



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

November 21, 2012

MEMORANDUM TO:           ACRS Members

FROM:                     Mark L. Banks, Senior Staff Engineer   */RA/*  
                              Technical Support Branch

SUBJECT:                 CERTIFICATION OF THE MINUTES OF THE ACRS  
                              REGULATORY POLICIES & PRACTICES SUBCOMMITTEE  
                              MEETING – REVIEW OF REGULATORY GUIDE 1.163,  
                              REVISION 1, “PERFORMANCE-BASED CONTAINMENT LEAK-  
                              TEST PROGRAM,” SEPTEMBER 18, 2012, ROCKVILLE,  
                              MARYLAND

The minutes for the subject meeting were certified on November 8, 2012, as the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: Certification Letter  
                  Minutes  
                  Meeting Transcript

cc w/o Attachment: E. Hackett  
                          H. Gonzalez



**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
REGULATORY POLICIES & PRACTICES SUBCOMMITTEE MEETING MINUTES  
SEPTEMBER 18, 2012  
ROCKVILLE, MARYLAND**

**INTRODUCTION**

The Advisory Committee on Reactor Safeguards (ACRS) Regulatory Policies and Practices Subcommittee met in room T-2B1 at the Headquarters of the U.S. Nuclear Regulatory Commission (NRC), located at 11545 Rockville Pike, Rockville, Maryland, on September 18, 2012. The Subcommittee was briefed by representatives of NRC's Office of Nuclear Regulatory Research (RES) and Office of Nuclear Reactor Regulation (NRR) regarding Regulatory Guide 1.163, Revision 1, "Performance-Based Containment Leak-Test Program."

The meeting convened at 8:30 am and adjourned at 10:27 am. The entire meeting was open to the public. No written comments or requests for time to make oral statements were received from members of the public related to this meeting.

**ATTENDEES**

ACRS Members/Consultants

W. Shack, Chairman  
H. Ray, Member  
J. Stetkar, Member

ACRS Staff

Q. Nguyen, Designated Federal Official

NRC Staff

B. Lee, RES  
B. Lin, RES  
S. Richards, RES  
G. Thomas, NRR  
A. Zoulis, NRR

Other Attendees

None

## SUMMARY

The purpose of this briefing was for the staff to discuss Revision 1, of RG 1.163, "Performance-Based Containment Leak-Test Program." NEI guidance, staff bases for acceptance of previous risk-informed interval extensions, and implications for future extensions from 10 to 15 years of Type A intervals (also known as the integrated leak rate test) were discussed. Additionally, intervals may be increased from 60 months up to a maximum of 75 months for Type C tests.

SIGNIFICANT ISSUES	
Issue	Reference Pages in Transcript
Chairman Shack wanted to know what the implementing document is and the relationship between the RG, license amendments, and corresponding RIS (Regulatory Issue Summary). Staff responded that the implementing document is the Technical Specifications which require a license amendment when changed.	6-7, 11
Member Stetkar has a lengthy discussion with staff regarding pre-operational testing and periodic testing.	17-24
Member Ray asked when pre-operational testing is counted as periodic testing.	24
Member Stetkar asked if any pre-screening or if failure definition was conducted.	38
Member Stetkar wondered how operating data from the existing fleet will apply to new reactors.	40-44, 77-78
Member Stetkar comments that the classification of components is equally important as the testing requirements.	46-50
Member Ray asks what is the basis behind the 15-yr time interval.	54-55
Member Stetkar asks about the validity in the EPRI report of eliminating the high and low data points in the data of failure likelihood as a function of leakage amount.	58-60

ACTION ITEMS	
Action Item	Reference Pages in Transcript
The Subcommittee wanted extended intervals testing data.	31-33, 36, 87

## Documents provided to the Subcommittee

1. Memorandum from M. Case, Director, Division of Engineering, Office of Nuclear Reactor Regulation to C. Adder, Director, Division of Safety Systems and Risk Assessment, Office of New Reactors, et al; Subject: "Request for Concurrence on Revision 1 of Regulatory Guide (RG) 1.163," dated June 29, 2012 (ML12087A247)
2. U.S. Nuclear Regulatory Commission, RG 1.163, Rev. 1, "Performance-Based Containment Leak-Test Program." (ML12087A248)
3. Nuclear Energy Institute, NEI 94-01, Revision 3-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," Jul 31, 2012. (ML12221A202)
4. Energy Power Research Institute, EPRI Report 1009325, Revision 2-A, "Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals."
5. U.S Nuclear Regulatory Commission, Safety Evaluation Input Regarding NEI Topical Report (TR) 94-01, Revision 3, "Industry Guideline For Implementing Performance-Based Option Of 10 CFR Part 50, Appendix J," April 5, 2012. (ML120810225)
6. U.S. Nuclear Regulatory Commission, Safety Evaluation for Nuclear Energy Institute (NEI) Topical Report (TR) 94-01, Revision 2, "Industry Guideline for Implementing Performance-based Option of 10 CFR Part 50, Appendix J" and Electric Power Research Institute (EPRI) Report No. 100932, Jun 25, 2008. (ML081140105)
7. U.S. Nuclear Regulatory Commission, NUREG-1493, "Performance-Based Containment Leak-Test Program, Draft Report for Comment," January 31, 1995. (ML091770283)

Official Transcript of Proceedings  
NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards  
Regulatory Policies and Practices

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Tuesday, September 18, 2012

Work Order No.: NRC-1895

Pages 1-93

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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

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NRC STAFF PRESENT:

QUYNH NGUYEN, Designated Federal Official

BRIAN LEE, NRR/DSS/SCVB

BRUCE LIN, RES/DE/CIB

STU RICHARDS, RES/DE

GEORGE THOMAS, NRR/DE/EMCB

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 discussion 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

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1 action, as appropriate, for deliberation by the full  
2 Committee, if necessary.

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

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

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

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1 of Research. We are just glad to be here today. Thank  
2 you for the opportunity to come and talk about Reg Guide  
3 1.163, and we look forward to your questions. It is an  
4 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 doing  
8 15-year test intervals on a one-time basis. So, the Reg  
9 Guide essentially now lets them do that permanently.

10 MR. RICHARDS: Yes, it will.

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

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

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

21 CHAIRMAN SHACK: Okay.

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

24 Actually, Appendix J, Option B, it requires  
25 you to include by reference the implementing document in

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1 the plan, technical specifications. That is done  
2 through a license amendment.

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

10 The staff position is that it will be  
11 approved only if there is a very compelling unforeseen --

12 CHAIRMAN SHACK: But it is a license  
13 amendment still?

14 MR. THOMAS: Yes, it requires license  
15 submittal.

16 CHAIRMAN SHACK: Okay. That was what I  
17 wanted --

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

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

22 I am Bruce Lin. I work in Research,  
23 Division of Engineering. We are up here, George Thomas,  
24 Division of Engineering; Brian Lee in our Division of  
25 Safety Systems, and Antonio in our Division of Risk

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1 Assessments.

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

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

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

16 MR. NGUYEN: Yes, in the Status Report it  
17 does reflect 3A.

18 CHAIRMAN SHACK: It does 3A?

19 MR. NGUYEN: Yes.

20 CHAIRMAN SHACK: Okay. In the Status  
21 Report. I just kept reading the old one.

22 MR. LIN: The containment leak test  
23 requirements are specified in 10 CFR Part 50, Appendix  
24 J. There are two options in Appendix J. Option A is  
25 prescriptive, and Option B is performance based.

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

9           Option B was issued in 1995. Basically,  
10 Option B allowed the licensees to replace the existing  
11 Option A requirements with testing requirements based on  
12 performance history.

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

19           I would also like to point out that in The  
20 Federal Register notice that added Option B, the  
21 supplementary information described the NRC staff  
22 rationale for settling on 10 years for Integrated Leakage  
23 Rate Tests and five years for the Type C, Local Leak Rate  
24 Test as "a cautious, evolutionary approach as data are  
25 compiled to minimize" the uncertainties.

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1 Concurrent with the Option B rulemaking, in  
2 1995, NEI issued Topical Report 94-01, providing  
3 Industry Guideline for Implementing Performance-Based  
4 Option of 10 CFR, Appendix J.

5 And also in 1995, NRC issued Reg Guide  
6 1.163, "Performance-Based Containment Leak-Test  
7 Program," which endorsed NEI 94-01, Revision 0, with  
8 limitations and conditions.

9 As George pointed out, Appendix J, Option  
10 B, required that the implementing document used by  
11 licensees to develop a performance-based leakage program  
12 must be included in the plant Technical Specifications.

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

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

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

20 Basically, the reason they have to come in  
21 for a license amendment is because the implementing  
22 document is in the Tech Spec. So, any change to the Tech  
23 Spec has to be done through a license amendment.

24 CHAIRMAN SHACK: Okay. They come in for  
25 the license amendment, so that they can, then, go to the

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1 risk-informed program, but they still keep that  
2 particular document that they used to justify that in the  
3 Tech Spec? So, if they wanted to change to a different  
4 document, they would have to come back for --

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

7 CHAIRMAN SHACK: Okay.

8 MR. LIN: Now, after Appendix J was issued  
9 in 1995, industry accumulated more testing data. So, in  
10 August 2007, NEI issued Revision 2 to the Topical Report.  
11 In Revision 2, they included provisions for extending the  
12 performance-based ILRT interval to 15 years and  
13 incorporated all the regulatory positions in Reg Guide  
14 1.163. The risk impact assessment of extending the  
15 interval was provided in an EPRI Report 1009325, which  
16 Antonio is going to talk about in a later slide.

17 The NRC reviewed both the EPRI report and  
18 the NEI Topical Report and issued a Safety Evaluation in  
19 June 2008. And NEI issued Revision 2A, which is a  
20 separate version of the NEI report, which included Safety  
21 Evaluations, in October 2008.

22 So, in 2009, the staff developed Draft Guide  
23 1220 to endorse NEI Topical Report 94-01, Revision 2A,  
24 subject to the limitations provided in NRC Safety  
25 Evaluation.

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

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

8                   MR. LIN: Yes.

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

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

15                  MR. THOMAS: This is George Thomas.

16                  The one-time approval was given to  
17 licensees that had Reg Guide 1.163, Rev. 0, as the  
18 implementing document, which endorsed NEI 94-01, Rev. 0.

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

22                  MR. THOMAS: Yes, in fact, three licensees  
23 did come in, and they got approval using NEI 94-01, Rev.  
24 2A, as the implementing document.

25                  MEMBER RAY: You mean license renewal?

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1 MR. THOMAS: No.

2 MEMBER RAY: You said relicense --

3 CHAIRMAN SHACK: License amendment.

4 MR. THOMAS: License amendment.

5 MEMBER RAY: Huh?

6 MR. THOMAS: License amendment.

7 MEMBER RAY: Okay. I thought he referred  
8 to relicensing.

9 MEMBER STETKAR: George, you said three  
10 licensees did that?

11 MR. THOMAS: Three licensees, actually.

12 MEMBER RAY: He said "three licensees"  
13 rather than "relicensing".

14 MR. THOMAS: Yes.

15 MEMBER STETKAR: Okay.

16 CHAIRMAN SHACK: Close.

17 (Laughter.)

18 MEMBER STETKAR: All right.

19 MR. THOMAS: So, they have an extension of  
20 ILRT interval to 15 years, as long as acceptable  
21 performance is maintained.

22 CHAIRMAN SHACK: Why only three?

23 MEMBER STETKAR: You don't need to push  
24 that?

25 CHAIRMAN SHACK: Okay.

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1 MEMBER STETKAR: These are on all the time.  
2 That is a new button.

3 (Laughter.)

4 MR. THOMAS: But I am sure more licensees  
5 will come in.

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

8 MR. THOMAS: Between October --

9 MR. LIN: No, after the --

10 MEMBER STETKAR: After Rev. 2A.

11 MR. LIN: No, after October 2008.

12 MR. THOMAS: Most of them will come in later  
13 because they are --

14 CHAIRMAN SHACK: Well, now three will give  
15 them more, yes.

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

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

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

23 Yes, the NRC reviewed Revision 3 and issued  
24 a Safety Evaluation approving Rev. 3 in June of this year,  
25 and NEI issued Rev. 3A in July of this year. So, Draft

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1 Guide 1220, the proposed one of Reg Guide 1.163, will  
2 endorse NEI Topical Report 94-01, Revision 3A, subject  
3 to the limitations provided in NRC Safety Evaluations for  
4 both Rev. 2 and Rev. 3.

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

7 MR. THOMAS: Yes, I am George Thomas from  
8 NRR Division of Engineering.

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

13 Essentially, NEI 94-01, Rev 3A, delineates  
14 a performance-based approach for determining Type A, B,  
15 and C containment leakage testing frequencies. The  
16 justification for extending intervals is based on  
17 performance history and risk insights.

18 The Topical Report includes guidance for  
19 extending performance-based Type A test intervals up to  
20 a maximum of 15 years and Type C test intervals up to 75  
21 months. Also, the Topical Report incorporated  
22 regulatory positions in Revision 0 of Reg Guide 1.163.

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

25 MEMBER STETKAR: Yes.

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1 MR. THOMAS: Now the Topical Report makes  
2 reference to industry standard ANSI/ANS 56.8, the 2002  
3 edition, for specific details of testing methods and  
4 techniques.

5 With regard to Type A tests, the Type A test  
6 intervals can be extended from the initial 48-month  
7 interval in the Topical Report up to a maximum of 15  
8 years, based on acceptable performance history and a  
9 supporting plant-specific confirmatory risk assessment  
10 that establishes the risk impact is small.

11 MEMBER STETKAR: George, should we hold  
12 questions about the kind of technical basis for this  
13 until you get through with the kind of regulatory issue  
14 part of it?

15 MR. THOMAS: Yes.

16 MEMBER STETKAR: Okay.

17 MR. THOMAS: And there will be a  
18 presentation on the risk proposal, right, by Antonio, in  
19 more detail.

20 MEMBER STETKAR: Okay.

21 CHAIRMAN SHACK: Chomping at the bit.

22 (Laughter.)

23 MR. THOMAS: Acceptable performance  
24 history is defined as successful completion of two  
25 consecutive periodic Type A tests where the calculated

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1 performance leakage rate was less than 1.0 times  $L_a$ .  $L_a$   
2 is expressed in percent rate for 24 hours, is the maximum  
3 allowable leakage rate at the test pressure of  $P_a$ , as  
4 specified in the Tech Spec. And the test pressure  $P_a$  is  
5 the calculated peak containment internal pressure  
6 related to a design-basis loss-of-coolant accident, also  
7 specified in the Tech Spec.

8 A Type A test failure report, the guidance  
9 requires corrective action, followed by a successful  
10 Type A test prior to resuming operation. Another  
11 successful periodic Type A test must be completed within  
12 48 months in order to reestablish performance before the  
13 test interval can be again extended to 15 years.

14 The Topical Report also specifies pretest  
15 and supplement visual inspection requirements to  
16 provide continuing supplemental means of identifying  
17 potential containment degradation.

18 MEMBER STETKAR: George, let me ask you a  
19 non-risk question, but it will help me understand  
20 something later. What is the shortest-possible  
21 interval for these two consecutive successful tests  
22 under this program?

23 MR. THOMAS: That is 24 months.

24 MEMBER STETKAR: Twenty-four months. So,  
25 a test at time zero, let's call it, has a success.

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1 Twenty-four months later, has a success. And now, I can  
2 extend it to 15 years?

3 MR. THOMAS: Yes, but, normally, the  
4 interval specified is 48 months. But it cannot be  
5 shorter than 24 months.

6 MEMBER STETKAR: But the shortest  
7 interval -- I am thinking a new plant, for example. I  
8 read a little bit of the background.

9 MR. THOMAS: Right.

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

12 MR. THOMAS: Yes.

13 MEMBER STETKAR: Twenty-four months later,  
14 do my first interval, and I am good to go for 15 years?

15 MR. THOMAS: It has to be a periodic test  
16 after pre-operation. For a new reactor, for example,  
17 they would have a pre-operational Type A test. Then,  
18 they would do another one within 48 months. And then,  
19 they would need to do a second one in the next 48 months  
20 to establish --

21 MEMBER STETKAR: Oh, okay. I thought I  
22 understood it that they could take credit for the pre-op  
23 test.

24 MR. THOMAS: They could take credit for the  
25 pre-op test in certain situations. For example, if the

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1 licensee performed a pre-op Type A test, and they did not  
2 go operational for more than three years before the plant  
3 went operational. In that situation, they would have to  
4 do a second pre-op test just before going operational,  
5 and then followed by a 48-month test. In that situation,  
6 the second pre-op test could be justified as Type A test.

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

10 MR. THOMAS: Then, that is not considered  
11 a periodic test.

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

16 MR. THOMAS: In that situation, it could  
17 be.

18 MEMBER STETKAR: It could be?

19 MR. THOMAS: Yes.

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

24 MR. THOMAS: The pre-op test is used as a  
25 periodic test, that test to be justified by the licensee

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1 in their documentation. For example, if they did a  
2 pre-op test and within a month they went into operation,  
3 that would not be counted as a periodic test.

4 MEMBER STETKAR: Okay, that one I got.

5 MR. THOMAS: Yes. So, they would do  
6 another one within 48 months. That would count. And  
7 then, they have do a second one in the following 48  
8 months.

9 MEMBER STETKAR: Yes. And that second  
10 time interval in that case could be as short as 24 months?

11 MR. THOMAS: Yes.

12 MEMBER STETKAR: So, essentially, six  
13 years into the operating life of the plant, they could  
14 then justify going out to --

15 MR. THOMAS: Yes.

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

18 MEMBER STETKAR: Yes.

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

21 MEMBER STETKAR: Yes, I guess that is  
22 right. There is nothing saying that they have to wait  
23 until 48.

24 CHAIRMAN SHACK: Wait until the 48. They  
25 just have to do it within the 48.

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1 MR. THOMAS: Right.

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

4 MEMBER STETKAR: From time of initial  
5 operation?

6 MR. THOMAS: Yes.

7 MEMBER STETKAR: Okay. It could be as  
8 short as four years.

9 Now, let's talk about the second example you  
10 had where they do, let's call it, a pre-pre-op test,  
11 sometime in history, and then, for whatever reason, they  
12 sit around for an extended period of time and do another,  
13 and I will call it a test, before they go into operation.  
14 How does one justify that pre-going-into-operation test  
15 as a periodic test under those conditions? How do you  
16 know that the status of the valves and the containment  
17 and the systems has not changed during that intervening  
18 period between those two pre-time-zero tests?

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

21 CHAIRMAN SHACK: Yes, I mean, the  
22 environments and everything would not necessarily be  
23 those of an operating plant. Or you are saying that is  
24 something you would have to justify in order to make that  
25 case --

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1 MR. THOMAS: Right, right.

2 CHAIRMAN SHACK: -- that that could be  
3 accepted, that somehow it wasn't an environment similar  
4 to what it would have experienced? So, that would be  
5 part of the demonstration you would have to do?

6 MR. THOMAS: Right. Yes. Yes, the  
7 Topical Report, we generally say that it is a pre-op test,  
8 that it needs to be used as a periodic test. The licensee  
9 will have to justify that in their documentation.

10 MEMBER STETKAR: But in that case, they  
11 could do that test, go into operation, two years later  
12 do their second test, and after two years in operation  
13 they could get justification for extending the 15 years,  
14 is that correct?

15 MR. LEE: Yes.

16 MEMBER STETKAR: Okay. Thanks.

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

24 To satisfy this, NEI 94-01 specifies  
25 general visual examinations of accessible interior and

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1 exterior surfaces to be conducted prior to each Type A  
2 test and during at least three other outages before the  
3 next Type A test if the interval has been extended 15  
4 years.

5 To avoid duplication and/or omissions, NEI  
6 94-01 recommends that these visual examinations be  
7 performed in conjunction or coordinated with the ASME  
8 Code Section XI, Subsection IWE and IWL examinations  
9 required by 10 CFR 50.55a.

10 The guidance requires deficiencies  
11 identified be entered into the plant's corrective action  
12 program to determine cause and appropriate corrective  
13 actions.

14 MEMBER STETKAR: George, I hate to keep  
15 dragging you back to this, but we certainly have ample  
16 time here. So, I was just trying to draw myself a little  
17 timeline. I will bring you back to this two  
18 pre-time-zero tests.

19 If they do an initial pre-op test and it  
20 fails, and then they wait some period of time before they  
21 go into operation, and then they do the second pre-op test  
22 and it passes, can that be considered a periodic test?

23 MR. THOMAS: No.

24 MEMBER STETKAR: It can't?

25 MR. THOMAS: It can't.

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1 MEMBER STETKAR: Okay. Thank you.

2 MR. THOMAS: Because the first one failed.

3 MEMBER STETKAR: Because the first one  
4 failed. Okay. Thank you.

5 MEMBER RAY: Well, John, my takeaway from  
6 all of that is what I guess Bill says, which is, why should  
7 the second pre-op test ever qualify as a periodic test?

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

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

18 MEMBER STETKAR: That is what I heard, yes.

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

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1 certain regulatory conditions.

2 Subsection IWE requires general visual  
3 examinations of 100 percent of accessible Class MC  
4 pressure-retaining surfaces and metallic liners of Class  
5 CC containments, as well as the moisture barriers, to be  
6 performed three times during a 10-year ISI interval.  
7 The ISI interval in Section XI is usually 10 years. This  
8 amounts to about four examinations over a 15-year ILRT  
9 interval.

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

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

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

25 The first condition is that, for

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1 calculating the Type A leakage rate, the licensee should  
2 use the definition in the Topical Report NEI 94-01 in lieu  
3 of that in ANSI/ANS Standard 56.8. Basically, the ANSI  
4 standard defines performance leakage rate of the sum of  
5 the measure Type A test at the confidence limit and, as  
6 left, the minimum Type A leakage rate from all Type B and  
7 C pathways isolated during the test.

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

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

25 CHAIRMAN SHACK: Now, with the new Reg

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1 Guide and the new SER, will they still have to submit that  
2 schedule or they will just have to have a schedule that  
3 you could go look at?

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

7 CHAIRMAN SHACK: That is for a typical  
8 15-year then, not the specific 15-year?

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

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

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

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

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

24           MR. THOMAS: Actually, we have a condition,  
25 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 in  
6 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 license  
10 amendment right in the Reg Guide, rather than have them  
11 refer back to the RIS. I mean, I always think of RIS as  
12 somehow less permanent than a Reg Guide. You know, the  
13 Reg Guide is the authoritative guidance.

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

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

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

24 CHAIRMAN SHACK: It would certainly  
25 provide clarity.

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

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

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

13 MEMBER STETKAR: Good takeaway.

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

23 There is one more slide.

24 With regard to operating experience, the  
25 majority of licensee have requested to receive one-time

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1 approval from 10 years to 15 years. Three plan to  
2 receive approval by extension of the performance-based  
3 ILRT to 15 years directly, based on adopting NEI 94-01,  
4 Rev. 2A, the implementing document.

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

9 CHAIRMAN SHACK: Of course, if it is in  
10 2008, it is a little early yet.

11 MR. THOMAS: No, including the ones that  
12 have done one-time.

13 CHAIRMAN SHACK: But they only started in  
14 2008, right?

15 MR. THOMAS: No, one-time extensions were  
16 given from 2000?

17 MR. LEE: 2002.

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

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

24 MEMBER STETKAR: And done the tests. We  
25 are trying to struggle with, you say that none have

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1 failed, but if none have actually performed a test, that  
2 wouldn't be surprising. If one performed a test and it  
3 didn't fail, well, that is information. If 107 have  
4 performed a test and they didn't fail, that is additional  
5 information.

6 MR. LEE: Yes, it is not that many. It is  
7 about five.

8 MEMBER STETKAR: About five?

9 MR. LEE: Yes.

10 MEMBER STETKAR: Okay.

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

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

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

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

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

24 MR. LEE: Right.

25 CHAIRMAN SHACK: -- in this timeframe?

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

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

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

9 MR. THOMAS: And even I would think it is  
10 more than five --

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

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

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

19 CHAIRMAN SHACK: It would be nice to know  
20 how many were done.

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

24 MEMBER RAY: Yes, I mean that it seems that  
25 we are struggling here with a simple proposition, which

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1 is, how many plants have passed a Type A test after an  
2 extended period of operation? And conversely, have any  
3 failed? I think the answer is nobody has failed during  
4 an extended period, following an extended period test.  
5 Is that correct?

6 MEMBER STETKAR: Yes. I mean, that is what  
7 they have said.

8 MEMBER RAY: All right.

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

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

14 MR. ZOULIS: I mean, we know there have been  
15 217 tests. Now what fraction of that were after the  
16 extension --

17 MEMBER STETKAR: That's right.

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

19 MEMBER RAY: Yes, but it should be a simple  
20 thing to learn.

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

23 (Laughter.)

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

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1 MEMBER STETKAR: Well, they have to report  
2 that they did the test --

3 MR. THOMAS: Yes.

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

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

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

20 MR. RICHARDS: George, it doesn't sound  
21 like it would be that hard to get this information.  
22 Could we commit that we would run this down and then  
23 provide that information to the ACRS members?

24 MEMBER STETKAR: Yes, I think that would be  
25 useful. The only problem is, you know, if it weren't

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1 called out as a bullet, kind of reinforcing this notion  
2 that everything is okay --

3 MR. RICHARDS: No, I understand your point.

4 MEMBER STETKAR: -- you would say okay.

5 MR. RICHARDS: Sure. So, I think we can  
6 provide that.

7 MEMBER STETKAR: Limited experience on  
8 rare-event data is questionable.

9 MR. THOMAS: Okay. Now I will turn it over  
10 to Brian Lee to continue.

11 MR. LEE: I am going to discuss about the  
12 performance-based Type B and Type C tests. These test  
13 intervals may be increased from 30 months to a maximum  
14 of 120 months for Type B tests and up to a maximum of 75  
15 months for Type C tests. These extensions are allowed  
16 based upon the completion of two periodic as-found tests  
17 where the results are within the licensee's allowable  
18 administrative limit. These administrative limits for  
19 leakage rates shall be established, documented, and  
20 maintained for each component prior to the performance  
21 of the Local Leak Rate Test. This is in accordance with  
22 the 2002 ANSI standard. A failure to find is a valve  
23 exceeding its administrative leakage limit.

24 Now, during the development of Revision 3  
25 of NEI 94-01, NEI did a study where they collected data

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1 for a time period of 1996 to 2010 on Type C valves on  
2 extended intervals, and the results were documented in  
3 EPRI Report 1022599.

4 The staff performed its own review of this  
5 report and found that the valves tested on extended  
6 intervals was about an order of magnitude less than what  
7 was reported in NUREG-1493 on the general population of  
8 valves tested prior to 1995.

9 MEMBER STETKAR: Do you have any notion of  
10 why that is?

11 MR. LEE: I would say better maintenance;  
12 stronger, better corrective action program.

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

20 MR. LEE: It is pretty much straightforward  
21 that a failure is any valve that has exceeded its  
22 administrative limit. So, in the report they listed the  
23 number of Type C valves, the actual administrative  
24 leakage limit, and how many valves failed.

25 MEMBER STETKAR: And they didn't do any

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1 type of cause-based screening?

2 MR. LEE: No.

3 MEMBER STETKAR: Okay. Thank you.

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

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

13 MEMBER STETKAR: Sure.

14 (Laughter.)

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

19 MEMBER STETKAR: Yes.

20 (Laughter.)

21 MEMBER RAY: Okay.

22 MEMBER STETKAR: There is that, too.

23 Before you switch them, something that I  
24 have been thinking about here a bit, we refer a lot -- and  
25 then, I will ask Antonio when he finally comes up also,

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1 so you might want to think about this -- we refer a lot  
2 to the data that have been collected from the current  
3 operating three plants regarding successful performance  
4 of the tests, failures of the tests, causes for the  
5 failures, and derive failure rates based on that  
6 information, and then use some sort of method to  
7 essentially extrapolate those failure rates out in time  
8 to give us some sort of confidence that, indeed,  
9 extending these intervals is justified.

10 The Reg Guide also applies to new plants,  
11 plants that have never operated before, new designs. It  
12 applies to new reactors. I don't necessarily know what  
13 their valves may look like. They will probably look  
14 quite a bit like valves that we have installed in the  
15 plants, but in some cases they might not.

16 How does the information that has been  
17 compiled from the current operating fleet apply to new  
18 plants when they come online? Because the Reg Guide does  
19 apply to plants licensed under Part 52. So, for example,  
20 I can start up a new plant, go through whatever gymnastics  
21 of, I will call it, pre-operational testing or periodic  
22 testing. Even if I do two periodic tests within four  
23 years after the startup of that plant, it might be the  
24 first of its kind that has never operated before here,  
25 I now don't need to do this test for another 15 years or,

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1 in the case of Type B and C, another six years,  
2 six-and-a-half or whatever it is, 75 months.

3 MR. LEE: That is a good question. The  
4 only thing that is in place right now is the two periodic  
5 as-found tests for the penetration for the isolation  
6 valves.

7 MEMBER STETKAR: The reason I ask, in some  
8 of the design certification things -- and, Bill, correct  
9 me if I have misremembered this -- there has been some  
10 concern about new and innovative-type equipment designs  
11 may not be -- you may not be able to apply the same type  
12 of risk-informed extensions of Tech Spec intervals, you  
13 know, testing intervals under Tech Specs for new and  
14 innovative equipment design.

15 People are working this out in the design  
16 certification process right now, but we have had some  
17 discussions of that nature. For example, the large  
18 squib valves on some of the designs, we said, well, you  
19 probably can't apply at time zero for risk-informed  
20 surveillance interval extensions for those valves  
21 because we really don't know much about them. Whereas,  
22 another plain vanilla motor-operated valve perhaps, you  
23 might be able to. As I said, I think the staff is still  
24 working through this because they haven't yet had a  
25 risk-informed application for Tech Spec surveillance

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1 intervals yet. There is one applicant that is  
2 considering that.

3 So, I guess my question kind of derives from  
4 that experience.

5 MR. ZOULIS: One of the things and one of  
6 the justifications for why it is okay to extend the  
7 integrated leak rate testing from 10 to 15 or from 3 to  
8 15 years was that the tests didn't -- the value-added of  
9 doing the tests wasn't justified for the time for doing  
10 the outage expense and all of that involved in the test.

11 And part of it was because a lot of the other  
12 things that the plant is doing, the visual inspections,  
13 the other local leak rate tests, give you most of the  
14 information that would identify any large leak,  
15 potential large leak.

16 So, in terms of the failures of the valves,  
17 it may be more pertinent for the extension of the B and  
18 C tests, but from the Type A perspective it would have  
19 been playing a role.

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

24 MR. ZOULIS: But, again, for the B and C  
25 testing, the interval change I think is not going to be

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1 that significant that it is going to modify your LERF.  
2 I mean, we have found that LERF is very insensitive to  
3 changes because it is dominated by the core damage  
4 frequency --

5 MEMBER STETKAR: Yes.

6 MR. ZOULIS: -- you know driving the  
7 sequences. Then, you have to have containment failures  
8 as a release.

9 MEMBER STETKAR: When I think of risk  
10 assessments, I think of large early releases is one  
11 thing. Small containment isolation failures is  
12 something else. So, I recognize Reg Guide 1.174  
13 constrains you to look at something called LERF. I think  
14 of having something happen at the plant and having an  
15 unisolated containment that has a release. It might be  
16 a 2-inch line. That is not a LERF.

17 MR. ZOULIS: Right.

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

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

24 MEMBER STETKAR: Right. That is a  
25 different issue, but I want to make sure that, just

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1 because we are focused on LERF in the context of the  
2 supporting analyses, we don't somehow suddenly overlook  
3 something that could be a problem, because there are a  
4 lot more isolation valves and there are a lot more  
5 penetrations and leakage paths that don't get you to a  
6 large early release or a large release, I would  
7 characterize that, in a typical containment. And these  
8 tests apply to all of those other things also.

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

14 MR. ZOULIS: I mean, your question about  
15 the ability of the data to new components that are  
16 different than the existing population, I mean that would  
17 have to be evaluated as part of your risk assessment to  
18 make sure that you are not applying generic data that  
19 doesn't fit to your valve data. I mean that would be  
20 supported by the ASME. I think the ASME standard has a  
21 criterion there that you are supposed to test your data  
22 and make sure that it is applicable.

23 MEMBER STETKAR: So, you just fall back to  
24 justification in the plant-specific risk assessment for  
25 the applicability of the --

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1 MR. ZOULIS: Right. I mean, they have to  
2 be Reg Guide 1.200-compliant to be able to come for any  
3 kind of a license change. And then, that links it to the  
4 ASME standard and, hopefully, it has been peer-reviewed  
5 and evaluated the data, it is shown to be valid. And that  
6 is their whole basis for the risk-informed process.

7 MEMBER STETKAR: That is a good point, ye.  
8 Thank you.

9 Sorry, Brian.

10 MR. LEE: Oh, no problem.

11 The regulatory limit for the combined  
12 leakage rate for all penetrations involved in Type B and  
13 Type C tests shall be less than 0.60 La, which George  
14 explained La is the maximum allowable leakage at  
15 calculated peak pressure.

16 In Section 12.1, a revision was made to  
17 require that the post-outage report shall include the  
18 margin between the Type B and Type C leakage rate  
19 summation and its regulatory limit.

20 And if any adverse trends shall occur to the  
21 summation, it should be identified in this report and a  
22 corrective action plan developed to restore the margin  
23 back to an acceptable level.

24 In the SER for Rev 3A, the staff identified  
25 two limitations and conditions. The first pertains to

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1 extensions of up to nine months for non-routine emergent  
2 conditions. However, this provision does not allow  
3 valves that are restricted and/or limited to the 30-month  
4 test interval or valves that are known for poor leakage  
5 performance to be granted this extension.

6 MEMBER STETKAR: Those valves that we know  
7 have a poor leakage performance today?

8 MR. LEE: Yes. They will be on the base  
9 30-month test interval, until they reestablish a good  
10 performance.

11 MEMBER STETKAR: Okay.

12 MR. LEE: Okay. The second condition  
13 deals with the Appendix J program. Trending and  
14 monitoring must include an estimate of the amount of  
15 understatement for the Type B and Type C total, and this  
16 must also be included in the outage report. The report  
17 must include the reasoning and determination of the  
18 acceptability of the extension, demonstrating that the  
19 Local Leak Rate Test totals calculated represent the  
20 actual leakage potential of the penetrations.

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

24 MR. LEE: Okay.

25 MEMBER STETKAR: We have had an example

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1 where people passed valve acceptance tests on main steam  
2 isolation valves for many consecutive years, and the  
3 performed a test and two or three valves stayed open for  
4 an awfully long time and discovered that there was a  
5 developing condition, either because of inadequate  
6 maintenance or missed things, or whatever, that caused  
7 that to happen.

8 So, suddenly, now we have valves that -- now  
9 you have called out BWR MSIVs because everybody knows  
10 that is a very important valve. Maybe I know that there  
11 are other very important valves; maybe I don't. I don't  
12 know.

13 The reason I ask about these questions about  
14 things that we know are important today, if BWR MSIVs  
15 weren't called out in the past because everybody didn't  
16 know they were very important, and then we had this  
17 experience that, gee, this is an unexpected failure that  
18 nobody ever thought about, and it is something that has  
19 been accruing over time, and, yes, if you did the  
20 forensics you could go back and perhaps justify the fact  
21 that maybe you should have known about it, but, in fact,  
22 nobody did.

23 That is a bit of my concern about saying,  
24 well, things that we know about, we will take a look at  
25 and be careful about. Things that we don't know about,

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1 we will let go because we don't know about it.

2 Do you follow my reasoning that this notion  
3 that important valves you are not allowed to have an  
4 extension on? Or certainly ones that have had a problem  
5 in the past, a known problem in the past. I am not  
6 arguing that.

7 But valves that have performed successfully  
8 in the past, the presumption is that we know everything  
9 there is to know about those valves and that there is  
10 nothing that can happen to those valves that would cause  
11 their failure rate to increase as a function of time, and  
12 we have just not detected that yet, as is the case with  
13 those MSIVs.

14 Have the supporting analyses looked at that  
15 type of phenomenon, considered it?

16 MR. LEE: For the MSIVs?

17 MEMBER STETKAR: No, for any type of valve.

18 MR. LEE: You are talking about in that EPRI  
19 report that they submitted?

20 MEMBER STETKAR: Yes.

21 MR. LEE: No.

22 MEMBER STETKAR: Okay.

23 MR. LEE: They didn't.

24 MR. ZOULIS: I will tell you, though, one  
25 of the specific examples that occurred recently, the

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1 issue involved failure to appropriately classify the  
2 valve as important. So, if it was classified correctly,  
3 there shouldn't have been any issues under the AOV  
4 program.

5 And that goes back to what you were stating,  
6 that if you make sure that the important valves you have  
7 are classified correctly as important, then you  
8 shouldn't have an issue. And part of the reason, I  
9 think, was that they looked at the contribution, not the  
10 contribution but to LERF, or vice versa -- I can't recall  
11 exactly -- but, I mean, your point is a very important  
12 one.

13 Your AOV program which ranks a lot of these  
14 valves must take into account the risk contribution from  
15 those valves in both LERF and CDF and classify them  
16 correctly, so that they do get the attention that they  
17 need to make sure that they work properly.

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

20 MEMBER STETKAR: The nice thing about  
21 testing is that the test doesn't care about how somebody  
22 has classified a valve in some study. It either works  
23 or it doesn't work. That is the nice thing about  
24 testing. Then, you discover the fact that it was  
25 misclassified or --

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

4 MEMBER STETKAR: No, I understand. I  
5 understand.

6 MR. ZOULIS: Yes.

7 MEMBER STETKAR: Okay.

8 MR. LIN: I mean, the test requirement  
9 could also be different. It depends on how you classify  
10 the valve.

11 MEMBER STETKAR: That is right.

12 MR. LIN: Yes.

13 MEMBER STETKAR: That is right. But, see,  
14 the test requirement can be different. If I classify a  
15 valve as unimportant, I am allowed less onerous testing,  
16 let's call it that way. And if I start extending testing  
17 intervals, I perform that less onerous testing even less  
18 frequently and have less of an opportunity to discover  
19 something that should have been classified as important,  
20 but wasn't.

21 Okay. Thanks.

22 MR. LEE: To sum this portion of the  
23 presentation up, the major difference between Rev. 0 and  
24 Rev. 2A was Rev. 2A includes provisions for extending  
25 Type A tests to permanent, continuous. The major

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1 difference from going from 2A to 3A is that 3A includes  
2 guidance on extending Type C valves from 60 months to 75  
3 months.

4 And the Appendix J program, in conjunction  
5 with the containment and service inspection program,  
6 together ensure that the containment structural and  
7 leakage integrity is maintained through the service  
8 life.

9 MEMBER RAY: What do the Europeans do?

10 MR. LEE: Are you asking are they on  
11 extended frequencies?

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

14 MR. LEE: I think they are on 10-year  
15 frequencies, I believe.

16 MEMBER STETKAR: I suspect it must be a  
17 10-year because a lot of them are on the 10-year periodic  
18 safety review.

19 MEMBER RAY: Right. It is an integrated  
20 leak rate test?

21 MEMBER STETKAR: I don't know that.

22 MEMBER RAY: Yes. Okay.

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

24 MR. THOMAS: France does it on 10-year  
25 intervals.

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1                   MEMBER RAY: And what about the B and C?  
2                   Got any idea?

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

5                   MR. ZOULIS: Good morning.

6                   As Bruce indicated, my name is Antonio  
7                   Zoulis. I am with the Office of Nuclear Reactor  
8                   Regulation in the Division of Risk Assessment.

9                   I kind of feel I am the main act. I hope  
10                  I don't disappoint today.

11                  My discussion will focus on the risk aspect  
12                  of the Integrated Leak Rate Testing, known as ILRT, the  
13                  interval extension; specifically, the methodology found  
14                  in the EPRI report "Risk Impact Assessment of Extended  
15                  of ILRT Intervals" and the Safety Evaluation which found  
16                  the method acceptable to meet our regulatory  
17                  requirements. So, I will cover both the SE and the EPRI  
18                  report.

19                  NUREG-1493, as mentioned above, used  
20                  risk-informed criteria to support modifying the  
21                  regulation to reduce unnecessary regulatory  
22                  requirements found in Appendix J. The EPRI report built  
23                  on the methodology and supports our risk-informed  
24                  process which uses risk insights, together with other  
25                  factors, to better focus licensee and regulatory

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1 attention on design and operation issues commensurate  
2 with their importance to health and safety.

3 The NRC approach is not risk-based due to  
4 the aleatory and epistemic concerns in these methods and  
5 the processes and programs which we regulate. So, we are  
6 risk-informed, not risk-based, in our evaluation and  
7 these changes to the license.

8 Next slide.

9 The key principles in the risk-informed  
10 process which support integrated decisionmaking are  
11 displayed here and are in found in Reg Guide 1.174 and  
12 other risk-informed guidance, 1.177.

13 So, basically, when the licensee comes in  
14 for a change, he or she still needs to meet the current  
15 regulation. The change has to be consistent with  
16 defense-in-depth philosophy. It is not that they cannot  
17 change or alter their philosophy. It has to be  
18 consistent with changes to support defense-in-depth  
19 philosophy.

20 They need to evaluate their safety margins,  
21 make sure that the change doesn't adversely impact their  
22 safety margins. The change in risk needs to be small and  
23 has to consistent with the Commission's safety goals.

24 And I think the most important thing that  
25 is the theme, I think, that keeps on coming up today is

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1 the performance monitoring. Part of our criteria is  
2 that they set up performance-measuring strategies to  
3 make sure that that change does not impact, adversely  
4 impact, the safety function of the system that are in  
5 question.

6 So, basically, the EPRI report concludes,  
7 and we agreed with our SE, that NUREG-1493, the  
8 conclusions were still valid, that the risks associated  
9 with these changes is very small. And the report  
10 basically develops a generic method which is then applied  
11 by each licensee using their plant-specific risk  
12 assessments to evaluate the risk for their plant change.

13 And I mentioned earlier, to do that, they  
14 must be Reg Guide 1.200-compliant. So, they have to meet  
15 the ASME standard to even consider making a change of this  
16 nature.

17 Next slide.

18 MEMBER RAY: Let me ask this question.

19 MR. ZOULIS: Yes.

20 MEMBER RAY: I doubt very much that the 15  
21 years or the other durations are derived from  
22 risk-informed considerations. They are supported by  
23 those, but I take it, I assume -- correct me if I am  
24 wrong -- that the durations are based on, let's call it,  
25 engineering judgment or some reason. Why not make it 20

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1 years, 25 years, 30 years? There is some reason why 15  
2 years is as far as we are going to go.

3 What supports that? Do you have anything  
4 support? Or is it just we don't want to go beyond this  
5 point?

6 MR. THOMAS: Well, it is just, as was  
7 mentioned, a cautious evolution of the approach.

8 MEMBER RAY: Say more. Again?

9 MR. THOMAS: A cautious evolution of the  
10 approach.

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

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

20 MEMBER RAY: Okay.

21 MR. ZOULIS: Next slide, please.

22 Again, CDF is not significantly impacted by  
23 the extension of the ILRT interval. However, plants  
24 that do rely on containment accident pressure for the  
25 ECCS need to assess that impact in their risk assessment.

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1 And I will discuss this later. They must come in for  
2 license amendment. If they take credit for containment  
3 accident pressure, they come in; they cannot just do a  
4 50.59 change and just submit a license amendment for  
5 that.

6 Next slide.

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

12 But it also, though, does take into account  
13 the increase in the population dose and the increase in  
14 the conditional containment failure probability. So,  
15 the methodology also evaluates those impacts to the  
16 public, I would say to the public.

17 Next slide.

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

20 MR. ZOULIS: So, basically, the change in  
21 LERF is derived by the change in the Integrated Leak Rate  
22 Test failure probability. In this case, integrated leak  
23 rate failure is not the failure of the ILRT test to  
24 measure containment leakage, nor does it indicate a  
25 failure of a Type A test to meet performance criteria of

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1 NEI 94-01. Rather, the term ILRT failure is used to  
2 describe those ILRT tests in which containment leakage  
3 was identified above the acceptance criteria that would  
4 not be detected by a Local Leak Rate Test, containment  
5 inspection, or other alternate means, and is of  
6 sufficient size to potentially result in a large early  
7 release.

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

12 MEMBER STETKAR: Antonio, since you have  
13 this nice equation --

14 MR. ZOULIS: Sure.

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

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

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1           Did anyone question the linearity in that  
2 assumption? That is a fundamental assumption. It says  
3 that the world behaves in a linear process.

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

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

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

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

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

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

25           Because, unfortunately, in the EPRI report,

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

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

9 MEMBER STETKAR: Okay.

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

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

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

20 MEMBER STETKAR: Yes.

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

23 MEMBER STETKAR: To handle that.

24 CHAIRMAN SHACK: -- handle that. I mean,  
25 I thought the factor of three was a lot better than the

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1 10 percent that was in the original analysis.

2 MEMBER STETKAR: Well, yes. Yes.

3 (Laughter.)

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

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

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

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

24 Of course, again, as Mr. Shack said, the  
25 liner corrosion model also is incorporated, which has a

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1 generic method for determining the change in likelihood  
2 of detecting liner corrosion and the corresponding  
3 change in the risk due to the ILRT 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 analysis  
7 of containment failure timing and operator reactions.

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

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

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

24 MR. ZOULIS: For BWRs, since their  
25 containment is nitrogen-inerted, then you should be okay

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1 detecting those kind. For the BWRs, we shouldn't have  
2 an issue with that.

3 MEMBER STETKAR: Right.

4 MR. ZOULIS: Now for the PWRs --

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

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

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

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

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

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

22 MR. ZOULIS: Next slide.

23 MEMBER STETKAR: I didn't get a chance to  
24 look at -- the data are in the report, and there are tables  
25 and tables. The said that the highest observed leakage

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1 was 21. What was the cause of that? Do you know that  
2 event?

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

9 MEMBER STETKAR: Okay.

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

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

14 Okay. Thank you.

15 MR. ZOULIS: Next slide.

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

21 So, the licensee needs to basically  
22 quantify the baseline. They start off from the three  
23 year to ten and then 15-year intervals. I have reviewed,  
24 I think, two applications, and they included the risk  
25 going from three to ten, and from ten to 15.

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

9           So, it is pretty thorough. It has, again,  
10          detailed steps. It gives an example for PWR and BWR.  
11          So, it goes through both. I think Vogtle is the example  
12          for the PWR.

13                 MEMBER STETKAR: Do those plant-specific  
14          analyses rely on this, on the expert elicitation results  
15          from the EPRI report on the probability distribution for  
16          the undetectable, if I call it that, leaks?

17                 MR. ZOULIS: I think, yes, the  
18          plant-specific portion is the sensitivity LERF sequences  
19          and the CDF.

20                 MEMBER STETKAR: But they essentially use  
21          the EPRI numbers?

22                 MR. ZOULIS: Yes.

23                 Next slide.

24                 So, the final SE that was issued, which  
25          endorsed the NEI Technical Report and the EPRI document,

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1 was issued. You need again, license amendment request  
2 must be submitted for containment overpressure if it is  
3 relied upon for ECCS.

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

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

20 The staff finds the implementation around  
21 the risks associated with the interval extension  
22 acceptable and consistent with the five key principles  
23 of Reg Guide 1.174 and other risk-informed guides. The  
24 revision of Reg Guide 1.163 reflects the latest staff  
25 position based on Version 3A of the NEI Technical Report

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1 94-01 guidelines. There are no new staff positions that  
2 are being promulgated in this revision.

3 And that concludes our presentation, I  
4 think, today, and we will probably open it up for  
5 questions, more questions.

6 MEMBER STETKAR: I guess this is not  
7 particularly a question. I have been dancing around it  
8 a bit, but it is more of my own thinking outloud a bit.

9 I think I understand fundamentally what has  
10 been done. I think a couple of my questions point to a  
11 bit of a concern about focusing only on LERF as the  
12 measure of merit for determining whether or not we can  
13 extend these and not also considering smaller isolation  
14 failures, which would, indeed, be detected, whether it  
15 is Type A or -- Type A I mostly concerned about testing.

16 We do have data and operating experience  
17 from the current fleet. I will come back to my question  
18 about going forward with new reactors. I just don't know  
19 how much thought has been put into this notion of, for  
20 a new reactor, their performing two consecutive  
21 successful tests of a plant that has never operated  
22 before in the first four years of operation, and then  
23 being allowed to extend their test interval out to 15  
24 years, with very little operating experience from that  
25 particular design.

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1           Even if we accept the fact that valves are  
2 valves for the same valves, are there other mechanisms  
3 or causes that can affect that particular design? And  
4 I don't know. I just don't know. The containments are  
5 not radically-different containments, by and large,  
6 Harold's plant notwithstanding.

7           (Laughter.)

8           MEMBER RAY: No, that is right.

9           CHAIRMAN SHACK: Steel shell containment.

10          MEMBER STETKAR: Steel shell containment.

11          So, one would not expect different failure mechanisms  
12 perhaps to derive.

13          MR. THOMAS: But Type A tests, you know, we  
14 have put a condition that states, for plants licensed  
15 under Part 52, applications requesting permanent  
16 extension of ILRT surveillance interval 15 years should  
17 be deferred until after construction and testing of the  
18 containments for that design have been completed and  
19 applicants have confirmed the applicability of NEI  
20 94-01, Rev. 2, and EPRI report, Rev. 2, including the use  
21 of past containment ILRT data. So, there is a general  
22 condition for Type A tests.

23          MEMBER STETKAR: For Type A? So, they  
24 would have to come in with a justification about why the  
25 current operating fleet ILRT data applied to that

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1 particular design. Am I understanding that correctly?

2 MR. THOMAS: Correct.

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

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

7 MR. ZOULIS: Makes sure that it is  
8 applicable.

9 MEMBER STETKAR: -- links or makes the  
10 applicant think about it and justify why data, that  
11 experience from the current operating fleet applies to  
12 their particular design and configuration. And it  
13 requires you to think about that, also, I guess, when they  
14 come in.

15 Okay. I will have to think about that a  
16 little bit. Thank you.

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

21 But, be that as it may, I am still stuck on,  
22 what is the point of the test in the first place?  
23 Supposing -- just supposing, hypothetically -- that we  
24 always found there are a lot of leaks that shouldn't  
25 exist. I am leaving aside LERF and exposure of the

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1 public, and so on. But just if the test found that  
2 regularly -- and I am making this just a  
3 hypothetically -- that we identified small leaks as  
4 compared with ones that would challenge the  
5 risk-informed basis of the extension, but we are saying,  
6 well, that is okay because we can extend the test  
7 interval, notwithstanding that fact, because the point  
8 of the containment is just the limitation on risk to the  
9 public health and safety due a LERF event.

10 I don't think that is right. I don't think  
11 that is where we really believe we are when it comes to  
12 containment integrity. And yet, I understand the policy  
13 objective of risk-informed regulation and justifying  
14 things that we require on that basis. But I am still  
15 uncomfortable with the idea that there are a lot of  
16 penetrations which, if they are found often to be leaking  
17 during a Type A, for example, that is not a good  
18 situation.

19 So, how do we deal with that?

20 CHAIRMAN SHACK: Well, I think you have it  
21 the other way around, Harold. I think this whole thing  
22 arose because, when you did the Type A tests, you found  
23 very few failures.

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

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

4 MEMBER RAY: Yes, exactly.

5 CHAIRMAN SHACK: But the whole Type A  
6 history is a good one. So, the question, then, becomes,  
7 okay, it really is a defense-in-depth thing. You really  
8 don't think you are going to have these small failures.  
9 You know, the failures are mostly Type B and Type C  
10 things, which you are inspecting on a much more frequent  
11 basis.

12 MEMBER RAY: Right.

13 CHAIRMAN SHACK: The risk-informed part  
14 sort of says, okay, am I really taking a big chance here  
15 when I do that? Even though my data looked good, am I  
16 giving up too much in defense-in-depth? To me, that is  
17 where the risk-informed argument comes in that says, no,  
18 I am not really losing my defense-in-depth. If I am  
19 wrong, I still have got some --

20 MEMBER RAY: I agree with you, if you are  
21 looking at it just from the standpoint of test failure  
22 experience, Type A test failures. I understand. But,  
23 still, we are now not finding and addressing the other  
24 causes of leakage that you do when you conduct a Type A  
25 test.

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1                   Again, I am not criticizing the  
2 conclusions.

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

6                   MEMBER RAY: Yes, I concede that.

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

11                   The expert elicitation looked at the  
12 experience, those however many leak rate tests that have  
13 been done, and said, given that experience, the experts  
14 were tasked were saying, as a function of undetected leak  
15 size, the size of the leak that would not be detected by,  
16 for example, Type B and C testing, what is the likelihood,  
17 given that operating experience, what we have learned?

18                   MR. ZOULIS: The other things, visual  
19 inspections and --

20                   MEMBER STETKAR: The other things. What  
21 is the likelihood that that type of leak might exist,  
22 given the testing history that we have had? And the  
23 experts, again, with the caveat that they threw out the  
24 high and the low, I would really be interested in what  
25 the high looked like and what the shape of that expert

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1 distribution actually was.

2 But, given that caveat, the experts are  
3 saying that, for -- and I don't know what you call a modest  
4 leak -- twice the allowable leakage rate, they are  
5 assigning about a 1-percent probability that that might  
6 be there at any given time, which depending on your notion  
7 of large or small numbers, that is essentially what they  
8 are saying.

9 And I think, Harold, that process tried to  
10 capture that operating experience. So, you know, when  
11 you say you have a lot of tests that have small failures,  
12 the experts at least who had the opportunity to look at  
13 all of that data assessed that that happens about once  
14 in 100 to once in 50 times or so. So, apparently, I am  
15 assuming that they didn't just wholesale throw out a lot  
16 of the actual failure experience data.

17 Now the question is whether that is  
18 something that we should be concerned about here because  
19 that certainly isn't a contributor to LERF.

20 MEMBER RAY: Yes.

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

25 MR. ZOULIS: They do look at potential

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1 containment failure probability and, also, the base dose  
2 to the population. So, they evaluate that as well. So,  
3 then, there are three figures that they evaluate. It is  
4 not just LERF.

5 MEMBER STETKAR: Okay.

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

12 It is just that that means to me that the  
13 Integrated Leak Rate Test has a limited, more limited  
14 role to play than --

15 MEMBER STETKAR: I think that is certainly  
16 true for large leaks.

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

19 CHAIRMAN SHACK: But, I mean, I am right  
20 that the IWE/IWL thing was actually brought into this,  
21 basically, to support the Appendix J kind of Option B  
22 thing, right? I mean, that is when IWE came into the  
23 code, wasn't it?

24 MR. THOMAS: Came into the regulation, yes,  
25 in 1995.

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1 CHAIRMAN SHACK: Yes. 1995.

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

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

8 I mean, if I can go back to Dennis' thing,  
9 you know --

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

12 CHAIRMAN SHACK: -- "Extensions of  
13 surveillance intervals are made in stepwise fashion,"  
14 such as equipment is tracked carefully in new failure  
15 modes. I mean, it seems to me, you know, they did the  
16 first extension to 60 months for the Type C. You looked  
17 at the data. It looks pretty good. I mean, the failure  
18 rates are low. There is no time-dependence. I mean,  
19 you are not seeing a history kind of accelerating thing.

20 And again, if we see a bunch of Type A  
21 failures here in the next couple of years, we can revisit  
22 this again. But, certainly, there are no trends that  
23 indicate a problem here.

24 It seems to me they are sort of following  
25 Dennis' notion of marching out here a little carefully.

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

4 And I will grant you that for the current  
5 operating fleet. But if I go to new plants, and  
6 something Antonio said earlier prompted another thought,  
7 new plants, for the passive plants, they have a list of  
8 equipment called RTNSS equipment on safety-related  
9 stuff. And for the active plants, they have what I think  
10 is a comparable list -- and I have forgotten the acronym  
11 for that list, but it is the --

12 CHAIRMAN SHACK: DRAP.

13 MEMBER STETKAR: Thank you. DRAP, Design  
14 Reliability Assurance Program equipment list, which is  
15 analogous in my mind.

16 Those SSCs are assigned to those lists based  
17 on risk indices in many cases. There is an expert panel  
18 that looks at other non-numerical factors, but there is  
19 reasonable reliance on risk indices.

20 We have not worked our way through, I don't  
21 think, as an agency, about how that process will be  
22 applied in practice. Well, there are sort of templates,  
23 but if I ask people about how DRAP lists that are  
24 developed during the design certification transition to  
25 operational phases, because of differences in guidances

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1 about numerical criteria, I don't get warm feelings about  
2 how people will make that transition.

3 The reason I bring this up is that you  
4 mentioned something that said, well, we have had some  
5 experience about somebody mischaracterized a piece of  
6 equipment as low significance and, therefore, didn't do  
7 the types of surveillance on that equipment that would  
8 have been applied, had it been appropriately  
9 characterized.

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

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

22 MEMBER STETKAR: They are. By the time of  
23 fuel load, they are, full-scope, all plant operating  
24 modes, Level 2 --

25 MR. ZOULIS: So, they should be better

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1 off --

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

5 MR. ZOULIS: They should be better off than  
6 the current fleet.

7 MEMBER STETKAR: At least in terms of  
8 characterizing the equipment, from that perspective, as  
9 long --

10 MR. ZOULIS: I mean, I came from the  
11 Northeast before I came to the agency. We just ran  
12 through an AOV program. We did that. We looked at CDF,  
13 but we also evaluated the LERF contribution from the  
14 valves.

15 And then, as you mentioned, we did have an  
16 expert panel meeting where we sat down with the AOV  
17 engineer, the maintenance engineer, the systems  
18 engineers, the PRA, and discussed other qualitative  
19 aspects of whether or not these valves -- for each valve  
20 individually, that is, I believe, part of the AOV  
21 risk-ranking program.

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

24 MEMBER STETKAR: Yes.

25 MR. ZOULIS: I mean, I don't know. I am

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1 telling you from experience how we applied that.

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

5 MEMBER STETKAR: One of the reasons I  
6 brought it up -- and I brought it up again thinking, Bill,  
7 about your comment from Dennis -- is that these  
8 extensions would be applied in a stepwise manner, looking  
9 at the performance of the equipment. Well, for new  
10 plants, they won't be applied in a stepwise manner. A  
11 new plant could start operation today, and four years  
12 from today would be granted, presumably zero failures in  
13 those two tests, would be granted an extension to 15  
14 years. That is not a stepwise approach. That is two  
15 attempts to find rare failures.

16 CHAIRMAN SHACK: But that does come back to  
17 how different you think the new plants are, and are the  
18 failure rates that we are applying to these plants  
19 applicable to the new plants.

20 MEMBER STETKAR: Right.

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

24 MEMBER STETKAR: I can't think of  
25 differences, either, but --

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1 CHAIRMAN SHACK: By and large, they are  
2 improvements. I mean, they have got better seals. I  
3 don't think we are going to get water running down into  
4 sand.

5 (Laughter.)

6 MEMBER STETKAR: But I will admit that,  
7 even on the design certifications, I haven't paid a lot  
8 of attention to the containment isolation valves or  
9 isolation barriers.

10 CHAIRMAN SHACK: But I just can't believe  
11 they are inventing new valve types. But you are right.  
12 But, again, that does come down to looking at this  
13 applicability, which is somewhere in that license  
14 condition.

15 MEMBER STETKAR: I was going to say, that  
16 is a very, very important part of that justification for  
17 the Part 52.

18 MR. ZOULIS: Also, we mentioned before,  
19 when they develop their PRAs, they need to be Reg  
20 1.200-compliant. So, they need to make sure that they  
21 are not using data that is not applicable to their  
22 population. And that should be peer-reviewed and make  
23 sure that it is done correctly and that they are  
24 evaluating that appropriately.

25 I mean, I can't see a peer review accepting

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1 generic data for a AOV valve to be applied to a new type  
2 valve that has no -- I mean, I don't know how they would  
3 accept that. It could happen, I guess. Anything is  
4 possible.

5 MEMBER RAY: Well, we just had a reactor  
6 vessel head problem, didn't we, somewhere? I think of  
7 the containment equipment hatch as being, for example,  
8 a huge potential leak path as a result of a problem with  
9 a seal.

10 CHAIRMAN SHACK: I think of people cutting  
11 into containments under 50.59.

12 (Laughter.)

13 That has happened. People have found  
14 2-inch holes open.

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

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

19 (Laughter.)

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

22 CHAIRMAN SHACK: Then, we patch it up.

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

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1 tests.

2 CHAIRMAN SHACK: Oh, but the equipment  
3 hatch is treated differently.

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

7 MR. THOMAS: Regarding the 24-month  
8 minimum interval, like Bill is speaking, licensees are  
9 going to push that as far as possible.

10 CHAIRMAN SHACK: They want the 48 months,  
11 huh?

12 (Laughter.)

13 MEMBER STETKAR: Well, that is true unless  
14 they are forward-thinking and think that, by doing a  
15 couple of quick tests, they can get a lot of relief over  
16 the next 60 years or 80 years. You know, if they can  
17 forgo doing two or three or four tests over the life of  
18 the plant by doing a couple of quicker tests in the first  
19 four years of operation, they might decide to do that.  
20 They might.

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

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

25 CHAIRMAN SHACK: Smaller intervals, right.

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1 MR. THOMAS: So, they have to do it, you  
2 know, to the maximum interval possible to get the minimum  
3 level.

4 MEMBER STETKAR: No, I am saying you do the  
5 first two tests quick, and by doing that, you save  
6 perhaps --

7 CHAIRMAN SHACK: But if I do the first two  
8 tests slow, I still get 15 years.

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

13 MEMBER STETKAR: Right, any  
14 time-dependent, non-linear effects that --

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

17 CHAIRMAN SHACK: But, I mean, in the first  
18 eight years I am not looking forward, you know -- man,  
19 if I think my containment is going to degrade my first  
20 eight years, I have got bigger problems than passing my  
21 Type A test.

22 (Laughter.)

23 MEMBER RAY: I agree.

24 MR. THOMAS: That is the reason we went with  
25 the 15-year interval. They have been trying to push it

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1 a few months further.

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

6 MEMBER RAY: But that would only be because  
7 you reduce the risk of a failure as a result of doing them  
8 quickly.

9 MEMBER STETKAR: That's right. Get them  
10 out of the way quick, when you have high confidence that  
11 you won't have any failures, and then reap the benefits  
12 that way.

13 I don't have anything more, Bill.

14 CHAIRMAN SHACK: No further comments?

15 (Laughter.)

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

18 Do we see a need to bring this to the full  
19 Committee?

20 MEMBER STETKAR: I have been trying to  
21 think about that.

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

24 MEMBER STETKAR: I mean, that would be the  
25 only reason, is because of the limited attendance of the

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1 Subcommittee.

2 MEMBER RAY: Well, there was so much  
3 background that, if we do it, I would suggest we just talk  
4 about what difference does the revised Reg Guide make,  
5 not what is the long, long history. Although it is  
6 informative for this meeting, I think the issue that  
7 might --

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

14 MEMBER RAY: Yes.

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

23 And in particular, I will give you the  
24 valves. I will come back to this expert elicitation,  
25 because I look at the Type A test as the test that

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1 ultimately discovers the things that you haven't thought  
2 about in any of your other testing. And I think that was  
3 the purpose of that expert elicitation and to understand,  
4 right?

5 CHAIRMAN SHACK: But I look at the purpose  
6 of the expert elicitation to meet the numbers in 1.174.

7 MEMBER STETKAR: Well, but it is a  
8 risk-informed application.

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

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

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

25 CHAIRMAN SHACK: That might come up?

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1                   MEMBER STETKAR: That might come up. This  
2 notion of small leaks, the risk-informed justification  
3 being key primarily to large early release versus higher  
4 frequency of undetected small release paths.

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

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

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

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

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

24                  MEMBER RAY: I think the 10-year data is in  
25 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 to  
8 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 aren't  
14 you talking about everything that has gone beyond, that  
15 is extended as a result of the earlier extension before?

16 MEMBER STETKAR: No, just the --

17 MEMBER RAY: Not the 217, though?

18 MEMBER STETKAR: No, just the --

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

21 MEMBER STETKAR: On the 15 years, the ones  
22 that have either gotten a one-time extension and the  
23 extended testing under that extension, or you said three  
24 plants have been approved for 15 years; I doubt any of  
25 those have done it, but maybe they have. How many of

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1 those? You know, this notion of, well, we haven't had  
2 any failures, is it zero out of --

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

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

7 CHAIRMAN SHACK: Coming in.

8 MEMBER STETKAR: I don't know.

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

12 (Laughter.)

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

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

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

23 CHAIRMAN SHACK: Want to come back.

24 MEMBER STETKAR: -- want to come back and  
25 revisit it. So, that is not a clear answer yet, but you

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1 will have one in two weeks.

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

4 MEMBER RAY: Yes.

5 CHAIRMAN SHACK: That seems to be  
6 reasonable.

7 MEMBER STETKAR: I think that sounds best.

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

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

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

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

20 MEMBER RAY: Okay?

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

23 We will leave it, essentially, as it is. We  
24 won't have anything at the October meeting, and we will  
25 make a final decision as to whether we will have a full

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1 Committee presentation at that time. I think the  
2 inclination from the Subcommittee, as you have heard, is  
3 not, but we may get some pushback from our members.

4 MR. RICHARDS: Thank you.

5 CHAIRMAN SHACK: Thank you.

6 (Whereupon, at 10:27 a.m., the meeting was  
7 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

Brian Lee  
NRR/DSS/SCVB

Antonios Zoulis  
NRR/DRA/APOB

## 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.