that  
22 design have been completed and applicants have  
23 confirmed the applicability of NEI 94-01, Rev. 2, and  
24 the EPRI Report 1009325 for the risk assessment.

25 There is one more slide.

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1 With regard to operating experience, the  
2 majority of licensee have requested to receive one-  
3 time approval from 10 years to 15 years. Three plan  
4 to receive approval by extension of the performance-  
5 based ILRT to 15 years directly, based on adopting NEI  
6 94-01, Rev. 2A, the implementing document.

7 With regard to the operating experience  
8 related to containment testing, there have been no  
9 reported Type A test failures as far as the result of  
10 extending frequencies to 15 years.

11 CHAIRMAN SHACK: Of course, if it is in  
12 2008, it is a little early yet.

13 MR. THOMAS: No, including the ones that  
14 have done one-time.

15 CHAIRMAN SHACK: But they only started in  
16 2008, right?

17 MR. THOMAS: No, one-time extensions were  
18 given from 2000?

19 MR. LEE: 2002.

20 MEMBER STETKAR: To ask it a different  
21 way, how many plants have actually done testing under  
22 the extended interval? I mean, you know, countable  
23 numbers. Two? Three? Twelve?

24 MR. LEE: How many plants have been  
25 granted a one-time extension?

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1                   MEMBER STETKAR: And done the tests. We  
2 are trying to struggle with, you say that none have  
3 failed, but if none have actually performed a test,  
4 that wouldn't be surprising. If one performed a test  
5 and it didn't fail, well, that is information. If 107  
6 have performed a test and they didn't fail, that is  
7 additional information.

8                   MR. LEE: Yes, it is not that many. It is  
9 about five.

10                  MEMBER STETKAR: About five?

11                  MR. LEE: Yes.

12                  MEMBER STETKAR: Okay.

13                  MR. THOMAS: Most of these plants that got  
14 the one-time extension, their last test was in the  
15 nineties.

16                  MEMBER STETKAR: So, they really haven't  
17 done their next test yet?

18                  CHAIRMAN SHACK: Well, I mean, you would  
19 have gotten a 10-year extension in the 1994-95  
20 timeframe, right?

21                  MR. THOMAS: Correct. And then, they come  
22 back and get another five years. So, that made it 15.

23                  CHAIRMAN SHACK: Okay. So, they should  
24 have been doing that. So, that is your five, then,  
25 They are somehow doing them now in this --

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1 MR. LEE: Right.

2 CHAIRMAN SHACK: -- in this timeframe?

3 MR. THOMAS: We don't have a number, but  
4 I would think there are more --

5 CHAIRMAN SHACK: If 75 got it, then  
6 sometime between 2010 and 2015 we should see something  
7 on the order of 75 tests in that timeframe.

8 MEMBER STETKAR: Not necessarily. It  
9 depends on when the plant came online also. I mean,  
10 if they put in for it, but they first came online --

11 MR. THOMAS: And even I would think it is  
12 more than five --

13 MEMBER STETKAR: -- in 1989 or something  
14 like that, we wouldn't see it yet.

15 MR. THOMAS: The ones that have completed,  
16 I think it will be more than five, but I don't have a  
17 number right here. Probably many more than five.

18 MEMBER STETKAR: Since you make a point of  
19 that, and people make a point, "Gee, nobody has failed  
20 one during this extension," well --

21 CHAIRMAN SHACK: It would be nice to know  
22 how many were done.

23 MEMBER STETKAR: -- if you are one-for-  
24 one, that is interesting. If you are 25 for 25, that  
25 is a little more interesting.

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1                   MEMBER RAY: Yes, I mean that it seems  
2                   that we are struggling here with a simple proposition,  
3                   which is, how many plants have passed a Type A test  
4                   after an extended period of operation? And  
5                   conversely, have any failed? I think the answer is  
6                   nobody has failed during an extended period, following  
7                   an extended period test. Is that correct?

8                   MEMBER STETKAR: Yes. I mean, that is  
9                   what they have said.

10                  MEMBER RAY: All right.

11                  MEMBER STETKAR: But, I mean, hanging your  
12                  hat on, since we are dealing with rare events here --

13                  MEMBER RAY: That isn't quite literally  
14                  what it said up there, but, nevertheless, I understand  
15                  that is what they mean.

16                  MR. ZOULIS: I mean, we know there have  
17                  been 217 tests. Now what fraction of that were after  
18                  the extension --

19                  MEMBER STETKAR: That's right.

20                  MR. ZOULIS: -- we don't know.

21                  MEMBER RAY: Yes, but it should be a  
22                  simple thing to learn.

23                  MR. THOMAS: Normally, it gets reported to  
24                  the NRC only if there is a failure.

25                  (Laughter.)

1 I mean, we could go look back into the  
2 Tech Specs and look at dates.

3 MEMBER STETKAR: Well, they have to report  
4 that they did the test --

5 MR. THOMAS: Yes.

6 MEMBER STETKAR: -- because they need to  
7 satisfy their Tech Spec. So, there needs to be a  
8 checkoff box. And we are not talking about tens of  
9 thousands of tests here and the entire history of the  
10 nuclear fleet in the United States. There are only a  
11 few hundred at the most.

12 MR. THOMAS: No, the resident in the  
13 region follows it up when the tests are performed. It  
14 is just we don't have that information.

15 MEMBER RAY: Okay, but we are revising the  
16 Reg Guide here, and it would be really embarrassing if  
17 it turned out that there were some data during this  
18 time period when we are making this change that  
19 suggested that extended-period testing wasn't turning  
20 out the way we were assuming that it was. And it is  
21 just a question of what kind of data do we have and  
22 what does it say.

23 MR. RICHARDS: George, it doesn't sound  
24 like it would be that hard to get this information.  
25 Could we commit that we would run this down and then

1 provide that information to the ACRS members?

2 MEMBER STETKAR: Yes, I think that would  
3 be useful. The only problem is, you know, if it  
4 weren't called out as a bullet, kind of reinforcing  
5 this notion that everything is okay --

6 MR. RICHARDS: No, I understand your  
7 point.

8 MEMBER STETKAR: -- you would say okay.

9 MR. RICHARDS: Sure. So, I think we can  
10 provide that.

11 MEMBER STETKAR: Limited experience on  
12 rare-event data is questionable.

13 MR. THOMAS: Okay. Now I will turn it  
14 over to Brian Lee to continue.

15 MR. LEE: I am going to discuss about the  
16 performance-based Type B and Type C tests. These test  
17 intervals may be increased from 30 months to a maximum  
18 of 120 months for Type B tests and up to a maximum of  
19 75 months for Type C tests. These extensions are  
20 allowed based upon the completion of two periodic as-  
21 found tests where the results are within the  
22 licensee's allowable administrative limit. These  
23 administrative limits for leakage rates shall be  
24 established, documented, and maintained for each  
25 component prior to the performance of the Local Leak

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1 Rate Test. This is in accordance with the 2002 ANSI  
2 standard. A failure to find is a valve exceeding its  
3 administrative leakage limit.

4 Now, during the development of Revision 3  
5 of NEI 94-01, NEI did a study where they collected  
6 data for a time period of 1996 to 2010 on Type C  
7 valves on extended intervals, and the results were  
8 documented in EPRI Report 1022599.

9 The staff performed its own review of this  
10 report and found that the valves tested on extended  
11 intervals was about an order of magnitude less than  
12 what was reported in NUREG-1493 on the general  
13 population of valves tested prior to 1995.

14 MEMBER STETKAR: Do you have any notion of  
15 why that is?

16 MR. LEE: I would say better maintenance;  
17 stronger, better corrective action program.

18 MEMBER STETKAR: Did you examine whether  
19 -- I didn't have a chance to look at that particular  
20 EPRI report. Oftentimes, we see notions that people  
21 redefine what a failure is. They do screening, that,  
22 well, this really wasn't a failure because we decided  
23 that it isn't a failure. Did any of that type of pre-  
24 screening, was that performed in that EPRI report?

25 MR. LEE: It is pretty much

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1 straightforward that a failure is any valve that has  
2 exceeded its administrative limit. So, in the report  
3 they listed the number of Type C valves, the actual  
4 administrative leakage limit, and how many valves  
5 failed.

6 MEMBER STETKAR: And they didn't do any  
7 type of cause-based screening?

8 MR. LEE: No.

9 MEMBER STETKAR: Okay. Thank you.

10 MR. LEE: So, this report validated risk  
11 impact assessment of the EPRI Report 104285, which was  
12 back in 1995, on the Type C valves on extended  
13 intervals. It further showed that the leak-tight  
14 performance of the Type C valves on extended interval  
15 is actually better, or were better, than the general  
16 population of valves tested prior to 1995.

17 MEMBER RAY: John, I think if I could  
18 suggest people learn in doing testing how to do tests.

19 MEMBER STETKAR: Sure.

20 (Laughter.)

21 MEMBER RAY: So, rather than maintenance,  
22 I would say it may well be that you just learn when to  
23 conduct the test and what to do before you conduct the  
24 test, so that you don't fail the test.

25 MEMBER STETKAR: Yes.



1 (Laughter.)

2 MEMBER RAY: Okay.

3 MEMBER STETKAR: There is that, too.

4 Before you switch them, something that I  
5 have been thinking about here a bit, we refer a lot --  
6 and then, I will ask Antonio when he finally comes up  
7 also, so you might want to think about this -- we  
8 refer a lot to the data that have been collected from  
9 the current operating three plants regarding  
10 successful performance of the tests, failures of the  
11 tests, causes for the failures, and derive failure  
12 rates based on that information, and then use some  
13 sort of method to essentially extrapolate those  
14 failure rates out in time to give us some sort of  
15 confidence that, indeed, extending these intervals is  
16 justified.

17 The Reg Guide also applies to new plants,  
18 plants that have never operated before, new designs.  
19 It applies to new reactors. I don't necessarily know  
20 what their valves may look like. They will probably  
21 look quite a bit like valves that we have installed in  
22 the plants, but in some cases they might not.

23 How does the information that has been  
24 compiled from the current operating fleet apply to new  
25 plants when they come online? Because the Reg Guide

1 does apply to plants licensed under Part 52. So, for  
2 example, I can start up a new plant, go through  
3 whatever gymnastics of, I will call it, pre-  
4 operational testing or periodic testing. Even if I do  
5 two periodic tests within four years after the startup  
6 of that plant, it might be the first of its kind that  
7 has never operated before here, I now don't need to do  
8 this test for another 15 years or, in the case of Type  
9 B and C, another six years, six-and-a-half or whatever  
10 it is, 75 months.

11 MR. LEE: That is a good question. The  
12 only thing that is in place right now is the two  
13 periodic as-found tests for the penetration for the  
14 isolation valves.

15 MEMBER STETKAR: The reason I ask, in some  
16 of the design certification things -- and, Bill,  
17 correct me if I have misremembered this -- there has  
18 been some concern about new and innovative-type  
19 equipment designs may not be -- you may not be able to  
20 apply the same type of risk-informed extensions of  
21 Tech Spec intervals, you know, testing intervals under  
22 Tech Specs for new and innovative equipment design.

23 People are working this out in the design  
24 certification process right now, but we have had some  
25 discussions of that nature. For example, the large

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1 squib valves on some of the designs, we said, well,  
2 you probably can't apply at time zero for risk-  
3 informed surveillance interval extensions for those  
4 valves because we really don't know much about them.  
5 Whereas, another plain vanilla motor-operated valve  
6 perhaps, you might be able to. As I said, I think the  
7 staff is still working through this because they  
8 haven't yet had a risk-informed application for Tech  
9 Spec surveillance intervals yet. There is one  
10 applicant that is considering that.

11 So, I guess my question kind of derives  
12 from that experience.

13 MR. ZOULIS: One of the things and one of  
14 the justifications for why it is okay to extend the  
15 integrated leak rate testing from 10 to 15 or from 3  
16 to 15 years was that the tests didn't -- the value-  
17 added of doing the tests wasn't justified for the time  
18 for doing the outage expense and all of that involved  
19 in the test.

20 And part of it was because a lot of the  
21 other things that the plant is doing, the visual  
22 inspections, the other local leak rate tests, give you  
23 most of the information that would identify any large  
24 leak, potential large leak.

25 So, in terms of the failures of the

1 valves, it may be more pertinent for the extension of  
2 the B and C tests, but from the Type A perspective it  
3 would have been playing a role.

4 MEMBER STETKAR: Yes, the reason I was  
5 asking is more because of the B and C tests, where it  
6 is more relevant to equipment failure rates, if you  
7 will, details of the plant-specific equipment.

8 MR. ZOULIS: But, again, for the B and C  
9 testing, the interval change I think is not going to  
10 be that significant that it is going to modify your  
11 LERF. I mean, we have found that LERF is very  
12 insensitive to changes because it is dominated by the  
13 core damage frequency --

14 MEMBER STETKAR: Yes.

15 MR. ZOULIS: -- you know driving the  
16 sequences. Then, you have to have containment  
17 failures as a release.

18 MEMBER STETKAR: When I think of risk  
19 assessments, I think of large early releases is one  
20 thing. Small containment isolation failures is  
21 something else. So, I recognize Reg Guide 1.174  
22 constrains you to look at something called LERF. I  
23 think of having something happen at the plant and  
24 having an unisolated containment that has a release.  
25 It might be a 2-inch line. That is not a LERF.

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1 MR. ZOULIS: Right.

2 MEMBER STETKAR: It is not a good day at  
3 the nuclear power plant, however,

4 MR. ZOULIS: But I think for our meeting  
5 today we ran into the pros and cons of risk-informed,  
6 you know, whether we should be looking at LERF,  
7 whether we should be looking at all releases or --

8 MEMBER STETKAR: Right. That is a  
9 different issue, but I want to make sure that, just  
10 because we are focused on LERF in the context of the  
11 supporting analyses, we don't somehow suddenly  
12 overlook something that could be a problem, because  
13 there are a lot more isolation valves and there are a  
14 lot more penetrations and leakage paths that don't get  
15 you to a large early release or a large release, I  
16 would characterize that, in a typical containment.  
17 And these tests apply to all of those other things  
18 also.

19 Okay. I think you may want to think about  
20 new plants as they come on line, because I will grant  
21 you we do have an experience base that has been  
22 derived over something on the order of now 35 years or  
23 more of operating experience.

24 MR. ZOULIS: I mean, your question about  
25 the ability of the data to new components that are

1 different than the existing population, I mean that  
2 would have to be evaluated as part of your risk  
3 assessment to make sure that you are not applying  
4 generic data that doesn't fit to your valve data. I  
5 mean that would be supported by the ASME. I think the  
6 ASME standard has a criterion there that you are  
7 supposed to test your data and make sure that it is  
8 applicable.

9 MEMBER STETKAR: So, you just fall back to  
10 justification in the plant-specific risk assessment  
11 for the applicability of the --

12 MR. ZOULIS: Right. I mean, they have to  
13 be Reg Guide 1.200-compliant to be able to come for  
14 any kind of a license change. And then, that links it  
15 to the ASME standard and, hopefully, it has been peer-  
16 reviewed and evaluated the data, it is shown to be  
17 valid. And that is their whole basis for the risk-  
18 informed process.

19 MEMBER STETKAR: That is a good point, ye.  
20 Thank you.

21 Sorry, Brian.

22 MR. LEE: Oh, no problem.

23 The regulatory limit for the combined  
24 leakage rate for all penetrations involved in Type B  
25 and Type C tests shall be less than 0.60 La, which

1 George explained La is the maximum allowable leakage  
2 at calculated peak pressure.

3 In Section 12.1, a revision was made to  
4 require that the post-outage report shall include the  
5 margin between the Type B and Type C leakage rate  
6 summation and its regulatory limit.

7 And if any adverse trends shall occur to  
8 the summation, it should be identified in this report  
9 and a corrective action plan developed to restore the  
10 margin back to an acceptable level.

11 In the SER for Rev 3A, the staff  
12 identified two limitations and conditions. The first  
13 pertains to extensions of up to nine months for non-  
14 routine emergent conditions. However, this provision  
15 does not allow valves that are restricted and/or  
16 limited to the 30-month test interval or valves that  
17 are known for poor leakage performance to be granted  
18 this extension.

19 MEMBER STETKAR: Those valves that we know  
20 have a poor leakage performance today?

21 MR. LEE: Yes. They will be on the base  
22 30-month test interval, until they reestablish a good  
23 performance.

24 MEMBER STETKAR: Okay.

25 MR. LEE: Okay. The second condition

1 deals with the Appendix J program. Trending and  
2 monitoring must include an estimate of the amount of  
3 understatement for the Type B and Type C total, and  
4 this must also be included in the outage report. The  
5 report must include the reasoning and determination of  
6 the acceptability of the extension, demonstrating that  
7 the Local Leak Rate Test totals calculated represent  
8 the actual leakage potential of the penetrations.

9 MEMBER STETKAR: I will ask it now, since  
10 you do have that nice little parentheses "(e.g., BWR  
11 MSIVs)".

12 MR. LEE: Okay.

13 MEMBER STETKAR: We have had an example  
14 where people passed valve acceptance tests on main  
15 steam isolation valves for many consecutive years, and  
16 the performed a test and two or three valves stayed  
17 open for an awfully long time and discovered that  
18 there was a developing condition, either because of  
19 inadequate maintenance or missed things, or whatever,  
20 that caused that to happen.

21 So, suddenly, now we have valves that --  
22 now you have called out BWR MSIVs because everybody  
23 knows that is a very important valve. Maybe I know  
24 that there are other very important valves; maybe I  
25 don't. I don't know.



1           The reason I ask about these questions  
2 about things that we know are important today, if BWR  
3 MSIVs weren't called out in the past because everybody  
4 didn't know they were very important, and then we had  
5 this experience that, gee, this is an unexpected  
6 failure that nobody ever thought about, and it is  
7 something that has been accruing over time, and, yes,  
8 if you did the forensics you could go back and perhaps  
9 justify the fact that maybe you should have known  
10 about it, but, in fact, nobody did.

11           That is a bit of my concern about saying,  
12 well, things that we know about, we will take a look  
13 at and be careful about. Things that we don't know  
14 about, we will let go because we don't know about it.

15           Do you follow my reasoning that this  
16 notion that important valves you are not allowed to  
17 have an extension on? Or certainly ones that have had  
18 a problem in the past, a known problem in the past.  
19 I am not arguing that.

20           But valves that have performed  
21 successfully in the past, the presumption is that we  
22 know everything there is to know about those valves  
23 and that there is nothing that can happen to those  
24 valves that would cause their failure rate to increase  
25 as a function of time, and we have just not detected

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1 that yet, as is the case with those MSIVs.

2 Have the supporting analyses looked at  
3 that type of phenomenon, considered it?

4 MR. LEE: For the MSIVs?

5 MEMBER STETKAR: No, for any type of  
6 valve.

7 MR. LEE: You are talking about in that  
8 EPRI report that they submitted?

9 MEMBER STETKAR: Yes.

10 MR. LEE: No.

11 MEMBER STETKAR: Okay.

12 MR. LEE: They didn't.

13 MR. ZOULIS: I will tell you, though, one  
14 of the specific examples that occurred recently, the  
15 issue involved failure to appropriately classify the  
16 valve as important. So, if it was classified  
17 correctly, there shouldn't have been any issues under  
18 the AOV program.

19 And that goes back to what you were  
20 stating, that if you make sure that the important  
21 valves you have are classified correctly as important,  
22 then you shouldn't have an issue. And part of the  
23 reason, I think, was that they looked at the  
24 contribution, not the contribution but to LERF, or  
25 vice versa -- I can't recall exactly -- but, I mean,

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1 your point is a very important one.

2 Your AOV program which ranks a lot of  
3 these valves must take into account the risk  
4 contribution from those valves in both LERF and CDF  
5 and classify them correctly, so that they do get the  
6 attention that they need to make sure that they work  
7 properly.

8 And, of course, as in any program, there  
9 are going to be failures or misses where that occurs,  
10 but --

11 MEMBER STETKAR: The nice thing about  
12 testing is that the test doesn't care about how  
13 somebody has classified a valve in some study. It  
14 either works or it doesn't work. That is the nice  
15 thing about testing. Then, you discover the fact that  
16 it was misclassified or --

17 MR. ZOULIS: But I guess my point was that  
18 the testing wasn't blanketedly not being conducted; it  
19 was that it was incorrectly classified --

20 MEMBER STETKAR: No, I understand. I  
21 understand.

22 MR. ZOULIS: Yes.

23 MEMBER STETKAR: Okay.

24 MR. LIN: I mean, the test requirement  
25 could also be different. It depends on how you

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1 classify the valve.

2 MEMBER STETKAR: That is right.

3 MR. LIN: Yes.

4 MEMBER STETKAR: That is right. But, see,  
5 the test requirement can be different. If I classify  
6 a valve as unimportant, I am allowed less onerous  
7 testing, let's call it that way. And if I start  
8 extending testing intervals, I perform that less  
9 onerous testing even less frequently and have less of  
10 an opportunity to discover something that should have  
11 been classified as important, but wasn't.

12 Okay. Thanks.

13 MR. LEE: To sum this portion of the  
14 presentation up, the major difference between Rev. 0  
15 and Rev. 2A was Rev. 2A includes provisions for  
16 extending Type A tests to permanent, continuous. The  
17 major difference from going from 2A to 3A is that 3A  
18 includes guidance on extending Type C valves from 60  
19 months to 75 months.

20 And the Appendix J program, in conjunction  
21 with the containment and service inspection program,  
22 together ensure that the containment structural and  
23 leakage integrity is maintained through the service  
24 life.

25 MEMBER RAY: What do the Europeans do?

1 MR. LEE: Are you asking are they on  
2 extended frequencies?

3 MEMBER RAY: I am just asking what they do  
4 when it comes to containment leakage test.

5 MR. LEE: I think they are on 10-year  
6 frequencies, I believe.

7 MEMBER STETKAR: I suspect it must be a  
8 10-year because a lot of them are on the 10-year  
9 periodic safety review.

10 MEMBER RAY: Right. It is an integrated  
11 leak rate test?

12 MEMBER STETKAR: I don't know that.

13 MEMBER RAY: Yes. Okay.

14 MEMBER STETKAR: That I don't know,  
15 Harold.

16 MR. THOMAS: France does it on 10-year  
17 intervals.

18 MEMBER RAY: And what about the B and C?  
19 Got any idea?

20 MR. LEE: I am not sure. Do you know? I  
21 am not sure about their Local Leak Rate Test.

22 MR. ZOULIS: Good morning.

23 As Bruce indicated, my name is Antonio  
24 Zoulis. I am with the Office of Nuclear Reactor  
25 Regulation in the Division of Risk Assessment.

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1 I kind of feel I am the main act. I hope  
2 I don't disappoint today.

3 My discussion will focus on the risk  
4 aspect of the Integrated Leak Rate Testing, known as  
5 ILRT, the interval extension; specifically, the  
6 methodology found in the EPRI report "Risk Impact  
7 Assessment of Extended of ILRT Intervals" and the  
8 Safety Evaluation which found the method acceptable to  
9 meet our regulatory requirements. So, I will cover  
10 both the SE and the EPRI report.

11 NUREG-1493, as mentioned above, used risk-  
12 informed criteria to support modifying the regulation  
13 to reduce unnecessary regulatory requirements found in  
14 Appendix J. The EPRI report built on the methodology  
15 and supports our risk-informed process which uses risk  
16 insights, together with other factors, to better focus  
17 licensee and regulatory attention on design and  
18 operation issues commensurate with their importance to  
19 health and safety.

20 The NRC approach is not risk-based due to  
21 the aleatory and epistemic concerns in these methods  
22 and the processes and programs which we regulate. So,  
23 we are risk-informed, not risk-based, in our  
24 evaluation and these changes to the license.

25 Next slide.

1           The key principles in the risk-informed  
2 process which support integrated decisionmaking are  
3 displayed here and are in found in Reg Guide 1.174 and  
4 other risk-informed guidance, 1.177.

5           So, basically, when the licensee comes in  
6 for a change, he or she still needs to meet the  
7 current regulation. The change has to be consistent  
8 with defense-in-depth philosophy. It is not that they  
9 cannot change or alter their philosophy. It has to be  
10 consistent with changes to support defense-in-depth  
11 philosophy.

12           They need to evaluate their safety  
13 margins, make sure that the change doesn't adversely  
14 impact their safety margins. The change in risk needs  
15 to be small and has to consistent with the  
16 Commission's safety goals.

17           And I think the most important thing that  
18 is the theme, I think, that keeps on coming up today  
19 is the performance monitoring. Part of our criteria  
20 is that they set up performance-measuring strategies  
21 to make sure that that change does not impact,  
22 adversely impact, the safety function of the system  
23 that are in question.

24           So, basically, the EPRI report concludes,  
25 and we agreed with our SE, that NUREG-1493, the

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1 conclusions were still valid, that the risks  
2 associated with these changes is very small. And the  
3 report basically develops a generic method which is  
4 then applied by each licensee using their plant-  
5 specific risk assessments to evaluate the risk for  
6 their plant change.

7 And I mentioned earlier, to do that, they  
8 must be Reg Guide 1.200-compliant. So, they have to  
9 meet the ASME standard to even consider making a  
10 change of this nature.

11 Next slide.

12 MEMBER RAY: Let me ask this question.

13 MR. ZOULIS: Yes.

14 MEMBER RAY: I doubt very much that the 15  
15 years or the other durations are derived from risk-  
16 informed considerations. They are supported by those,  
17 but I take it, I assume -- correct me if I am wrong --  
18 that the durations are based on, let's call it,  
19 engineering judgment or some reason. Why not make it  
20 20 years, 25 years, 30 years? There is some reason  
21 why 15 years is as far as we are going to go.

22 What supports that? Do you have anything  
23 support? Or is it just we don't want to go beyond  
24 this point?

25 MR. THOMAS: Well, it is just, as was



1 mentioned, a cautious evolution of the approach.

2 MEMBER RAY: Say more. Again?

3 MR. THOMAS: A cautious evolution of the  
4 approach.

5 MEMBER RAY: Yes. So, it is as far as we  
6 want to go. We don't want to go any further than  
7 that.

8 MR. ZOULIS: Also, one of the other  
9 factors was, if a plant went for license renewal for  
10 20 years, we didn't want them to go through a whole  
11 20-year period without one test. So, we have kind of  
12 kept it at 15, so that, hopefully, between the 20-year  
13 licensing, they would have at least one other test  
14 done in that period. So, that was part of the  
15 justification also.

16 MEMBER RAY: Okay.

17 MR. ZOULIS: Next slide, please.

18 Again, CDF is not significantly impacted  
19 by the extension of the ILRT interval. However,  
20 plants that do rely on containment accident pressure  
21 for the ECCS need to assess that impact in their risk  
22 assessment. And I will discuss this later. They must  
23 come in for license amendment. If they take credit  
24 for containment accident pressure, they come in; they  
25 cannot just do a 50.59 change and just submit a

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1 license amendment for that.

2 Next slide.

3 Again, the figure of merit for this  
4 evaluation, whether right or wrong, is LERF. In  
5 addition to LERF -- well, I mean, that is our risk-  
6 informed process. I mean, it has a whole different  
7 meaning if you want to change that.

8 But it also, though, does take into  
9 account the increase in the population dose and the  
10 increase in the conditional containment failure  
11 probability. So, the methodology also evaluates those  
12 impacts to the public, I would say to the public.

13 Next slide.

14 MEMBER STETKAR: I will let you get  
15 through your slides before I ask a bunch of questions.

16 MR. ZOULIS: So, basically, the change in  
17 LERF is derived by the change in the Integrated Leak  
18 Rate Test failure probability. In this case,  
19 integrated leak rate failure is not the failure of the  
20 ILRT test to measure containment leakage, nor does it  
21 indicate a failure of a Type A test to meet  
22 performance criteria of NEI 94-01. Rather, the term  
23 ILRT failure is used to describe those ILRT tests in  
24 which containment leakage was identified above the  
25 acceptance criteria that would not be detected by a

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1 Local Leak Rate Test, containment inspection, or other  
2 alternate means, and is of sufficient size to  
3 potentially result in a large early release.

4 So, what that means is the portion of the  
5 test that may not be either covered by the Local Leak  
6 Test inspection, that is the portion that we are  
7 focusing on, that by not doing this test, you wouldn't  
8 identify.

9 MEMBER STETKAR: Antonio, since you have  
10 this nice equation --

11 MR. ZOULIS: Sure.

12 MEMBER STETKAR: -- if I go back -- and I  
13 didn't get a chance, unfortunately, to really study  
14 all of the details of the EPRI report; I have to  
15 apologize for that. I did read through it.

16 It seems like the EPRI report develops the  
17 delta assuming a linear relationship with the duration  
18 of the test interval. If I look at their results, and  
19 I scale from three in 10 years to once in 10 years,  
20 there is miraculously a factor of three difference.  
21 And if I, then, scale to once in 10 years to once in  
22 15 years, there is a factor of 1.5 difference there.

23 Did anyone question the linearity in that  
24 assumption? That is a fundamental assumption. It  
25 says that the world behaves in a linear process.

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1           For the purpose of this Type A test now,  
2           and I will go away from the other things that I was  
3           talking about, valve failure rates, which is also a  
4           question there, but in this, do we have any reason to  
5           believe that the world behaves linearly for the types  
6           of causes or failure modes that would contribute to  
7           these types of failures?

8           MR. ZOULIS: No, I don't think we question  
9           that. But I think because we consider the other  
10          factors, I mean like the defense-in-depth safety  
11          margin and all the other criteria, and we make gross  
12          assumptions on the size of the leak, all these things,  
13          we feel that we may be bounded by those other  
14          considerations.

15          MEMBER STETKAR: All right. The EPRI  
16          report talks an awful lot about the expert elicitation  
17          process that was also factors in for essentially  
18          undetected or leakage that is not detectable by any  
19          of these other means. If I read through that process,  
20          they said they had six experts and they ran through a  
21          whole formal expert elicitation process about the  
22          likelihood of those types of failures as a function of  
23          leakage amount in terms of fraction of  $I_a$ .

24          They polled six experts and they threw out  
25          the high and the low because they said, well, the low

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1 had a bunch of zeroes and they didn't know how to  
2 treat zeroes in their statistical methods. Because  
3 they threw out the low, they also threw out the high.  
4 That is not an appropriate way to treat uncertainties  
5 in expert elicitation. There are methods that treat  
6 zeroes, not the classical statistic methods that they  
7 used. Bayesian analysis treats zeroes perfectly fine.

8 My curiosity is, because they threw out  
9 those, the high and the low, you get this central-  
10 limit tendency of people who have looked at a limited  
11 set of data and draw conclusions. Do you have any  
12 idea how much difference including the high and the  
13 low would have made to those estimates? Because that  
14 is also something that influences this. You know, the  
15 risks-informed conclusion is what is the likelihood  
16 that this is the only test that can discover that type  
17 of leakage.

18 And then, the question is, how did the  
19 experts, then, account for the possibility -- they  
20 were presented the data, the historical data, but did  
21 they consider the possibility that there might be non-  
22 linear effects or something that just isn't a data-  
23 averaged-type phenomenon?

24 Because, unfortunately, in the EPRI  
25 report, once they threw out the high and the low, they

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1 give me the results from the four that they kept.  
2 They don't tell me the results from the two that they  
3 threw out, so that I can even tell where they were.  
4 It might be something I missed, but I thought that is  
5 all that was there.

6 MR. ZOULIS: I don't have any information  
7 on that.

8 MEMBER STETKAR: Okay.

9 CHAIRMAN SHACK: But just in my  
10 simpleminded view, I mean, I assume the linearity  
11 comes back to the fact that you assume you have kind  
12 of random fit. So, if I increase the time interval,  
13 I increase the failure rate.

14 MEMBER STETKAR: Yes, but there is no  
15 time-dependent type of accelerating process.

16 CHAIRMAN SHACK: Now they do have a  
17 corrosion correction model that is the one mechanism  
18 one would sort of see as kind of a non --

19 MEMBER STETKAR: Yes.

20 CHAIRMAN SHACK: -- a non-constant thing.  
21 And so, they do attempt to --

22 MEMBER STETKAR: To handle that.

23 CHAIRMAN SHACK: -- handle that. I mean,  
24 I thought the factor of three was a lot better than  
25 the 10 percent that was in the original analysis.

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1 MEMBER STETKAR: Well, yes. Yes.

2 (Laughter.)

3 CHAIRMAN SHACK: Now that one I couldn't  
4 figure out at all.

5 MR. ZOULIS: So, the population dose is  
6 calculated by multiplying the base population dose by  
7 the change of the probability of leakage event over  
8 the affected CDF end-states. And the conditional  
9 containment failure probability amounted to sequences  
10 where containment does not fail over the total CDF,  
11 and the difference in the percentage of the CDF where  
12 containment failure occurs.

13 So, their report considers the data that  
14 we were talking about. Over 217 tests conducted  
15 resulted in no ILRT failures; that there are different  
16 ways of detecting leakage pathways in the containment.  
17 These methods include the Local Leak Rate Test that we  
18 talked about before, reactor startup, normal  
19 operation, and other containment piping inspections.

20 We also spoke about the estimation of the  
21 containment leakage, of how they use 100 La. And the  
22 highest observed was about 21 La from past tests.

23 Of course, again, as Mr. Shack said, the  
24 liner corrosion model also is incorporated, which has  
25 a generic method for determining the change in

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1 likelihood of detecting liner corrosion and the  
2 corresponding change in the risk due to the ILRT  
3 extension.

4 It also assumes that all non-detectable  
5 failures result in early releases. So, I mean, that  
6 approach is conservative and avoids a detailed  
7 analysis of containment failure timing and operator  
8 reactions.

9 MEMBER STETKAR: To come back to the LERF,  
10 though, the 100 La is a fairly large leak. If I look  
11 at the expert elicitation results, the four that I can  
12 look at, they were in the a couple times 10-to-the-  
13 minus-4 probability that that size of leak might exist  
14 and not be detected by any of these other cases.

15 If I fall back from LERF to smaller leaks,  
16 5 to 10 La, there is an order of magnitude to an  
17 order-and-a-half of magnitude from the expert  
18 elicitation process that those types of leakage might  
19 be there, something in the middle to seven or eight  
20 times 10-to-the-minus-3 range.

21 Again, we are limited by this LERF in  
22 terms of the delta risk assessment for the purposes of  
23 the risk-informed regulations. I don't know how to  
24 deal with that.

25 MR. ZOULIS: For BWRs, since their

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1 containment is nitrogen-inerted, then you should be  
2 okay detecting those kind. For the BWRs, we shouldn't  
3 have an issue with that.

4 MEMBER STETKAR: Right.

5 MR. ZOULIS: Now for the PWRs --

6 MEMBER STETKAR: In sub-atmospheric, there  
7 is, I don't know, two or three, I don't know how many  
8 sub-atmospheric PWRs, but a couple of those around.  
9 But for the large, dry PWRs, we don't have a lot.

10 MEMBER RAY: Don't have a lot of?

11 MEMBER STETKAR: Of other ways of  
12 determining that, indeed, the containment doesn't have  
13 an open pathway.

14 MEMBER RAY: Yes. No, I agree with you,  
15 John. I am sitting here just trying to focus on,  
16 well, what is the purpose of this thing to begin with,  
17 the containment leak rate test.

18 MEMBER STETKAR: It is to find those  
19 things, I think.

20 MEMBER RAY: Well, I do, too, but that  
21 doesn't seem to be where the agency is coming from.  
22 So, I am just trying to reconcile those things.

23 MR. ZOULIS: Next slide.

24 MEMBER STETKAR: I didn't get a chance to  
25 look at -- the data are in the report, and there are

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1 tables and tables. The said that the highest observed  
2 leakage was 21. What was the cause of that? Do you  
3 know that event?

4 MR. ZOULIS: I read it, but I can't  
5 recall. I know they had trouble trying to find data  
6 that they could use, observable data, to come up with  
7 a rate. They even assumed in some cases it was the  
8 steam generator manway was open or some sort of -- it  
9 wasn't even really the containment. But, then, they  
10 used those values.

11 MEMBER STETKAR: Okay.

12 MR. ZOULIS: I read it, but I can't  
13 recall.

14 MEMBER STETKAR: Okay. And I should know,  
15 but, as I said, I think all the data are in the  
16 report. Your eyes glaze over after you read too many  
17 tables.

18 Okay. Thank you.

19 MR. ZOULIS: Next slide.

20 So, basically, the EPRI report has six  
21 steps of quantifying the risk. It has detailed  
22 methodology for each step, and it considers specific  
23 accident classes and uses those classes to calculate  
24 the risk impact to LERF and the population dose.

25 So, the licensee needs to basically

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1 quantify the baseline. They start off from the three  
2 year to ten and then 15-year intervals. I have  
3 reviewed, I think, two applications, and they included  
4 the risk going from three to ten, and from ten to 15.

5 They developed a baseline population dose.  
6 They evaluated the risk impact for the interval  
7 extension changes, the impact to LERF and the change  
8 in the conditional containment failure probability.  
9 They do evaluate both internal and external events,  
10 and they perform a sensitivity analysis of the  
11 results. And they also consider the assumptions  
12 related to the liner corrosion analysis to evaluate  
13 that uncertainty.

14 So, it is pretty thorough. It has, again,  
15 detailed steps. It gives an example for PWR and BWR.  
16 So, it goes through both. I think Vogtle is the  
17 example for the PWR.

18 MEMBER STETKAR: Do those plant-specific  
19 analyses rely on this, on the expert elicitation  
20 results from the EPRI report on the probability  
21 distribution for the undetectable, if I call it that,  
22 leaks?

23 MR. ZOULIS: I think, yes, the plant-  
24 specific portion is the sensitivity LERF sequences and  
25 the CDF.

1                   MEMBER STETKAR: But they essentially use  
2 the EPRI numbers?

3                   MR. ZOULIS: Yes.

4                   Next slide.

5                   So, the final SE that was issued, which  
6 endorsed the NEI Technical Report and the EPRI  
7 document, was issued. You need again, license  
8 amendment request must be submitted for containment  
9 overpressure if it is relied upon for ECCS.

10                  The PRA must meet Reg Guide 1.200  
11 requirements for risk-informed submittal. And we  
12 found that the methodology supported the five key  
13 principles found in Reg Guide 1.174. So, we were  
14 satisfied that the risk associated with these changes  
15 was very small and was acceptable to grant the  
16 extension, permanent extension, to 15 years.

17                  The conclusion, I think that basically the  
18 conclusions were that the intents of the Appendix J  
19 containment program ensures that the containment  
20 structure and the leakage integrity is maintained  
21 through its service life. We found the guidance to be  
22 acceptable for implementing Option B of 10 CFR 50,  
23 subject to the limitations and conditions in the NRC  
24 SER for Version 2, and the limitations and conditions  
25 for the NRC SER from Revision 3.

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1           The staff finds the implementation around  
2           the risks associated with the interval extension  
3           acceptable and consistent with the five key principles  
4           of Reg Guide 1.174 and other risk-informed guides.  
5           The revision of Reg Guide 1.163 reflects the latest  
6           staff position based on Version 3A of the NEI  
7           Technical Report 94-01 guidelines. There are no new  
8           staff positions that are being promulgated in this  
9           revision.

10           And that concludes our presentation, I  
11           think, today, and we will probably open it up for  
12           questions, more questions.

13           MEMBER STETKAR: I guess this is not  
14           particularly a question. I have been dancing around  
15           it a bit, but it is more of my own thinking outloud a  
16           bit.

17           I think I understand fundamentally what  
18           has been done. I think a couple of my questions point  
19           to a bit of a concern about focusing only on LERF as  
20           the measure of merit for determining whether or not we  
21           can extend these and not also considering smaller  
22           isolation failures, which would, indeed, be detected,  
23           whether it is Type A or -- Type A I mostly concerned  
24           about testing.

25           We do have data and operating experience

1 from the current fleet. I will come back to my  
2 question about going forward with new reactors. I  
3 just don't know how much thought has been put into  
4 this notion of, for a new reactor, their performing  
5 two consecutive successful tests of a plant that has  
6 never operated before in the first four years of  
7 operation, and then being allowed to extend their test  
8 interval out to 15 years, with very little operating  
9 experience from that particular design.

10 Even if we accept the fact that valves are  
11 valves for the same valves, are there other mechanisms  
12 or causes that can affect that particular design? And  
13 I don't know. I just don't know. The containments  
14 are not radically-different containments, by and  
15 large, Harold's plant notwithstanding.

16 (Laughter.)

17 MEMBER RAY: No, that is right.

18 CHAIRMAN SHACK: Steel shell containment.

19 MEMBER STETKAR: Steel shell containment.

20 So, one would not expect different failure mechanisms  
21 perhaps to derive.

22 MR. THOMAS: But Type A tests, you know,  
23 we have put a condition that states, for plants  
24 licensed under Part 52, applications requesting  
25 permanent extension of ILRT surveillance interval 15

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1 years should be deferred until after construction and  
2 testing of the containments for that design have been  
3 completed and applicants have confirmed the  
4 applicability of NEI 94-01, Rev. 2, and EPRI report,  
5 Rev. 2, including the use of past containment ILRT  
6 data. So, there is a general condition for Type A  
7 tests.

8 MEMBER STETKAR: For Type A? So, they  
9 would have to come in with a justification about why  
10 the current operating fleet ILRT data applied to that  
11 particular design. Am I understanding that correctly?

12 MR. THOMAS: Correct.

13 MR. ZOULIS: I mean, it doesn't address  
14 the issue of the operating experience, the four years  
15 to --

16 MEMBER STETKAR: It doesn't address that  
17 directly, but it at least --

18 MR. ZOULIS: Makes sure that it is  
19 applicable.

20 MEMBER STETKAR: -- links or makes the  
21 applicant think about it and justify why data, that  
22 experience from the current operating fleet applies to  
23 their particular design and configuration. And it  
24 requires you to think about that, also, I guess, when  
25 they come in.

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1                   Okay. I will have to think about that a  
2 little bit. Thank you.

3                   MEMBER RAY: Well, I have a similar kind  
4 of -- I spent time working for the meeting next door,  
5 not this one. So, I am having to think about this as  
6 we go along here.

7                   But, be that as it may, I am still stuck  
8 on, what is the point of the test in the first place?  
9 Supposing -- just supposing, hypothetically -- that we  
10 always found there are a lot of leaks that shouldn't  
11 exist. I am leaving aside LERF and exposure of the  
12 public, and so on. But just if the test found that  
13 regularly -- and I am making this just a  
14 hypothetically -- that we identified small leaks as  
15 compared with ones that would challenge the risk-  
16 informed basis of the extension, but we are saying,  
17 well, that is okay because we can extend the test  
18 interval, notwithstanding that fact, because the point  
19 of the containment is just the limitation on risk to  
20 the public health and safety due a LERF event.

21                   I don't think that is right. I don't  
22 think that is where we really believe we are when it  
23 comes to containment integrity. And yet, I understand  
24 the policy objective of risk-informed regulation and  
25 justifying things that we require on that basis. But

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1 I am still uncomfortable with the idea that there are  
2 a lot of penetrations which, if they are found often  
3 to be leaking during a Type A, for example, that is  
4 not a good situation.

5 So, how do we deal with that?

6 CHAIRMAN SHACK: Well, I think you have it  
7 the other way around, Harold. I think this whole  
8 thing arose because, when you did the Type A tests,  
9 you found very few failures.

10 MEMBER RAY: But we don't have that data  
11 here, Bill. That is my point.

12 CHAIRMAN SHACK: Well, we know that we  
13 have the 217, or whatever it is, with no failures.  
14 Now that includes some that don't have the 15 years.

15 MEMBER RAY: Yes, exactly.

16 CHAIRMAN SHACK: But the whole Type A  
17 history is a good one. So, the question, then,  
18 becomes, okay, it really is a defense-in-depth thing.  
19 You really don't think you are going to have these  
20 small failures. You know, the failures are mostly  
21 Type B and Type C things, which you are inspecting on  
22 a much more frequent basis.

23 MEMBER RAY: Right.

24 CHAIRMAN SHACK: The risk-informed part  
25 sort of says, okay, am I really taking a big chance

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1 here when I do that? Even though my data looked good,  
2 am I giving up too much in defense-in-depth? To me,  
3 that is where the risk-informed argument comes in that  
4 says, no, I am not really losing my defense-in-depth.  
5 If I am wrong, I still have got some --

6 MEMBER RAY: I agree with you, if you are  
7 looking at it just from the standpoint of test failure  
8 experience, Type A test failures. I understand. But,  
9 still, we are now not finding and addressing the other  
10 causes of leakage that you do when you conduct a Type  
11 A test.

12 Again, I am not criticizing the  
13 conclusions.

14 CHAIRMAN SHACK: But I think we have a  
15 very different discussion here if they had lots of  
16 failures in Type A tests.

17 MEMBER RAY: Yes, I concede that.

18 MEMBER STETKAR: I go back to this expert  
19 elicitation process for this, and correct me if I am  
20 wrong, please, because, as I said, I didn't have the  
21 time, a chance to really sit down and study this.

22 The expert elicitation looked at the  
23 experience, those however many leak rate tests that  
24 have been done, and said, given that experience, the  
25 experts were tasked were saying, as a function of

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1 undetected leak size, the size of the leak that would  
2 not be detected by, for example, Type B and C testing,  
3 what is the likelihood, given that operating  
4 experience, what we have learned?

5 MR. ZOULIS: The other things, visual  
6 inspections and --

7 MEMBER STETKAR: The other things. What  
8 is the likelihood that that type of leak might exist,  
9 given the testing history that we have had? And the  
10 experts, again, with the caveat that they threw out  
11 the high and the low, I would really be interested in  
12 what the high looked like and what the shape of that  
13 expert distribution actually was.

14 But, given that caveat, the experts are  
15 saying that, for -- and I don't know what you call a  
16 modest leak -- twice the allowable leakage rate, they  
17 are assigning about a 1-percent probability that that  
18 might be there at any given time, which depending on  
19 your notion of large or small numbers, that is  
20 essentially what they are saying.

21 And I think, Harold, that process tried to  
22 capture that operating experience. So, you know, when  
23 you say you have a lot of tests that have small  
24 failures, the experts at least who had the opportunity  
25 to look at all of that data assessed that that happens

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1 about once in 100 to once in 50 times or so. So,  
2 apparently, I am assuming that they didn't just  
3 wholesale throw out a lot of the actual failure  
4 experience data.

5 Now the question is whether that is  
6 something that we should be concerned about here  
7 because that certainly isn't a contributor to LERF.

8 MEMBER RAY: Yes.

9 MEMBER STETKAR: And it is something that  
10 has not, explicitly not been considered in -- I don't  
11 think, anyway -- in the EPRI analyses because they did  
12 look specifically at LERF.

13 MR. ZOULIS: They do look at potential  
14 containment failure probability and, also, the base  
15 dose to the population. So, they evaluate that as  
16 well. So, then, there are three figures that they  
17 evaluate. It is not just LERF.

18 MEMBER STETKAR: Okay.

19 MEMBER RAY: Well, again, to speak to what  
20 Bill said, I agree with you, John, we look to other  
21 things, basically, than the Integrated Leak Rate Test  
22 to provide necessary confidence that we don't have  
23 unacceptable, but still small leaks in penetrations  
24 and isolation valves, and that sort of thing.

25 It is just that that means to me that the

1 Integrated Leak Rate Test has a limited, more limited  
2 role to play than --

3 MEMBER STETKAR: I think that is certainly  
4 true for large leaks.

5 MEMBER RAY: So, anyway, having made that  
6 point, I don't have anything else to offer, I guess.

7 CHAIRMAN SHACK: But, I mean, I am right  
8 that the IWE/IWL thing was actually brought into this,  
9 basically, to support the Appendix J kind of Option B  
10 thing, right? I mean, that is when IWE came into the  
11 code, wasn't it?

12 MR. THOMAS: Came into the regulation,  
13 yes, in 1995.

14 CHAIRMAN SHACK: Yes. 1995.

15 MR. THOMAS: About the same time as --

16 CHAIRMAN SHACK: So, I mean, that was  
17 another sort of defense-in-depth thing, is to add a  
18 large amount of at least visual inspection on a much  
19 more frequent basis. Again, it doesn't address  
20 everything, but it certainly helps.

21 I mean, if I can go back to Dennis' thing,  
22 you know --

23 MEMBER RAY: Trust me, you don't want to  
24 do these tests unnecessarily and for no reason.

25 CHAIRMAN SHACK: -- "Extensions of

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1 surveillance intervals are made in stepwise fashion,"  
2 such as equipment is tracked carefully in new failure  
3 modes. I mean, it seems to me, you know, they did the  
4 first extension to 60 months for the Type C. You  
5 looked at the data. It looks pretty good. I mean,  
6 the failure rates are low. There is no time-  
7 dependence. I mean, you are not seeing a history kind  
8 of accelerating thing.

9 And again, if we see a bunch of Type A  
10 failures here in the next couple of years, we can  
11 revisit this again. But, certainly, there are no  
12 trends that indicate a problem here.

13 It seems to me they are sort of following  
14 Dennis' notion of marching out here a little  
15 carefully.

16 MEMBER STETKAR: I am forgetting the  
17 acronyms here. So, I am trying to remember acronyms  
18 in real-time, but somebody will help me out.

19 And I will grant you that for the current  
20 operating fleet. But if I go to new plants, and  
21 something Antonio said earlier prompted another  
22 thought, new plants, for the passive plants, they have  
23 a list of equipment called RTNSS equipment on safety-  
24 related stuff. And for the active plants, they have  
25 what I think is a comparable list -- and I have

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1 forgotten the acronym for that list, but it is the --

2 CHAIRMAN SHACK: DRAP.

3 MEMBER STETKAR: Thank you. DRAP, Design  
4 Reliability Assurance Program equipment list, which is  
5 analogous in my mind.

6 Those SSCs are assigned to those lists  
7 based on risk indices in many cases. There is an  
8 expert panel that looks at other non-numerical  
9 factors, but there is reasonable reliance on risk  
10 indices.

11 We have not worked our way through, I  
12 don't think, as an agency, about how that process will  
13 be applied in practice. Well, there are sort of  
14 templates, but if I ask people about how DRAP lists  
15 that are developed during the design certification  
16 transition to operational phases, because of  
17 differences in guidances about numerical criteria, I  
18 don't get warm feelings about how people will make  
19 that transition.

20 The reason I bring this up is that you  
21 mentioned something that said, well, we have had some  
22 experience about somebody mischaracterized a piece of  
23 equipment as low significance and, therefore, didn't  
24 do the types of surveillance on that equipment that  
25 would have been applied, had it been appropriately

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1 characterized.

2           Is there a danger of doing that with the  
3 new designs? How carefully do we need to work through  
4 this process for the new designs? Because they are  
5 characterized, they are binning equipment based on  
6 risk-informed judgments. And will people be thinking  
7 about that characterization with regard to containment  
8 leak rate testing? Because a lot of that has been  
9 done primarily on core damage frequency, I will tell  
10 you. Very few detailed analyses. They have done some  
11 limited Level 2-type analyses, but not very much.

12           MR. ZOULIS: Are the new reactors required  
13 to have a Level 2 model or --

14           MEMBER STETKAR: They are. By the time of  
15 fuel load, they are, full-scope, all plant operating  
16 modes, Level 2 --

17           MR. ZOULIS: So, they should be better  
18 off --

19           MEMBER STETKAR: -- even out to  
20 considering Level 3 issues, but certainly Level 2.  
21 All internal/external initiating events.

22           MR. ZOULIS: They should be better off  
23 than the current fleet.

24           MEMBER STETKAR: At least in terms of  
25 characterizing the equipment, from that perspective,

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1 as long --

2 MR. ZOULIS: I mean, I came from the  
3 Northeast before I came to the agency. We just ran  
4 through an AOV program. We did that. We looked at  
5 CDF, but we also evaluated the LERF contribution from  
6 the valves.

7 And then, as you mentioned, we did have an  
8 expert panel meeting where we sat down with the AOV  
9 engineer, the maintenance engineer, the systems  
10 engineers, the PRA, and discussed other qualitative  
11 aspects of whether or not these valves -- for each  
12 valve individually, that is, I believe, part of the  
13 AOV risk-ranking program.

14 Now the NRC's role in evaluating these  
15 programs, I am not sure.

16 MEMBER STETKAR: Yes.

17 MR. ZOULIS: I mean, I don't know. I am  
18 telling you from experience how we applied that.

19 Will you miss valves? Hopefully, you  
20 won't. I mean, the whole purpose of having an expert  
21 panel and having these reviews is not to miss them.

22 MEMBER STETKAR: One of the reasons I  
23 brought it up -- and I brought it up again thinking,  
24 Bill, about your comment from Dennis -- is that these  
25 extensions would be applied in a stepwise manner,

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1 looking at the performance of the equipment. Well,  
2 for new plants, they won't be applied in a stepwise  
3 manner. A new plant could start operation today, and  
4 four years from today would be granted, presumably  
5 zero failures in those two tests, would be granted an  
6 extension to 15 years. That is not a stepwise  
7 approach. That is two attempts to find rare failures.

8 CHAIRMAN SHACK: But that does come back  
9 to how different you think the new plants are, and are  
10 the failure rates that we are applying to these plants  
11 applicable to the new plants.

12 MEMBER STETKAR: Right.

13 CHAIRMAN SHACK: As far as I can tell for  
14 the kinds of things we are talking about today, I  
15 can't think of differences.

16 MEMBER STETKAR: I can't think of  
17 differences, either, but --

18 CHAIRMAN SHACK: By and large, they are  
19 improvements. I mean, they have got better seals. I  
20 don't think we are going to get water running down  
21 into sand.

22 (Laughter.)

23 MEMBER STETKAR: But I will admit that,  
24 even on the design certifications, I haven't paid a  
25 lot of attention to the containment isolation valves

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1 or isolation barriers.

2 CHAIRMAN SHACK: But I just can't believe  
3 they are inventing new valve types. But you are  
4 right. But, again, that does come down to looking at  
5 this applicability, which is somewhere in that license  
6 condition.

7 MEMBER STETKAR: I was going to say, that  
8 is a very, very important part of that justification  
9 for the Part 52.

10 MR. ZOULIS: Also, we mentioned before,  
11 when they develop their PRAs, they need to be Reg  
12 1.200-compliant. So, they need to make sure that they  
13 are not using data that is not applicable to their  
14 population. And that should be peer-reviewed and make  
15 sure that it is done correctly and that they are  
16 evaluating that appropriately.

17 I mean, I can't see a peer review  
18 accepting generic data for a AOV valve to be applied  
19 to a new type valve that has no -- I mean, I don't  
20 know how they would accept that. It could happen, I  
21 guess. Anything is possible.

22 MEMBER RAY: Well, we just had a reactor  
23 vessel head problem, didn't we, somewhere? I think of  
24 the containment equipment hatch as being, for example,  
25 a huge potential leak path as a result of a problem

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1 with a seal.

2 CHAIRMAN SHACK: I think of people cutting  
3 into containments under 50.59.

4 (Laughter.)

5 That has happened. People have found 2-  
6 inch holes open.

7 MEMBER RAY: Anyway, in the liner, I  
8 assume you are talking about, but --

9 CHAIRMAN SHACK: No, I mean, cutting big  
10 hatches for like a steam generator.

11 (Laughter.)

12 MEMBER RAY: Oh, oh, oh, yes. Well, no,  
13 I don't worry about --

14 CHAIRMAN SHACK: Then, we patch it up.

15 MEMBER RAY: No, I don't worry about  
16 those. I worry about the equipment hatch that you are  
17 moving in and out umpteen times between tests, between  
18 integrated tests.

19 CHAIRMAN SHACK: Oh, but the equipment  
20 hatch is treated differently.

21 MEMBER RAY: I know. You have got a  
22 double seal and you can test between the seals. I  
23 know. I understand that. But, nevertheless --

24 MR. THOMAS: Regarding the 24-month  
25 minimum interval, like Bill is speaking, licensees are

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1 going to push that as far as possible.

2 CHAIRMAN SHACK: They want the 48 months,  
3 huh?

4 (Laughter.)

5 MEMBER STETKAR: Well, that is true unless  
6 they are forward-thinking and think that, by doing a  
7 couple of quick tests, they can get a lot of relief  
8 over the next 60 years or 80 years. You know, if they  
9 can forgo doing two or three or four tests over the  
10 life of the plant by doing a couple of quicker tests  
11 in the first four years of operation, they might  
12 decide to do that. They might.

13 CHAIRMAN SHACK: But, still, you take  
14 every month you can get, I would think.

15 MR. THOMAS: They are more likely to go  
16 more number of tests if they do it at smaller  
17 intervals.

18 CHAIRMAN SHACK: Smaller intervals, right.

19 MR. THOMAS: So, they have to do it, you  
20 know, to the maximum interval possible to get the  
21 minimum level.

22 MEMBER STETKAR: No, I am saying you do  
23 the first two tests quick, and by doing that, you save  
24 perhaps --

25 CHAIRMAN SHACK: But if I do the first two

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1 tests slow, I still get 15 years.

2 MEMBER RAY: I thought what John was  
3 talking about was you do it when you think you can  
4 pass. The only incentive for doing them quick is to  
5 eliminate the risk of degradation.

6 MEMBER STETKAR: Right, any time-  
7 dependent, non-linear effects that --

8 MEMBER RAY: I agree with those who say  
9 that you would extend it out.

10 CHAIRMAN SHACK: But, I mean, in the first  
11 eight years I am not looking forward, you know -- man,  
12 if I think my containment is going to degrade my first  
13 eight years, I have got bigger problems than passing  
14 my Type A test.

15 (Laughter.)

16 MEMBER RAY: I agree.

17 MR. THOMAS: That is the reason we went  
18 with the 15-year interval. They have been trying to  
19 push it a few months further.

20 MEMBER STETKAR: I think, in practice, you  
21 are probably right. I am trying to play devil's  
22 advocate here about how people might try to game the  
23 system, if they think they might save something over  
24 60 years.

25 MEMBER RAY: But that would only be

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1 because you reduce the risk of a failure as a result  
2 of doing them quickly.

3 MEMBER STETKAR: That's right. Get them  
4 out of the way quick, when you have high confidence  
5 that you won't have any failures, and then reap the  
6 benefits that way.

7 I don't have anything more, Bill.

8 CHAIRMAN SHACK: No further comments?

9 (Laughter.)

10 I won't even ask if there is anybody on  
11 the phone line today, I don't think.

12 Do we see a need to bring this to the full  
13 Committee?

14 MEMBER STETKAR: I have been trying to  
15 think about that.

16 CHAIRMAN SHACK: Outside of the interest  
17 we have in some members who are not here today --

18 MEMBER STETKAR: I mean, that would be the  
19 only reason, is because of the limited attendance of  
20 the Subcommittee.

21 MEMBER RAY: Well, there was so much  
22 background that, if we do it, I would suggest we just  
23 talk about what difference does the revised Reg Guide  
24 make, not what is the long, long history. Although it  
25 is informative for this meeting, I think the issue

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1 that might --

2 CHAIRMAN SHACK: Yes, but without looking  
3 at the history, I am not sure that you can make a  
4 judgment on the reg. Dennis' whole concern is, have  
5 we been going at this in kind of a stepwise,  
6 incremental fashion? I think the history says yes.  
7 And if we take the history out, then the question  
8 arises, are we, you know --

9 MEMBER RAY: Yes.

10 MEMBER STETKAR: And I agree for the  
11 operating plants. I think that, for the new plants,  
12 that second bullet that is on the slide that we have  
13 here has to be the critical element, that those plants  
14 need to very clearly justify why the experience from  
15 the current fleet, not filtered, not screened, not  
16 disposed of otherwise, is applicable for their  
17 particular containment design and their particular  
18 systems.

19 And in particular, I will give you the  
20 valves. I will come back to this expert elicitation,  
21 because I look at the Type A test as the test that  
22 ultimately discovers the things that you haven't  
23 thought about in any of your other testing. And I  
24 think that was the purpose of that expert elicitation  
25 and to understand, right?

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1 CHAIRMAN SHACK: But I look at the purpose  
2 of the expert elicitation to meet the numbers in  
3 1.174.

4 MEMBER STETKAR: Well, but it is a risk-  
5 informed application.

6 CHAIRMAN SHACK: I know, but if I go back  
7 to 1493, which I look at the real defense-in-depth  
8 argument, I find that to me much more convincing in a  
9 defense-in-depth fashion than I do the expert  
10 elicitation to give me the numbers, which I admit I  
11 need for 1.174. But if I am sitting here asking  
12 myself, am I really risking my defense-in-depth, I got  
13 back to the 1493 analysis, which I like those  
14 sensitivity studies to give me that defense-in-depth  
15 feeling much more than I do an expert elicitation that  
16 I need because I need a number. I mean, that gets me  
17 "risk-basey".

18 And if I put uncertainties in all this,  
19 you know, we would be somewhere, but, again, I get a  
20 lot of confidence out of the 1493 kind of arguments.

21 MEMBER STETKAR: What about, Bill -- I am  
22 trying to think of other issues that --

23 CHAIRMAN SHACK: That might come up?

24 MEMBER STETKAR: That might come up. This  
25 notion of small leaks, the risk-informed justification

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1 being key primarily to large early release versus  
2 higher frequency of undetected small release paths.

3 CHAIRMAN SHACK: But I think that was  
4 looked at in the 1493 kind of analysis where they  
5 looked at the sensitivity analysis there. You know,  
6 they looked at basically small leaks up to pretty  
7 large leaks, then the containment bypass and failure.

8 MR. ZOULIS: I mean, 1493 was very  
9 detailed. There was a lot of information in that  
10 really.

11 CHAIRMAN SHACK: I mean, that is a true  
12 risk-insight kind of a document that sometimes we lose  
13 when we get to the formalism of having to demonstrate  
14 numbers.

15 MR. ZOULIS: I mean, the EPRI methodology  
16 is more of an application of that information. How do  
17 you use it if you are coming for license submittal?  
18 But the whole basis was 1493.

19 MR. RICHARDS: You have asked us for some  
20 additional information on how many containments have  
21 been tested after, roughly, 15 years. Will that  
22 impact your thinking as far as taking it to the full  
23 Committee?

24 MEMBER RAY: I think the 10-year data is  
25 in that database, the same database, right?

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1 CHAIRMAN SHACK: Yes, but we were  
2 specifically looking at the 15-year kind of --

3 MEMBER STETKAR: Yes, I am interested in  
4 that. I don't think it would affect my decision about  
5 taking it to the full Committee. I think the full  
6 Committee is sort of broader issues than that.

7 CHAIRMAN SHACK: We would certainly like  
8 to know that information.

9 MEMBER STETKAR: We would like to see that  
10 because it was highlighted as a point here to kind of  
11 support the notion of extending the --

12 MEMBER RAY: Are you just talking about  
13 those that have gone out as far as 15 years? Or  
14 aren't you talking about everything that has gone  
15 beyond, that is extended as a result of the earlier  
16 extension before?

17 MEMBER STETKAR: No, just the --

18 MEMBER RAY: Not the 217, though?

19 MEMBER STETKAR: No, just the --

20 CHAIRMAN SHACK: That fraction that is  
21 based on the 15 years.

22 MEMBER STETKAR: On the 15 years, the ones  
23 that have either gotten a one-time extension and the  
24 extended testing under that extension, or you said  
25 three plants have been approved for 15 years; I doubt

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1 any of those have done it, but maybe they have. How  
2 many of those? You know, this notion of, well, we  
3 haven't had any failures, is it zero out of --

4 CHAIRMAN SHACK: There has got to be a  
5 fair number of tests between now and 2015.

6 MEMBER STETKAR: You would think that a  
7 bunch would be coming in, wouldn't you?

8 CHAIRMAN SHACK: Coming in.

9 MEMBER STETKAR: I don't know.

10 CHAIRMAN SHACK: But, as you say, my guess  
11 is, if they can put it off until 2015, it is going to  
12 be 2015.

13 (Laughter.)

14 MEMBER STETKAR: You know what we may want  
15 to do, Bill, is I am kind of on the cusp here. I  
16 don't think we need to go to the full Committee, but  
17 I think we should probably summarize the results of  
18 this Subcommittee meeting at our October full  
19 Committee meeting --

20 CHAIRMAN SHACK: That is a fair-enough  
21 statement.

22 MEMBER STETKAR: -- and see whether any of  
23 the members, given our summary --

24 CHAIRMAN SHACK: Want to come back.

25 MEMBER STETKAR: -- want to come back and

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1 revisit it. So, that is not a clear answer yet, but  
2 you will have one in two weeks.

3 CHAIRMAN SHACK: Harold, is that  
4 acceptable to you?

5 MEMBER RAY: Yes.

6 CHAIRMAN SHACK: That seems to be  
7 reasonable.

8 MEMBER STETKAR: I think that sounds best.

9 MR. ZOULIS: Was there anything that we  
10 could provide that may help you? I mean, I know we  
11 gave you the SE, had some information in the EPRI  
12 report. Is there anything else that maybe might -- I  
13 am sure you have NUREG-1493.

14 MR. NGUYEN: That was limited to the  
15 SharePoint workspace because it is 300-some pages.

16 MEMBER STETKAR: No, I think we have got  
17 all the --

18 CHAIRMAN SHACK: Except for the data on  
19 the tests that is coming up, but I think we have all  
20 the supporting information that we need.

21 MEMBER RAY: Okay?

22 CHAIRMAN SHACK: Okay. I think we can  
23 adjourn then.

24 We will leave it, essentially, as it is.  
25 We won't have anything at the October meeting, and we

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1 will make a final decision as to whether we will have  
2 a full Committee presentation at that time. I think  
3 the inclination from the Subcommittee, as you have  
4 heard, is not, but we may get some pushback from our  
5 members.

6 MR. RICHARDS: Thank you.

7 CHAIRMAN SHACK: Thank you.

8 (Whereupon, at 10:27 a.m., the meeting was  
9 adjourned.)

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# **Regulatory Guide 1.163**

## **Performance-Based Containment Leak- Test Program**

**ACRS Subcommittee Meeting**  
**September 18, 2012**

Bruce Lin  
RES/DE/CIB

George Thomas  
NRR/DE/EMCB

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NRR/DSS/SCVB

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## Objective

- The objective of this briefing is to provide ACRS subcommittee an overview of RG 1.163, NEI guidance for implementing the performance based leak test program and the staff evaluation of the risk assessment of extending integrated leak rate testing intervals.



## Outline

- Background
- Overview of NEI 94-01
- Risk Assessment (EPRI Report 1009325)
- Conclusion

## Background

- 10 CFR Part 50, Appendix J specifies containment leakage testing requirements : Option A (Prescriptive) & Option B (Performance-Based)
  - Type A Test: Integrated leakage rate tests (ILRTs)
  - Type B Test: Leakage tests of penetration seals, gaskets, and expansion bellows
  - Type C Test: Leakage tests of containment isolation valves
- Option B “Performance-Based Requirements” in Appendix J was issued in 1995. Option B allowed licensees to voluntarily replace existing Option A Appendix J prescriptive testing requirements with testing requirements based on leakage rate performance, and a supporting plant-specific risk impact assessment.

## Background

- NUREG-1493 (1995) “Performance-Based Containment Leak-Test Program” and EPRI TR 104285 “Risk Impact Assessment of Revised Containment Leak Rate Testing Intervals” provided the technical bases for NRC’s 1995 rulemaking (60 FR 49495) that added an Option B to Appendix J.
- The FR notice supplementary information describes the NRC staff’s rationale for settling on the 10-year interval for ILRT and 5-year interval for Type C LLRT as “...a cautious, evolutionary approach as data are compiled to minimize the uncertainty....a prudent first step.”

## Background

- The Nuclear Energy Institute (NEI) issued Topical Report 94-01, Revision 0, “Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J” in 1995.
- Regulatory Guide (RG) 1.163, “Performance-Based Containment Leak-Test Program”, was issued in 1995 which endorsed NEI 94-01, Revision 0, with limitations and conditions.
- Appendix J, Option B, requires that the implementing document (RG or other) used by a licensee to develop a performance-based leakage-testing program must be included by reference in the plant Technical Specifications.

## Background

- In August 2007, NEI issued revision 2 to TR 94-01 which included provisions for extending the performance based ILRT interval to 15 years and incorporated the regulatory positions in RG 1.163. The risk impact assessment of extended ILRT intervals was provided in EPRI Report 1009325.
- The NRC staff issued safety evaluation approving NEI 94-01 Rev 2 and EPRI Report 1009325 Rev 2 with conditions and limitations in June 2008. NEI 94-01, Rev 2-A, was issued October 2008 by NEI.
- DG 1220 (RG 1.163 Rev 1) was developed to endorse NEI TR 94-01, Rev 2-A subject to limitations and conditions provided in the NRC Safety Evaluation.

## Background

- Subsequent to issuance of DG 1220, NEI submitted revision 3 to NEI TR 94-01 in June 2011 which included guidance for extending Type C local leak rate test (LLRT) interval from 60 months to 75 months.
- The NRC staff issued safety evaluation approving NEI 94-01 Rev 3 with conditions and limitations in June 2012. NEI 94-01, Rev 3-A, was issued July 2012 by NEI.
- DG 1220 (RG 1.163 Rev 1) will be updated to endorse NEI TR 94-01, Rev 3-A subject to limitations and conditions provided in the NRC Safety Evaluations for Rev 2 and Rev 3.

## NEI 94-01, Rev 3A

- Delineates a performance-based approach for determining Type A, Type B, and Type C containment leakage rate testing frequencies. Justification for extending intervals is based on performance history and risk insights.
- Includes guidance for extending performance-based Type A ILRT intervals up to 15 years and Type C test intervals up to 75 months. Also, incorporated regulatory positions in RG 1.163 (1995).
- Specific details of the testing methodology and requirements are contained in ANSI/ANS 56.8-2002.

## Performance-Based Type A (ILRT) Tests

- Type A Test intervals can be extended from the initial 48 months up to a maximum of 15 years based on acceptable performance history and a supporting plant-specific confirmatory risk impact assessment establishing the risk impact is small.
- Acceptable performance history is defined as successful completion of two consecutive periodic Type A tests where the calculated performance leakage rate was less than 1.0 La
- A Type A test failure requires corrective action followed by a successful Type A test prior to going operational. Another successful periodic test must be completed within 48 months to reestablish performance before the test interval can be again extended to 15 years
- Pretest and supplemental visual inspection requirements to provide continuing supplemental means of identifying potential containment degradation



## Performance-Based Type A (ILRT) Tests

- Appendix J - Option B, requires that a general visual inspection of accessible interior and exterior containment surfaces for structural deterioration that may affect leak-tight integrity must be conducted prior to each Type A test and at a periodic interval between tests. NEI 94-01, Rev 3-A specifies:
  - General visual examinations of accessible interior and exterior surfaces of the containment must be conducted prior to each Type A test; and during at least three other outages before the next Type A test if the Type A test interval has been extended to 15 years
  - To avoid duplication or omissions, NEI 94-01 recommends that these visual examinations be performed in conjunction or coordinated with the ASME Code, Section XI, Subsections IWE/IWL examinations required by 10 CFR 50.55a
  - Deficiencies identified are entered into the plant's corrective action program to determine cause and appropriate corrective actions

## Containment In-Service Inspection Program

- 10 CFR 50.55a Containment In-Service Inspection (ISI) Program
  - Mandates ISI of Class MC (steel) and Class CC (concrete) containment pressure-retaining surfaces to be performed in accordance with applicable editions/addenda of the ASME Code, Section XI, Subsection IWE and Subsection IWL, respectively, subject to regulatory conditions
  - Subsection IWE requires general visual examinations of 100 percent of accessible Class MC containment pressure retaining surfaces and metallic liners of Class CC containments to be performed 3 times during a 10-year ISI interval (i.e., at least 4 examinations over a 15-year ILRT interval)
  - Subsection IWL requires general visual examination of accessible Class CC concrete pressure-retaining surfaces to be performed every 5 years (i.e., 3 examinations over a 15-year ILRT interval)
  - Suspect areas are subject to detailed/augmented examination and evaluation

## Limitations and Conditions

- Limitations and Conditions (for extending Type A test intervals up to 15 years - NRC SER for Rev 2-A)
  - For calculating the Type A leakage rate, the licensee should use the definition in the NEI TR 94-01, Revision 2, in lieu of that in ANSI/ANS 56.8-2002
  - The licensee submits a schedule of containment inspections to be performed prior to and between Type A tests
  - The licensee addresses the areas of the containment structure potentially subjected to degradation
  - The licensee addresses any tests and inspections performed following major modifications to the containment structure, as applicable

## Limitations and Conditions

- Limitations and Conditions (for extending Type A test intervals up to 15 years - NRC SER for Rev 2-A) (cont...)
  - The normal Type A test interval should be less than 15 years. If the licensee has to utilize the provision of Section 9.1 of NEI TR 94-01, Revision 2, related to extending the ILRT interval beyond 15 years, the licensee must demonstrate to the NRC staff that it is an unforeseen emergent condition. (The NRC issued RIS 2008-27 to clarify this position)
  - For plants licensed under 10 CFR Part 52, applications requesting a permanent extension of the ILRT surveillance interval to 15 years should be deferred until after the construction and testing of containments for that design have been completed and applicants have confirmed the applicability of NEI TR 94-01, Revision 2, and EPRI Report No. 1009325, Revision 2, including the use of past containment ILRT data

## Operating Experience

- Extension Requests
  - Many licensees requested and received approval for one-time 5-year extensions to the 10-year performance-based interval requirement for ILRT performance in RG 1.163 (1995)
  - Three plants have received approval for extension of the performance-based ILRT interval to 15 years, based on adopting TR NEI 94-01, Rev 2-A, as the implementing document
- Operating experience related to containment testing and inspections
  - There has been no reported Type A test failures as a result of extended testing frequencies to 15 years

## Performance-Based Type B & C Tests

- Test intervals may be increased from 30 months up to a maximum of 120 months for Type B tests (except for containment airlocks) and up to a maximum of 75 months for Type C tests
- Extensions of Type B and Type C test intervals are allowed based upon completion of two consecutive periodic as-found tests where the results of each test are within a licensee's allowable administrative limit
- Administrative limits for leakage rates shall be established, documented, and maintained for each Type B and Type C component prior to the performance of LLRT in accordance with the guidance provided in ANSI/ANS-56.8-2002
- A failure is defined as a valve exceeding its administrative leakage limit

## Performance-Based Types B & C Tests

- NEI collected data for leak-tight performance of Type C containment isolation valves on extended intervals and presented them in EPRI Report No. 1022599, “Type C Containment Isolation Valve Performance”
- This report validates the risk impact assessment of EPRI TR-104285 for Type C containment isolation valve extended intervals and further shows that the leak-tight performance of Type C containment isolation valves tested on extended intervals after 1995 is significantly better than the leak-tight performance of the general population of Type C valves tested before 1995

## Performance-Based Types B & C Tests

- The combined leakage rate for all penetrations and valves subject to Type B and Type C tests shall be less than  $0.60 L_a$
- Section 12.1, “Report Requirements” was revised to require that the post-outage report shall include the margin between the Type B and Type C leakage rate summation and its regulatory limit
- Any adverse trends in the Type B and Type C leakage rate summation shall be identified in the report and a corrective action plan developed to restore the margin to an acceptable level



## Limitations and Conditions

- Limitations and Conditions (for extending Type C test intervals up to 75 months - NRC SER for Rev 3-A)
  - Extensions of up to nine months (total maximum interval of 84 months for Type C tests) are permissible only for non-routine emergent conditions. At no time shall an extension be allowed for Type C valves that are restricted categorically (e.g. BWR MSIVs), and those valves with a history of leakage, or any valves held to either a less than maximum interval or to the base refueling cycle interval
  - When routinely scheduling any LLRT valve interval beyond 60-months and up to 75-months, the primary containment leakage rate testing program trending or monitoring must include an estimate of the amount of understatement in the Type B and Type C total, and must be included in a licensee's outage report. The report must include the reasoning and determination of the acceptability of the extension, demonstrating that the LLRT totals calculated represent the actual leakage potential of the penetrations

## NEI 94-01 Summary

- The major difference between NEI TR 94-01, Revision 0 and Revision 2A is Revision 2A includes provisions for extending Type A test intervals up to 15 years.
- The major difference between NEI TR 94-01, Revision 2A and Revision 3A is Revision 3A added guidance for extending Type C tests from 60 months to 75 months.
- The 10 CFR 50, Appendix J, Containment Leakage Testing Program (consisting of ILRTs, LLRTs) and the 10 CFR 50.55a Containment In-Service Inspection (CISI) Program (in accordance with ASME Section XI, Subsections IWE/IWL) together ensure that containment structural and leakage integrity is maintained through its service life.

## Risk-Informed Regulation

- A philosophy whereby risk insights are considered together with other factors\* to establish requirements that better focus licensee and regulatory attention on design and operational issues commensurate with their importance to health and safety
- NRC approach is not “*risk-based*”

\* e.g., traditional engineering approaches

## Risk Assessment – Principles of R.G. 1.174

### *Key Principles*

1. Change meets current regulations unless it is explicitly related to an exemption or rule change.

2. Change is consistent with defense-in-depth philosophy.

3. Maintain sufficient safety margins.

**INTEGRATED  
DECISIONMAKING**

5. Use performance-measurement strategies to monitor the change.

4. Proposed increases to CDF or risk are small and are consistent with the Commission's Safety Goal Policy Statement.

## EPRI Report: Risk Impact Assessment of Extended ILRT Intervals

- EPRI report demonstrates conclusions developed in NUREG-1493 are still valid.
  - NUREG-1493 states, “Reducing the frequency of Type A tests (ILRTs) from the current three per 10 years to one per 20 years was found to lead to imperceptible increase in risk.”
- Utilizes the principles of risk-informed regulation and integrated decision-making illustrated above

## EPRI Report (Cont.)

- CDF is not significantly impacted by an extension of the ILRT interval. Plants that rely on containment overpressure for net positive suction head (NPSH) for emergency core coolant system (ECCS) injection for certain accident sequences may experience an increase in CDF (This impact is evaluated in the risk assessment)

## EPRI Report (Cont.)

- LERF is the figure of merit for evaluating the risk of the interval extensions
- In addition to LERF, EPRI risk assessment takes into consideration 2 additional metrics:
  - increase in population dose (expressed both as person-rem/year and percent increase above the total base dose)
  - increase in conditional containment failure probability (CCFP) (expressed as percentage points)

## EPRI Report (Cont.)

$$\Delta \text{ LERF} = \Delta \text{ ILRT Failure Probability} \times \text{CDF}$$

$$\Delta \text{ Population Dose} = \Delta \text{ ILRT Failure Probability} \\ \times \text{Population Dose}$$

$$\text{CCFP} = 1 - (\text{Intact CDF} / \text{Total CDF})$$



## EPRI Report (Cont.)

- Key Considerations:
  - **Data.** Over 217 tests conducted resulted in no ILRT failures
  - **Alternate means of detection.** Various alternative methods of detecting a leakage pathway in containment exist. These methods include local leak rate tests (LLRTs), reactor startup, normal operation, and other containment and piping inspections.
  - **Estimation of containment leakage.** The use of 100 La is very conservative and leakage of this size has never been observed from empirical data. Highest observed was 21 La.
  - **Liner Corrosion.** Generic method for determining the change in likelihood of detecting liner corrosion and corresponding change in risk due to the ILRT extension is provided.

## EPRI Report (Cont.)

- 6 Steps:
  1. Quantify the baseline (three-year ILRT frequency) risk in terms of frequency per reactor year for the EPRI accident classes of interest.
  2. Develop the baseline population dose (person-rem, from the plant PRA or IPE, or calculated based on leakage) for the applicable accident classes.
  3. Evaluate the risk impact (in terms of population dose rate and percentile change in population dose rate) for the interval extension cases.
  4. Determine the risk impact in terms of the change in LERF and the change in CCFP.
  5. Consider both internal and external events.
  6. Evaluate the sensitivity of the results to assumptions in the liner corrosion analysis

## EPRI Report (Cont.)

- Final SE for NEI TR 94-01, Rev 2, “Industry Guideline For Implementing Performance-Based Option Of 10 CFR Part 50, Appendix J” & EPRI Report No. 1009325, Rev 2, August 2007, “Risk Impact Assessment of Extended ILRT Intervals” (ML081140105)
  - License amendment request must be submitted if containment over-pressure is relied upon by ECCs
  - PRA must meet Regulatory Guide (RG) 1.200 Requirements for risk-informed submittals
  - 5 Key principles of RG 1.174 are met

## Conclusion

- The 10 CFR 50, Appendix J, Containment Leakage Testing Program (consisting of ILRTs, LLRTs) and the 10 CFR 50.55a Containment In-Service Inspection (CISI) Program (in accordance with ASME Section XI, Subsections IWE/IWL) together ensure that containment structural and leakage integrity is maintained through its service life.
- The NRC staff finds the guidance in TR NEI 94-01, Revision 3-A, acceptable for referencing for implementing Option B of 10 CFR 50, subject to the limitations and conditions in NRC SER for Rev 2 (for extending Type A test intervals up to 15 years) and the limitations and conditions in NRC SER for Rev 3 (for extending Type C test intervals up to 75 months).
- The staff finds the EPRI methodology of evaluating the risk associated with the interval extensions acceptable and consistent with the 5 Key principles of RG 1.174.
- This revision of RG 1.163 reflects the latest staff positions based on Revision 3-A of the NEI TR 94-01 guideline. There are no new staff positions that are being promulgated in this revision.