

Official Transcript of Proceedings
NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
577th Meeting - Open Session

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Thursday, November 4, 2010

Work Order No.: NRC-531

Pages 1-131

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, as reported herein, is a record of the discussions recorded at the meeting.

This transcript has not been reviewed, corrected, and edited, and it may contain inaccuracies.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION

3 + + + + +

4 577TH MEETING

5 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

6 + + + + +

7 OPEN SESSION

8 + + + + +

9 THURSDAY,

10 NOVEMBER 4, 2010

11 + + + + +

12 ROCKVILLE, MARYLAND

13 + + + + +

14 The Advisory Committee convened in Room
15 T2B1 at the Nuclear Regulatory Commission, Two White
16 Flint North, 11545 Rockville Pike, at 8:30 a.m., DR.
17 SAID ABDEL-KHALIK, Chairman, presiding.

18 MEMBERS PRESENT:

19 SAID ABDEL-KHALIK, Chairman

20 J. SAM ARMIJO, Vice Chairman

21 JOHN W. STETKAR, Member-at-Large

22 SANJOY BANERJEE

23 DENNIS C. BLEY

24 MARIO V. BONACA

25 CHARLES H. BROWN, JR.

26 **NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBERS PRESENT (Continued):

2 MICHAEL CORRADINI

3 DANA A. POWERS

4 HAROLD B. RAY

5 JOY REMPE

6 MICHAEL T. RYAN

7 WILLIAM J. SHACK

8 JOHN D. SIEBER

9 DESIGNATED FEDERAL OFFICIAL:

10 CHRISTOPHER BROWN

11 NRC STAFF PRESENT:

12 DAVID ALLEY

13 HANSRAJ ASHAR

14 LEE BANIC

15 GANESH CHERUVENKI

16 ARTHUR CUNANAN

17 PATRICK DONNELLY

18 JOE DONOHUE

19 CLIFFORD DOUTT

20 JERRY DOZIER

21 BARRY ELLIOT

22 BART FU

23 BOB GRAMM

24 DON HABIB

25 MICHELLE HAYES

26 **NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 NRC STAFF PRESENT (Continued):

2 ALLEN HISER

3 BRIAN HOLIAN

4 Y. GENE HSII

5 AMY HULL

6 ATA ISTAR

7 RALPH LANDRY

8 BRYCE LEHMAN

9 SHANLAI LU

10 GREG MAKAR

11 KATY MAKEIG

12 MATTHEW McCONNELL

13 EILEEN McKENNA

14 JOHN McKIRGAN

15 JAMES MEDOFF

16 SEUNG MIN

17 MICHAEL NORATO

18 ERACH PATEL

19 ANDREW PRINARIS

20 DAVID PSTRAK

21 PATRICK RAYNAUD

22 DIEGO SAENZ

23 BOB TRIPATHI

24 RACHEL VAUCHER

25 EMMA WONG

26 **NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 NRC STAFF PRESENT (Continued):

2 WEIDONG WONG

3 ON YEE

4 ALSO PRESENT:

5 TIM ANDREYCHEK, Westinghouse

6 AMY AUGHTMAN, SNC

7 BRAD CARPENTER, Westinghouse

8 JULIE CATALANO, Westinghouse

9 STEVE COLLAS, Westinghouse

10 ED CUMMINS, Westinghouse

11 JULIE KEYS, MEI

12 MEGHAN LESLIE, Westinghouse

13 MIKE MELTON, Westinghouse

14 NIKOLAY PETKOV, Westinghouse

15 GIUSEPPE SCADDOZZO, Ansaldo

16 Nucleare/Westinghouse

17 TIM SCHMIDT, SCE&G

18 TERRY SCHULZ, Westinghouse

19 ROB SISK, Westinghouse

20

21

22

23

24

25

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

TABLE OF CONTENTS

AGENDA ITEM	PAGE
1) Opening Remarks by the ACRS Chairman	7
1.1) Opening statement	7
2) Standard Review Plan for Renewal of Independent Spent Fuel Storage Installation Licenses and Dry Cask Storage System Certificates of Compliance	9
2.1) Remarks by the Subcommittee Chairman	9
2.2) Briefing by and discussions with representatives of the NRC staff	9
3) Draft Final Revision 2 of NUREG-1801 and NUREG-1800	59
3.1) Remarks by the Subcommittee Chairman	60
3.2) Briefing by and discussions with representatives of the NRC staff	61
4) Long-Term Core Cooling Approach for the Revised AP1000 Design	
4.1) Remarks by the Subcommittee Chairman	
4.2) Briefing by and discussions with representatives of the NRC staff and Westinghouse	

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1	TABLE OF CONTENTS (Continued)	
2	AGENDA ITEM (Continued)	PAGE
3	5) Discussion of Topics for Meeting with the	
4	Commission	
5	5.1) Overview	
6	5.2) ABWR Aircraft Impact Assessment	
7	5.3) 10 CFR 50.46(a)	
8	5.4) Mixed Oxide Fuel Fabrication	
9	Facility	
10	5.5) ESBWR - Long-term Core Cooling	
11	5.6) Design Acceptance Criteria	
12	6) Preparation of ACRS Reports	
13	6.1) Standard Review Plan for Renewal of	
14	Independent Spent Fuel Storage	
15	Installation Licenses and Dry Cask	
16	Storage System Certificates of	
17	Compliance	
18	6.2) Draft Final Revision 2 of NUREG-1801	
19	and NUREG-1800	
20	6.3) Long-Term Core Cooling Approach for	
21	the Revised AP1000 Design	
22		
23		
24		
25		

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

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

(8:30 a.m.)

1) OPENING REMARKS BY THE ACRS CHAIRMAN

1.1) OPENING STATEMENT

CHAIR ABDEL-KHALIK: The meeting will now come to order. This is the first day of the 577th meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will consider the following: one, standard review plan for license renewal of independent spent fuel storage installation licenses and dry cask storage system certificates of compliance; two, draft final revision 2 of NUREG-1801, "Generic Aging Lessons Learned Report," and NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants"; three, long-term core cooling approach for the revised AP1000 design; four, discussion of topics for meeting with the Commission; and, five, preparation of ACRS reports.

The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Christopher Brown is the designated federal official for the initial portion of the meeting.

Portions of the session dealing with the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 long-term core cooling approach for the revised AP1000
2 design may be closed to protect information that is
3 proprietary to Westinghouse.

4 We have received no written comments or
5 requests for time to make oral statements from members
6 of the public regarding today's sessions. There will
7 be a phone bridge line. To preclude interruption of
8 the meeting, the phone will be placed in a listen-in
9 mode during the presentations and Committee
10 discussion.

11 A transcript of portions of the meeting is
12 being kept. And it is requested that the speakers use
13 one of the microphones, identify themselves, and speak
14 with sufficient clarity and volume so that they can be
15 readily heard.

16 We will now proceed with the first item on
17 the agenda, "Standard Review Plan for Renewal of
18 Independent Spent Fuel Storage Installation Licenses
19 and Dry Cask Storage System Certificates of
20 Compliance." And Dr. Ryan will lead us through that
21 discussion.

22 MEMBER RYAN: Thank you, Mr. Chairman.

23 2) STANDARD REVIEW PLAN FOR RENEWAL OF
24 INDEPENDENT SPENT FUEL STORAGE INSTALLATION LICENSES
25 AND DRY CASK STORAGE SYSTEM

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 CERTIFICATES OF COMPLIANCE

2 2.1) REMARKS BY THE SUBCOMMITTEE CHAIRMAN

3 MEMBER RYAN: We had I think a very
4 productive subcommittee meeting, which we're going to
5 summarize for you today, but I would like to call on
6 David Pstrak from NMSS to start off our conversation.

7 MR. PSTRAK: Thank you, Dr. Ryan.

8 CHAIR ABDEL-KHALIK: Welcome.

9 2.2) BRIEFING BY AND DISCUSSIONS WITH

10 REPRESENTATIVES OF THE NRC STAFF

11 MR. PSTRAK: My name is David Pstrak. I
12 am a Branch Chief in the Division of Rural Inspections
13 Operations in the Division of Spent Fuel Storage and
14 Transportation. I appreciate the opportunity to be
15 here this morning to make a presentation on
16 NUREG-1927. You already have the title explained to
17 you on the agenda.

18 Just a couple of over-arching opening
19 comments. We in the Division of Spent Fuel Storage
20 and Transportation have a lot of experience in working
21 with the dry cask storage systems and the associated
22 operations of the independent spent fuel storage
23 installations where those systems are actively used.

24 As we go through this presentation, you
25 will note that this is a process-oriented center

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 review plan that provides instructions to staff, who
2 will do reviews for renewals of certificates, a little
3 bit of a different formula than what you would
4 normally see in the standard review plan.

5 We developed this model using an approach
6 that is currently being used in the Office of Nuclear
7 Reactor Regulation for their renewal of operating
8 reactor licenses. So this has a running history, a
9 very successful history, in that regard.

10 Additionally, during the presentation, you
11 will hear that we have already applied this in draft
12 form, this, the applicability of the standard review
13 plan, to current applications that we are currently
14 looking at for renewal and applications that we have
15 renewed. So we have tested the waters with this. It
16 is a good process. And we anticipate certainly in the
17 very near future using this same approach for
18 additional renewals as they come in.

19 We did go out for public comment on this
20 document. And the comments have been assessed, and
21 those comments have been incorporated into the current
22 document that you will be briefed on here in just a
23 moment. And certainly we look forward to your
24 suggestions and recommendations to improve this
25 document as we move forward.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 With that short introduction, I would like
2 to introduce Mr. Geoff Hornseth and Mr. Ata Istar,
3 both of whom are senior reviewers in the Division of
4 Spent Fuel Storage and Transportation. They are
5 co-authors of this NUREG-1927.

6 Thank you.

7 CHAIRMAN ABDEL-KHALIK: Thank you.

8 MR. HORNSETH: Good morning. I'm Geoff
9 Hornseth, senior materials reviewer in the Spent Fuel
10 Storage and Transportation Division.

11 We can go to slide number 2, what we are
12 going to be talking about today. I'm going to go over
13 a short introduction to dry cask storage systems. How
14 many Committee members have visited an independent
15 spent fuel storage installation site? Anybody?

16 (Whereupon, there was a show of hands.)

17 MR. HORNSETH: Oh, that's pretty good.
18 Okay. For the benefit of the few that have not, I'll
19 have just a short discussion of what they look like
20 and so forth. Then we talk a little bit about license
21 renewal background, kind of a short history, and go
22 with some of the technical basis for license renewal.

23 And then at that point, Ata Istar is going to take
24 over and talk about the license renewal process and
25 ongoing activities supporting that activity and do the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 summary.

2 Slide number 3 is some abbreviations that
3 you may find useful later.

4 Slide 4 is a map of the United States with
5 current ISFSIs, independent spent fuel storage
6 installations, -- staff refers to them as ISFSIs --
7 that are in operation or are planned. At the bottom
8 is the ADAMS link if you want to download your own
9 copy of the map.

10 We see this as one certain growth area for
11 the nuclear power industry.

12 (Laughter.)

13 MR. HORNSETH: Okay. Slide number 5,
14 we'll get down to a little bit nitty-gritty. There
15 are basically two types of storage cask designs
16 offered by the three principal vendors in the country.

17 There's a horizontal canister-type design, a
18 horizontal cask. Cask and canister are used
19 interchangeably depending on which vendor you're
20 talking to, then a vertical type. Both types are
21 actively in use and being licensed and relicensed with
22 respect to revisions.

23 The horizontal picture there shows
24 actually two of them inside the storage vault. The
25 canisters just slide in horizontally on rails, and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 then there's a heavy shielded door that closes up the
2 vault.

3 The cooling is an entirely passive system.

4 There are slots in the bottom of the concrete housing
5 that allow cold air in and slots in the top that allow
6 hot air out so it's a natural convection cooling type
7 of system.

8 The vertical cask basically works the same
9 way. It's a passive-type cooling system with air
10 inlets at the bottom, air outlets at the top, natural
11 convection cooling.

12 For these air inlets on both types of
13 designs, there's some kind of a barrier to keep out
14 the animals and debris from blocking the vents. And
15 these are checked on a daily basis to make sure
16 there's no blockage.

17 MEMBER CORRADINI: Is there any
18 instrumentation? I know that you physically go check
19 for birds' nests and all sorts of stuff, but is there
20 instrumentation that measures temperatures to see if
21 there is any sort of issue?

22 MR. HORNSETH: Not at this time. That is
23 an evolving issue that we're in the midst of
24 negotiation with industry to maybe add that in the
25 future.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBER CORRADINI: Okay. All right.

2 MR. HORNSETH: Ata will address that.

3 MEMBER POWERS: Why would you consider
4 that?

5 MR. HORNSETH: As a double check on, you
6 know, predicted curves of heat load decay and also to
7 see. It might give us an indication of if there was
8 something unanticipated occurring.

9 MEMBER POWERS: Yes, but I can hypothesize
10 all kinds of things that might be unanticipated
11 occurring.

12 MR. HORNSETH: Right.

13 MEMBER POWERS: Would you want an
14 instrument for everything I can hypothesize?

15 MEMBER CORRADINI: I was thinking my own
16 personal question was more a temperature excursion to
17 see if there was some sort of measurement so if I
18 would have an indication of an excursion of something
19 that was occurring that I didn't expect.

20 VICE CHAIRMAN ARMIJO: I asked a similar
21 question in the subcommittee meeting.

22 MEMBER CORRADINI: Oh, did you? Okay.

23 VICE CHAIRMAN ARMIJO: And the issue was
24 if you had a very, very small heat -- these are all
25 inerted -- that over a long period of time --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBER CORRADINI: Yes.

2 VICE CHAIRMAN ARMIJO: -- you would
3 exchange heat for air in that container. Is there
4 some simple, inexpensive way to check it periodically?

5 MR. HORNSETH: And that's --

6 VICE CHAIRMAN ARMIJO: I'm going to come
7 up on that.

8 MR. HORNSETH: That question is the one
9 that has driven us to start discussions with industry
10 about possibly adding accurate temperatures --

11 MEMBER CORRADINI: Thank you.

12 MR. HORNSETH: -- instrumentation, but at
13 present there is none except on or there was on some
14 older assemblies way back when everybody was still on
15 the steep part of the learning curve. We're talking
16 20 years ago.

17 MEMBER CORRADINI: Thank you.

18 MEMBER BONACA: Some facilities already
19 have a measurement of temperature.

20 MR. HORNSETH: Very few, --

21 MEMBER BONACA: Very few, but --

22 MR. HORNSETH: -- if any at this point.

23 MEMBER BONACA: Well, I've seen one the
24 other night.

25 MR. HORNSETH: Okay. The next slide,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 number 6, is a photograph of one of the
2 horizontal-type installations. It's currently in use.

3 Slide 7 shows a fairly typical vertical
4 type of facility in use.

5 MEMBER SHACK: And those horizontal casks
6 are how far apart to get air flow between them?

7 MR. HORNSETH: Well, the door on the
8 cover, the cover door, is a little over five feet in
9 diameter. So it looks like there may be --

10 MEMBER SHACK: A foot apart?

11 MR. HORNSETH: A foot apart, yes. It
12 doesn't take much air flow to keep these things cooled
13 to the specifications. You can have a fairly
14 substantial number of the air inlets blocked and you
15 still don't overheat the canister according to the
16 tech specs for the maximum allowable temperature.

17 MEMBER SHACK: I mean, I was thinking in
18 snowfall, how far up is that inlet off the ground?

19 MR. HORNSETH: Some of them are right at
20 ground level, but there is a daily surveillance to
21 ensure that inlets and outlets are not blocked. So if
22 you have a snowfall situation, that will be dealt with
23 as a maintenance activity promptly.

24 MEMBER SHACK: And how long does it take
25 if you do get blocked?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MR. HORNSETH: That is going to vary with
2 design, but the limiting condition for operation is
3 several days.

4 VICE CHAIRMAN ARMIJO: I think you showed
5 us some pictures in the subcommittee of snow had
6 fallen all around these casks. And the dry area that
7 surrounds each, they're so warm that it kind of --

8 MEMBER SHACK: Kind of self-protecting.

9 VICE CHAIRMAN ARMIJO: Self-protecting.

10 MR. HORNSETH: Yes. And that will vary.
11 Yes.

12 MEMBER STETKAR: And if they aren't warm
13 --

14 MR. HORNSETH: Yes. If they're not warm,
15 it sort of doesn't matter. Yes. Just, you know, the
16 heat load on these can vary dramatically. Humboldt
17 Bay has a whopping 50-watt, not kilowatt, watt, heat
18 load for -- of course, it won't snow at Humboldt Bay,
19 but if that were buried in snow, it won't make any
20 difference.

21 Some of the ones that are currently under
22 review or have been recently licensed are licensed for
23 up to 38 kilowatts. And that was certainly not a lot
24 of snow. I wouldn't mind being licensed for one of
25 those things myself so I could heat my house in the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 winter.

2 Okay. Going to slide 8. A little bit of
3 history here. Two thousand one, we saw that VEPCO,
4 Virginia Electric Power Company, their Surry plant
5 license was coming up for the end of the initial
6 20-year license term. And so I drafted the
7 preliminary guidance for license renewal. And I drew
8 upon experience, a number of years' experience, with
9 prior operating plant license renewal and plant life
10 extension studies and things like that.

11 That went out to VEPCO for comment. They
12 commented back. We incorporated the comments as
13 appropriate. And then in 2002, they did make their
14 application for license renewal. With an interesting
15 little regulatory twist on it, they wanted a 40-year
16 exemption, instead of the normal 20-year period.

17 We proceeded with the technical review and
18 held the 40-year exemption in abeyance for a while
19 while we did the technical review. And after the
20 technical review, then we looked at the 40-year
21 exemption request and decided that it was adequately
22 supported.

23 The basic story is -- and I'll come to
24 that in a little detail -- the environment and the
25 stresses and things that these systems see are pretty

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 benign compared to an operating nuclear power plant.
2 So you really don't stress the materials. So they're
3 going to last a good while without any problems.

4 A couple of years later, we had an SRM
5 come down from up on high to approve the 40-year
6 renewal for Surry and also H. B. Robinson, which had
7 submitted fairly soon after Surry.

8 Then in 2006, the Commission directed the
9 staff to proceed with rulemaking since it appeared
10 that 40-year terms would be viable probably across the
11 industry. We don't like regulating by exemption. So
12 it was time to review and potentially change the rule
13 from 20-year license interval to up to 40-year
14 license intervals. So we proceeded with the
15 rulemaking.

16 In the meantime, Oconee plant submitted
17 their renewal request. And Fort St. Vrain ISFSI is
18 in-house right now being reviewed.

19 While that was going on, we drafted the
20 standard review plan which is the topic of today's
21 discussion based upon the preliminary staff guidance
22 that I wrote back in 2001.

23 And then this year, the Commission has
24 approved the Part 72 rulemaking for up to 40-year
25 initial license period and up to 40-year renewal

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 period for these facilities. And the rule will
2 probably become final early next year.

3 Okay. Slide number --

4 MEMBER SHACK: The rule specifies one
5 renewal period?

6 MR. HORNSETH: No, it does not. It just
7 says that renewal may occur for up to 40-year period.

8 There can be multiple renewals. There is no
9 prohibition against that.

10 Okay. Page 9, a little bit of the
11 technical basis for the preliminary guidance that was
12 initially written in now the standard review plan was
13 based very heavily on experience with power plant
14 license renewal.

15 It's almost a case of license renewal is
16 license renewal that all the technical issues are
17 fundamentally the same, you're looking for degradation
18 and things like that. So that was an excellent model
19 to copy from very heavily.

20 The other thing that was a key item, at
21 ISFSIs, you know, we don't have in-service inspections
22 and things like that that you have in an operating
23 power plant, where you unload the reactor vessel and
24 you can look inside it if you want or something like
25 that.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 So there was always a question of, well,
2 in theory, with an inert atmosphere and the
3 temperature conditions and so forth, radiation field,
4 there really shouldn't be any degradation inside one
5 of these canisters over the storage life, but, as a
6 sanity check, we unloaded a storage canister that was
7 out at Idaho National Labs, looked at the inside of
8 the canister, looked at the fuel, pulled the fuel pin,
9 looked at the cladding. And the detailed story of
10 that is in the two NUREGs that are referenced there.

11 The big picture was we found no
12 degradation. Everything was virtually pristine. And
13 that was a sanity check on all the theoretical
14 arguments about, well, there shouldn't be anything
15 happening.

16 So that became a real cornerstone for
17 license renewal because that allowed us to proceed
18 with license renewal without requiring anybody to
19 unload one of these canisters and look inside because
20 that would be, a), pretty burdensome. And the ALARA
21 is a large penalty for having to do that.

22 CHAIRMAN ABDEL-KHALIK: What was the
23 initial heat load per bundle for these casks, for this
24 cask that was open?

25 MR. HORNSETH: I don't know. I would have

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 to look that one up. It was low-burnup fuel. Per
2 bundle? Oh, probably for the total canister, it would
3 probably be under probably the range of 10 or 15
4 kilowatts, not much.

5 CHAIRMAN ABDEL-KHALIK: And this was a 24?

6 MR. HORNSETH: This was -- oh, the number
7 of bundles? Assemblies? Yes, it was probably a 24.
8 Yes. That is something we would have to go back and
9 look up. It's probably reported in the NUREGs.

10 CHAIRMAN ABDEL-KHALIK: Okay.

11 MR. HORNSETH: I don't have that off the
12 top of my head. Sorry about that.

13 The other thing was technical basis was,
14 you know, go back and do a review of the original
15 licensing basis and make sure that all the assumptions
16 and so forth that are built into the original
17 licensing basis are still valid carrying through into
18 the future. So that's an important aspect there, too.

19 Okay. Going into slide 10, the
20 preliminary guidance in the standard review plan is,
21 you know, the key items that were going on there, were
22 review the environment and the potential degradation
23 mechanisms -- and I'll come to those in a minute --
24 review the operational and maintenance history, very
25 important, review time-dependent issues. There's only

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 one that has been identified to date, and that is
2 thermal fatigue of the canister shelf due to diurnal
3 temperature variations.

4 We have also discovered just from looking
5 at those calculations for three or four sites now that
6 out to 100 years, it's still a "No. Never mind. You
7 don't use up enough fatigue life fraction to be of any
8 concern."

9 And then one that I put in initially --
10 and this is, again, a sanity check or, as I like to
11 say, one test is worth 1,000 expert opinions -- a
12 20-year interval, external, external visual
13 examination of the inaccessible areas of a -- we'll
14 call it a lead canister. And you can't see these
15 canisters when they are in service because they are,
16 of course, shielded inside the concrete shields.

17 So the idea is, okay, go inside there with
18 a flexible fiber optic probe and a camera attached to
19 the end. And let's do a visual examination of
20 canister exterior to make sure that all of our
21 assumptions and things are still valid and there are
22 no surprises.

23 This has been done for all of the renewals
24 to date. And there have been no surprises, which is
25 great, but it is, like I indicated, a sanity check on

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 all your --

2 MEMBER SHACK: Has there been anything
3 interesting?

4 MR. HORNSETH: Pardon?

5 MEMBER SHACK: Has there been anything
6 interesting?

7 MR. HORNSETH: No. It has been real
8 boring.

9 (Laughter.)

10 MR. HORNSETH: I'll come back. There is a
11 potential evolving issue that we will touch on later
12 that may give us something of interest to chew on in
13 the future but not right away.

14 So that was one that we insisted that be
15 done. And, again, I will reiterate there is no
16 requirement or identified need at this time for any
17 internal examinations of any canisters.

18 Okay. Going to slide 11, the key renewal
19 issues, well, it's predominately a materials engineers
20 game and predominantly an assessment for material
21 degradation. And those mechanisms are for the
22 canister, of course, corrosion and then thermal
23 fatigue, which is the only time-limited aging
24 mechanism that has been identified. Them, of course,
25 the concrete shielding; cracking/spalling, you know,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 due to weathering. There was a little bit of thermal
2 fatigue that may result in cracking and spalling.

3 The big thing to remember with these dry
4 cask storage systems is they are passive. They are
5 static, no moving parts. Nothing is active, though
6 it's a much simpler situation than it is for an
7 operating power plant.

8 Okay. I said we would get into a little
9 bit of details. Slide 12, the canister exterior
10 environment. Well, it's indoors. It is shielded from
11 direct impingement of precipitation because there
12 cannot be a straight line path from the environment
13 outside to the canister itself just for shielding
14 reasons. So there's no direct path for precipitation
15 to reach inside. So it keeps it dry.

16 Yes, there is a decay heat. And in a
17 couple of slides, I will show you what some of the
18 decay heat curves look like. Basically the amount of
19 decay heat, even for a very densely loaded canister
20 with 38-40 kilowatts load, the canister metal
21 temperature is going to be a maximum -- and this is
22 really pushing it -- 700 degrees, maybe 750
23 Fahrenheit, which is still below the creek regime for
24 the materials. So it's not breathing hard by any
25 stretch of the imagination.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 You get the diurnal and annual temperature
2 changes due to weather, which is a little bit of
3 cycling. And, of course, then there is the dose.

4 The dose is not a life-limiting issue
5 either because we are about six orders of magnitude
6 below what you see in a reactor after 40 years of
7 service there. There your neutron dose might be up
8 around 10²³ neutrons per square centimeter.

9 Dose for roughly 100 years for a canister
10 if you do the calculation will be on an order of 10¹⁴,
11 maybe 10¹⁵ neutron per centimeter. So we're not
12 challenging the materials from the standpoint of
13 neutron embrittlement or radiation embrittlement.
14 It's just too low.

15 Okay. The shield, exterior shield, wall;
16 -- it sees the weather; so you have freeze/thaw issues
17 -- the decay heat, of course; temperature changes, as
18 before; and also the dose. And, again, the dose is
19 not enough to challenge the materials.

20 CHAIRMAN ABDEL-KHALIK: Good. Tom, a
21 question?

22 MEMBER STETKAR: Yes. For renewal, do you
23 ask the licensees to confirm changes or projected
24 changes in weather patterns and things like that as we
25 go along? These things are licensed for 40 years.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 And you said they might be renewed --

2 MR. HORNSETH: Yes, we do.

3 MEMBER STETKAR: -- several times and --

4 MR. HORNSETH: Yes, we do.

5 MEMBER STETKAR: I don't want to bring up
6 issues of climate change so much because those are
7 relatively small, but we learn a lot more about
8 frequencies of severe storms and things like that as
9 we gather more data.

10 So I was curious. Is there a requirement
11 for people to reevaluate since they are exposed to the
12 environment?

13 MR. HORNSETH: Yes, there is.

14 MEMBER STETKAR: Okay.

15 MR. HORNSETH: It's indirect in that they
16 have to go back and look at all of the initial
17 licensing conditions and assumptions. And part of
18 that does involve climate. And it will have minimum
19 temperature, maximum temperature, things like that.
20 And they do have to --

21 MEMBER STETKAR: They basically have to
22 reassert that --

23 MR. HORNSETH: Yes.

24 MEMBER STETKAR: -- those conditions
25 remain valid for --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MR. HORNSETH: That's right.

2 MEMBER STETKAR: -- the extended period?

3 MR. HORNSETH: That's right.

4 MEMBER STETKAR: Thank you. Yes. Thanks.

5 MR. HORNSETH: That's a good question.

6 Okay. Slide 13 and 14 I put in to show
7 you -- 13 is your representative cladding temperature.

8 And, of course, that's the hottest components. The
9 actual canister will probably be 50 degrees less than
10 this.

11 But the point of it is it's showing that
12 the environment gets easier and easier on the
13 materials as time goes on. So we don't have a
14 situation where it's getting worse and worse, it's
15 getting better and better. So that helps the
16 longevity of these things.

17 CHAIRMAN ABDEL-KHALIK: Well, some of the
18 early designs had aluminum conduction elements within
19 them.

20 MR. HORNSETH: Yes.

21 CHAIRMAN ABDEL-KHALIK: And those aluminum
22 conduction elements operated presumably based on
23 calculations at temperatures way above half the
24 melting point of aluminum. Is that a matter of
25 concern?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MR. HORNSETH: It certainly gets scrutiny
2 by me, but because the stresses are so low, the creep
3 calculations have shown that you don't get any
4 significant deformation over time that would cause
5 anything, you know, any adverse effect as far as the
6 heat rejection capability of the canister. So the
7 fact that there's no stress --

8 CHAIRMAN ABDEL-KHALIK: But these things
9 wouldn't slump on their own weight if they are at
10 temperatures very close to their melting point?

11 MR. HORNSETH: Well, they are not close to
12 their melting point.

13 CHAIRMAN ABDEL-KHALIK: Well --

14 MR. HORNSETH: They're possibly in the
15 creep regime, but the deadweight load turns out to be
16 psi, not ksi. Creep perceives as a function of stress
17 to the nth power, where n is typically three or four.
18 So when you're in the creep regime, aluminum may be
19 good for one KSI load, but if you're at a 50 psi load,
20 that sigma to the n power becomes insignificant.

21 VICE CHAIRMAN ARMIJO: Is aluminum still
22 used as structural internals in more modern casks?

23 MR. HORNSETH: There's one unique design
24 that does have structural aluminum in service, but
25 it's an aluminum unlike anything ever seen before.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 It's an oxide dispersion-strengthened material. It's
2 been creep-tested out to 20,000 hours. It has superb
3 performance. Like I said, there is nothing else in
4 the world that's even close to it.

5 VICE CHAIRMAN ARMIJO: Yes. So it's
6 engineered for that particular --

7 MR. HORNSETH: It's engineered for that,
8 yes. With the other applications that you are talking
9 about, the aluminum really is not used as a structural
10 component. It's used for shims or it's used for
11 heat-conducting element, where it only has to support
12 its own weight, no other weight. So the stress is so
13 low that the creep distortion becomes immaterial.

14 VICE CHAIRMAN ARMIJO: Okay.

15 MR. HORNSETH: In the aluminum heat
16 conduction element, they are kind of passed out of
17 favor because the heat loads keep going up, which
18 means the temperature keeps going up. So you see
19 those on older designs with low-burnup cold fuel, but
20 you don't see them too much on more recent designs
21 that we are currently reviewing our licensing.

22 MEMBER BLEY: When you say, "too much,"
23 does that mean you don't see it?

24 MR. HORNSETH: I don't see it at all on
25 the designs that I review, but I can't speak for the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 other two competing designs because I haven't looked
2 at those in a number of years. But the designs that I
3 review by one manufacturer, they've completely
4 eliminated heat-conducting elements unless they're the
5 new super material.

6 MEMBER BLEY: Okay.

7 MR. HORNSETH: Slide 14 shows you the
8 representative dose rate. It's one meter from the
9 fuel. And it follows what everybody should anticipate
10 as a classic continually, asymptotically decaying type
11 of dose rate. So, from that standpoint, our dose rate
12 is continually declining. And, hence, my comment
13 earlier that neutron embrittlement or radiation
14 embrittlement just is not going to occur in these
15 systems.

16 Okay. Page 15, a little summary on our
17 renewal experience to date. And this covers tree
18 ISFSIs that have been relicensed for 40-year renewal
19 and our preliminary conclusions on another renewal
20 that is currently in-house under review.

21 No degradation of the canisters themselves
22 has been observed of any manner, shape, or form.
23 Thermal fatigue of the canister shell is not a
24 limiting issue.

25 The underlying assumptions about the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 operating conditions and so forth have been
2 consistently upheld. So the initial licensing got it
3 right. And the 40-year term has been justified by the
4 technical findings from the first two renewals and
5 then further supported by the third renewal and is
6 proceeding along the same lines with the fourth
7 renewal that is under review right now.

8 And, with that, I will turn it over to Ata
9 Istar to talk about the process.

10 MR. PSTRAK: If there aren't any other
11 questions.

12 VICE CHAIRMAN ARMIJO: Yes. Just is there
13 a routine inspection for cleanliness or housekeeping
14 or pulling the air inlets or something like that?

15 MR. HORNSETH: Yes. There is a daily
16 surveillance to ensure that the air vents are not
17 blocked. That's daily.

18 VICE CHAIRMAN ARMIJO: Okay.

19 MR. HORNSETH: There are periodic just
20 look around at general condition of things, looking
21 for cracks in concrete shields. There are also
22 monthly radiation surveys. These are all tech spec
23 items that are required by the regulations.

24 So they do get -- it's not a situation you
25 put the fuel out there in these things --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 VICE CHAIRMAN ARMIJO: Forget about it.

2 MR. HORNSETH: -- and forget about it.

3 VICE CHAIRMAN ARMIJO: Thank you.

4 MR. HORNSETH: They get a lot of
5 attention.

6 MR. ISTAR: Thank you, Geoff.

7 I am going to go through the structure of
8 the SRP. And, again, the SRP is a process and is
9 based on the preliminary NRC staff guide that was
10 prepared in 2001. And the objective of the SRP is to
11 provide structure and consistency to the renewal
12 process. It also enables staff to review applications
13 in a timely manner and assures that all SSCs in scope
14 are evaluated for their intent and importance to
15 safety functions during the renewal period.

16 There are three sections in the SRP:
17 general information reviews, scoping evaluations, and
18 aging management review. And each section includes
19 the regulatory requirements tied to 10 CFR 72.

20 And also there are flow charts that were
21 provided for the staff in scoping evaluation as well
22 as in the aging management review.

23 We have five appendices included.
24 Appendix A, based on our preliminary reviews of H.B.
25 Robinson, Surry, and Oconee, we found out the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 applicants use a lot of non-quantifiable terms in
2 their SARs we don't want them to use. And we point
3 that to the staff that they should be refrained from.

4 And also we developed a guidance to provide
5 quantitative measures and information, a table that
6 will help the staff when those kinds of terms are
7 used.

8 And in appendix B, C, and D, we picked up
9 some of the important tables that were provided in
10 those SARs as a guidance for the staff. And appendix
11 A is the requirement that we put in for 20-year
12 internal visual inspections for the lead canister and
13 their cask or canisters and their associated support
14 structures in the concrete bunkers.

15 And after the scoping evaluation, you
16 know, identifying the SSCs in scope, the aging
17 management review needs to be performed, which I'm
18 going to get into details in the next slide.

19 And the applicable aging management should
20 be determined. Either it's going to fall under a
21 time-limiting aging analysis or aging management
22 program. And we made this as simple as possible for
23 the staff. I believe it's very simple for the
24 utilities.

25 I was at Calvert Cliffs Monday and Tuesday

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 with their project manager. We went through this
2 process and explained to them, and which they are
3 going to go through for license renewal as well.

4 Going to page number 17, I provide a
5 simple table that was included in the SARs that we
6 reviewed and at the left column list the ACCs in
7 scope. And I gave some examples.

8 During the aging management review, what
9 we were looking for goes to SSCs' intended functions,
10 material environment, and aging effects requiring
11 management. I'll pick up one or two examples.

12 Let's say the first line, concrete above
13 grade, which intended functions are either heat
14 transfer, structural support, or radiation shielding,
15 materials concrete environment is wetter, and the
16 aging effects requiring managing spalling/cracking,
17 changing material properties.

18 And after identification of these, the
19 applicable aging management activity needs to be
20 identified. In this case, site-specific aging
21 management program would be an appropriate one, which
22 I'll go in detail on aging management activities in
23 the next slide.

24 Picking up another one out of this table
25 will be a canister. Canister is one of the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 defense-in-depth boundary conditions, which is, as
2 intended, functions the confinement. Material is
3 stainless steel. Environment is indoor. And thermal
4 fatigue is the aging effects plant management. And,
5 again, as it was picked up from an aging management
6 activity as time-limiting aging analysis.

7 So this kind of helps. This kind of table
8 helps to be able to do a very quick review. And also
9 we encourage the utilities to provide a table similar
10 to this one so it can be reviewed in a timely fashion.

11 Going into page 18 --

12 CHAIRMAN ABDEL-KHALIK: When you talk
13 about canister in this table, you are talking about
14 the external part of the canister, nothing about the
15 internal --

16 MR. ISTAR: Right. They are not
17 accessible at this point.

18 MR. HORNSETH: Well, I think he's speaking
19 of canister here, which would be, yes, the fuel
20 canister inside the concrete shielding.

21 MR. ISTAR: Shielding, yes.

22 CHAIRMAN ABDEL-KHALIK: Right, right,
23 essentially the pressure boundary for the helium,
24 rather than --

25 MR. HORNSETH: Right.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN ABDEL-KHALIK: -- what's inside
2 that cylindrical canister.

3 MR. HORNSETH: Right, the pressure
4 boundary. Yes. Actually, we call it the confinement
5 boundary. We don't really regard it as a pressure
6 boundary per se.

7 MR. ISTAR: Confinement.

8 VICE CHAIRMAN ARMIJO: What's the maximum
9 pressure for your inerting gas?

10 MR. HORNSETH: One of the vendors is using
11 a helium charge up around 60 to 70 psi. Some of the
12 other -- that's for a pretty hot design, 38 kilowatts.
13 Competing designs may be anywhere from zero psi gauge
14 to maybe one atmosphere. And that's about it. That's
15 typical range.

16 MR. ISTAR: Comment?

17 CHAIRMAN ABDEL-KHALIK: The 70 psi is
18 initial room temperature pressure at the time the cask
19 is loaded?

20 MR. HORNSETH: That is the operating
21 temperature at design heat load. That would be the
22 maximum pressure at the design operating temperature.

23 CHAIRMAN ABDEL-KHALIK: Okay.

24 MR. HORNSETH: So yes. It will be less
25 than that as loaded.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 CHAIRMAN ABDEL-KHALIK: Yes.

2 MR. ISTAR: Thank you, Geoff.

3 Going back to the aging managing
4 activities, as I stated earlier, there are two types:
5 time-limited aging analysis and aging management
6 programs. And time-limited aging analysis is either
7 going to be performed by analysis and/or a maintenance
8 activity. We don't have any maintenance activities on
9 these.

10 I think the only thing that we have seen
11 so far is thermal fatigue or DSCs, canisters, that was
12 included in the time-limited analysis qualification,
13 basically what the applicants do, thermal fatigue
14 analysis, for the licensing period. And if the review
15 of the thermal fatigue analysis is acceptable by staff
16 and brought up time period, licensing time period,
17 that would be an acceptable situation for us.

18 And aging management programs are kind of
19 action items. They could be prevention mitigation,
20 condition monitoring, and performance monitoring.
21 Prevention is like concrete and cladding temperature
22 limits, which could be taken out of ACI code or ISG.
23 A limit for the cladding temperatures, we have
24 detailed limitations on the cladding temperatures.

25 Mitigation could be coating on the support

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 structures against corrosion. And some corrective
2 actions could be a good example. Condition monitoring
3 inspection against the lead canister and support
4 structure, remote visual inspections became one of our
5 requirements for the license renewal.

6 Performance monitoring surveillance,
7 currently radiation monitoring and visual inspections
8 of inlets and outlets are the inspections surveillance
9 that the utilities perform.

10 We are currently involved with vendors and
11 utilities through EPRI group work that we would like
12 to get the utilities to install thermocouples at the
13 inlets and outlets for long-term temperature
14 monitoring to verify the trending that we have seen
15 earlier.

16 We currently did those calculations
17 through Sandia Lab. And those are very draft. And we
18 asked them to do it for us. And we want to make sure
19 that those graphs are correct with actual
20 measurements. And we're in the process of still going
21 for discussions. And I'll elaborate that further in
22 the next slide.

23 CHAIRMAN ABDEL-KHALIK: Well, without
24 knowing an actual convection-induced flow rate of the
25 air through the canister, what would the temperatures

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 tell you?

2 MR. ISTAR: I think it would be a good
3 indication of what the temperature reduction for the
4 long-term measurements -- based on the thermal guys
5 that I have been talking to and the vendors, the
6 vendors especially, they are very much interested in
7 that because everything is based on the high-end
8 temperature, all the analysis.

9 It may not be high end. And it may be in
10 the lower end that we -- I mean, we are talking in the
11 long-term storage here. The critical issue comes in
12 where we had the brittle condition of cladding.

13 If you look at the graph, like based on
14 that graph, like in 100 years, we are going to be like
15 100 Centigrade degree level.

16 CHAIRMAN ABDEL-KHALIK: So you are not
17 viewing this as a way of checking possible misloading
18 of a cask?

19 MR. ISTAR: It could be.

20 MR. HORNSETH: It could indicate that,
21 too, yes.

22 MR. ISTAR: It could indicate that, yes.
23 It could indicate it. We are looking for -- I mean,
24 that's one of the limitations. What can we do?
25 Radiation measurements and temperature measurements,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 the cheapest and easiest way.

2 I think, knowing those in real time will
3 be a good thing. You know --

4 MEMBER POWERS: Have you looked --

5 MR. HORNSETH: There's a little bit of a
6 crossover here. We're focused on in discussing
7 license renewal for 20 to 40-year periods. I know the
8 question on a lot of people's minds is, what about all
9 the stuff you are hearing in the newspaper and stuff
10 about, oh, these canisters can last hundreds of years?

11 That's a completely separate issue. And
12 we're really not talking about that. But
13 instrumentation would be useful for us for making
14 assessments against these prognostications about
15 hundreds of year-type storage, which we've not made
16 any technical finding on.

17 CHAIRMAN ABDEL-KHALIK: But the point I
18 was trying to make is that the temperature
19 measurements in and of themselves without the model
20 used in the analysis --

21 MR. HORNSETH: Oh, we have the model.

22 CHAIRMAN ABDEL-KHALIK: -- would not allow
23 you to actually predict whatever the heat load is --

24 MR. HORNSETH: Yes.

25 CHAIRMAN ABDEL-KHALIK: -- because you

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 don't know what the flow rate is.

2 MR. HORNSETH: Well, we do have the model.

3 CHAIRMAN ABDEL-KHALIK: From?

4 MR. HORNSETH: From the initial licensing
5 review --

6 CHAIRMAN ABDEL-KHALIK: Yes.

7 MR. HORNSETH: -- that will indicate the
8 flow rate because they do either two-dimensional or
9 three-dimensional heat transfer assessments. So we
10 have a pretty good idea of what it should be based on
11 that.

12 CHAIRMAN ABDEL-KHALIK: Dr. Powers?

13 MEMBER POWERS: What kind of temperature
14 measurement were you talking about? How would you do
15 it?

16 MR. ISTAR: Again, that's in the
17 preliminary discussions, what are we talking. We
18 don't know what --

19 MEMBER POWERS: Suppose we had the choice
20 of any known temperature measurement device:
21 thermocouples, resistance thermometers, acoustic, any
22 device you can think of. What are the chance of
23 installing that it would give you a reliable signal
24 after 40 years?

25 A thermocouple, the Seebeck coefficient

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 will change over 40 years enough, but it's probably
2 huge compared to your temperature signal here. I
3 can't think of the Seebeck coefficient stable for any
4 thermocouple you are liable to use for 40 years in
5 this kind of environment.

6 MR. ISTAR: Again, the discussions about
7 going on on this.

8 MEMBER POWERS: Yes. It can go on
9 forever.

10 MR. ISTAR: Yes.

11 MEMBER POWERS: We have a lot of
12 experience with putting thermocouples into devices for
13 long periods of time. And we have to change them out
14 all the time.

15 VICE CHAIRMAN ARMIJO: I think that's what
16 they would -- you know, periodic measurements without
17 --

18 PARTICIPANT: It sounds like it's
19 recalibrated, you know, on some kind of schedule.

20 VICE CHAIRMAN ARMIJO: Like a continuous
21 measurement kind of thing.

22 MEMBER POWERS: I mean, they're just -- it
23 seems to me you're looking for something that's just
24 not likely to be very -- I mean, you're more likely to
25 get a false signal than you are to et something wrong

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 here. And so, you know, on the off chance that
2 something might perhaps be wrong, it seems to me I can
3 come up with an awful lot of hypotheses that are just
4 as likely to wrong.

5 The one thing I don't have to hypothesize,
6 your temperature measurements are not going to be very
7 good if I install thermocouples and wait 40 years to
8 take a measurement on them.

9 VICE CHAIRMAN ARMIJO: Yes.

10 MEMBER POWERS: And then if it goes bad,
11 what do you do? I mean, that's even a bigger problem.

12 VICE CHAIRMAN ARMIJO: Yes, yes.

13 MEMBER POWERS: I mean, I think you are
14 just inviting headaches here in a place where you
15 don't have any headaches right now.

16 MR. HORNSETH: Those are good comments.

17 VICE CHAIRMAN ARMIJO: Very good comments.

18 MR. HORNSETH: And we will certainly
19 consider this, yes, definitely consider this.

20 CHAIRMAN ABDEL-KHALIK: But those
21 thermocouples if they were to be installed would be
22 installed at the inlet and exit ports of the shield,
23 right? And, therefore, they are readily accessible.

24 MR. HORNSETH: Those would be accessible,
25 but if we're talking about possibly -- and it would be

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 desirable sometimes to have contact thermocouple on
2 the exterior of the canister. Now, that's a much more
3 difficult area to access and much more problematic.

4 Yes. I mean, that's why we're talking,
5 negotiating with industry about it because you have to
6 -- there has to be a positive net gain for the effort.

7 VICE CHAIRMAN ARMIJO: It's got to be more
8 than a curiosity.

9 MR. HORNSETH: That's right, yes.

10 VICE CHAIRMAN ARMIJO: And where it really
11 makes a big difference is early in the life.

12 MR. HORNSETH: Yes.

13 VICE CHAIRMAN ARMIJO: If you made an
14 error there, --

15 MR. HORNSETH: Yes. That's right.

16 VICE CHAIRMAN ARMIJO: -- that's
17 ridiculous ten years later.

18 MR. HORNSETH: The early stuff is what
19 counts, yes. After so many years, it just doesn't
20 matter because the decay heat load has gone down so
21 much that it doesn't matter any more.

22 MR. ISTAR: Thank you for your comments.
23 I think going to page 19, "Ongoing activities
24 supporting the aging management," NRC is very active.
25 We are very active on this. And I am the chairperson

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 for the EPRI Methodology Committee, including vendors,
2 utilities, and the NRC.

3 There is monthly teleconferencing
4 regarding the aging management issues for future
5 developments that we discussed. And that thermocouple
6 issue -- well, a couple of thermocouple issues. One
7 of them -- and we are hearing from all kind of groups
8 whether it's doable or not and also the early trending
9 graphs that you have seen based on radiation versus
10 time and temperature versus time was the result of
11 that. I think we have tried to refine that.

12 And also staff-sponsored research, coastal
13 marine atmosphere effects, recently published
14 NUREG-1730, Geoff may want to talk about something.
15 He was the budget manager for that.

16 MR. HORNSETH: I can give a little bit of
17 detail. This NUREG was published last week. And so
18 it's hot off the presses. I haven't even had time to
19 read the final version of it. The last time I saw it
20 was still in draft with markups. That's how new it
21 is.

22 This one came about because the question
23 arose, could there be a problem at a coastal marine
24 site with atmospheric salt drift accumulating on the
25 exterior of a stainless steel storage canister and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 causing problems, being specifically pitting and maybe
2 stress corrosion cracking?

3 There is a huge body of literature
4 regarding exposure of various types of stainless
5 steels to a beach type of atmosphere. I am not
6 talking about salt spray blowing on something. This
7 is a little different. This is microscopic salt
8 drift. Okay? It's kind of anhydrous or maybe has a
9 little bit, but it's a little different.

10 There is a classic study of the deposition
11 rates of this material. If you go to the Kennedy
12 Space Flight Center website, there is a classic paper
13 that they published some years ago where they measured
14 it from basically the high water mark on the beach at
15 the launch facility all the way inland to Orlando,
16 Florida. And, of course, it's a classic exponential
17 decay type of thing.

18 That got our attention because if you are
19 located on the coast, the stuff is in the atmosphere.

20 What is happening inside the concrete overpack? We
21 don't know.

22 And then there was no literature to guide
23 us as to what the effects might be at the temperatures
24 that our canisters could operate at. You've got room
25 temperature. Ambient temperature, there's tons of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 literature, but there was nothing at elevated
2 temperature.

3 So we let a contract. The work was done
4 by Southwest Research Institute. And we put samples
5 of three different types of stainless steel, 304, 316,
6 with welds, classic U-bend specimens, in a fog chamber
7 after we had devised a way to coat the specimens with
8 salt but not by painting it on because that created a
9 false positive. We had to do it in a kind of a dry
10 fashion. It was an interesting technique they had to
11 come up with.

12 Then we put the coated specimens in a salt
13 cabinet and exposed them up to a year, pulled
14 specimens every quarter. And the result was
15 interesting. At the 43 degrees C, 100 percent of the
16 samples develop pitting and stress corrosion cracks
17 within a year. At about 75 degrees C and about 120
18 degrees C, none of the samples developed any pitting
19 or any stress corrosion cracks.

20 Now, there is a possibility -- I say this
21 is a possible emerging issue because we had to drive
22 the samples pretty hard. We ran the absolute humidity
23 at a level that is twice what you could ever
24 realistically find in nature because this is an
25 accelerated test.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 We are trying to get results in our
2 lifetime, not in ten lifetimes out. And so we had to
3 run the humidity much higher than is realistic. And
4 to try and get some --

5 CHAIRMAN ABDEL-KHALIK: What do you mean
6 by that? I mean, does that mean you ran the tests at
7 higher air temperatures?

8 MR. HORNSETH: The temperatures were run
9 at very high humidity, absolute humidity. And the air
10 temperature in the chamber was also elevated so we
11 weren't chilling the samples. All right?

12 And what we were trying to do was we were
13 trying to drive the deposited salts, which was we had
14 synthetic and natural sea water salts. We were trying
15 to get the salts to deliquesce, which is absorb
16 moisture from the air and form a salt solution on the
17 surface of the samples. That did occur for the
18 43-degree C samples. It did not occur for the samples
19 that were operating at the higher temperature.

20 You know, we are trying to force
21 deliquescence to see would it occur. And we did force
22 it to occur. But the question now arises, is that a
23 false positive because we were forced to run the
24 humidity at such a high absolute level that we may
25 have caused it inadvertently because we were trying to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 cause deliquescence so we could see what the effect of
2 the salt solution was.

3 You know, would it deliquesce and then dry
4 out right away because of the heating effect -- the
5 drying out is called efflorescence -- or would the
6 water-salt solution stay on there long enough to have
7 an adverse effect? Well, the answer was, yeah, it
8 deliquesced. It stayed on there long enough to have
9 an adverse effect on the material.

10 CHAIRMAN ABDEL-KHALIK: The maximum you
11 could run at is 100 percent relative humidity.

12 MR. HORNSETH: Yes.

13 CHAIRMAN ABDEL-KHALIK: So for those 43
14 degrees C surface temperatures, what was the air
15 temperature?

16 MR. HORNSETH: I don't remember that
17 number right now. The air temperature -- my
18 recollection, the air temperature was a little bit
19 below 43 C.

20 MEMBER SIEBER: Yes. It can't be higher.

21 VICE CHAIRMAN ARMIJO: It would have to
22 be. It would be --

23 MR. HORNSETH: Yes. Otherwise we would be
24 heating the samples, yes, because there was an issue
25 about thermal downshocking and stuff like that and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 causing condensation.

2 MEMBER SIEBER: It would be within a
3 couple of degrees.

4 MR. HORNSETH: So it was below that, but I
5 don't recall the temperature right now.

6 VICE CHAIRMAN ARMIJO: So this is really
7 ongoing research to see if there's a --

8 MR. HORNSETH: This is ongoing, yes. And
9 at this point, we have established, okay, what
10 happens. And so now we are in the midst of
11 discussions with industry. They're going to review
12 this report and respond to us with either a decision
13 that, "Well, we think there needs to be more research"
14 or "We'll go out and take a look inside some of these
15 canisters and see if -- what's going on" or whatever
16 they decide to do. There is a myriad of possibilities
17 of what you could do to go further on this to see if
18 the problem does exist and if it is going to be a
19 problem for us.

20 I mean, one solution is you stick a fire
21 hose in the outlet once a year, and we'll hose the
22 thing down if you have accumulation.

23 Now, we know from the Kennedy Space Flight
24 Center paper that if you have a sample that's in a
25 shielded environment; in other words, you just put a

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 little roof over it.

2 The deposition rate from the salt drift
3 gets cut by about a factor of ten or more. Well,
4 these things not only have a roof on them, but there's
5 no direct line-of-sight path from the exterior. So we
6 anticipate the deposition rate if there even is one is
7 going to be quite, quite low.

8 So, like I say, this is an ongoing
9 activity. It's still kind of in its rudimentary
10 stages. I'm sorry I can't answer the question about
11 what our air temperature was in the fog chamber. But,
12 you know, it's an evolving thing that we're looking
13 at. It is an evolving thing that we are looking at to
14 see if there is an issue here that we have to address.

15 MEMBER SIEBER: I take it that NUREG is in
16 ADAMS?

17 MR. HORNSETH: Yes. Chris Brown has --

18 MEMBER SIEBER: Maybe during the break, we
19 can --

20 MR. HORNSETH: -- the link for us.

21 MEMBER SIEBER: -- look at the Kennedy
22 Space Flight Center. I would like to download that
23 paper.

24 MR. HORNSETH: Yes.

25 MEMBER SHACK: Jack, I have got them.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 I'll send them to you.

2 MEMBER SIEBER: What?

3 MEMBER SHACK: I'll send them to you. I
4 have them.

5 MEMBER SIEBER: Oh, you do?

6 MEMBER SHACK: Yes.

7 MEMBER SIEBER: Great. Thanks.

8 MEMBER SHACK: I'll send them around to
9 everybody.

10 MEMBER SIEBER: I'll wait for it
11 momentarily.

12 MR. ISTAR: Going back to --

13 CHAIRMAN ABDEL-KHALIK: I was just
14 wondering of any of these activities supporting aging
15 management are aimed at producing a document similar
16 to GALL that is used for license renewal.

17 MR. ISTAR: I think we are going to make
18 the SRP a leading document --

19 CHAIRMAN ABDEL-KHALIK: Yes. That's --

20 MR. ISTAR: -- as we learn more about from
21 the industry and anyone in research. And we are going
22 to revise this report.

23 It could develop to be a report like GALL,
24 but this is the first cut and, again, for the staff
25 used to review the license renewal applications, SARs,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 safety analysis reports, that is provided by
2 utilities.

3 Right. I am going back to page 19. The
4 last bullet is "The applicant may provide new data
5 demonstrating DCSS performance." I am just going to
6 repeat myself. We like this standard review plan as a
7 living document as we learn more about what is going
8 on. And NRC and EPRI and other vendors are proactive
9 with workgroups that we are in. And we would like to
10 revise it as we learn new mechanisms and new
11 information that needs to be incorporated in this SRP.

12 Going to page --

13 VICE CHAIRMAN ARMIJO: Could we go back?
14 I just thought of something that you're talking about,
15 that salt deposition, initial salt deposition. If in
16 the mitigating actions that someone coming in for a
17 renewal -- let's say they were a seawater coastal site
18 and they had stainless steel canisters. If they came
19 to you and said, "Well, we have been hearing about
20 this potential salt stuff. And what we are going to
21 do is part of our program. We are going to wash down
22 the canisters once a year," would you respond
23 positively or negatively? Could you be doing more
24 harm than good? You know, are we in that stage or
25 would you be "Okay. Let's do it," you know?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MR. HORNSETH: We would look at it. The
2 first thing would come to mind was I would talk to the
3 thermal people and say, "All right. Let's look at the
4 thermal fatigue issues."

5 VICE CHAIRMAN ARMIJO: Okay. You know, I
6 can see a guy saying, "Okay. This could be a creeping
7 problem."

8 MR. HORNSETH: Yes.

9 VICE CHAIRMAN ARMIJO: "It could creep up
10 on me. It could be ten years before the research is
11 done. And I did nothing waiting for that" or "I can
12 take some actions now that are hopefully harmless. We
13 could do some good."

14 MEMBER POWERS: Sam, suppose you did what
15 they --

16 VICE CHAIRMAN ARMIJO: I'm just wondering
17 they --

18 MEMBER POWERS: Yes. And I am wondering
19 about the efficacy of the mitigation. Suppose I did
20 stick my garden hose in there and sprayed everything
21 down.

22 MR. HORNSETH: Yes.

23 MEMBER POWERS: I may just move my problem
24 from the surface into the crevices and things that
25 don't get hosed down that much.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MR. HORNSETH: Yes, right.

2 MEMBER POWERS: And life becomes much
3 worse for me there.

4 MR. HORNSETH: Yes.

5 MEMBER POWERS: I mean --

6 VICE CHAIRMAN ARMIJO: I'm presuming this
7 thing will dry itself off.

8 MEMBER POWERS: The problem --

9 VICE CHAIRMAN ARMIJO: Well, that's what
10 you've got to think about, yes.

11 MEMBER POWERS: The problem is one that's
12 driven by the solubility of salt in water. Okay? And
13 the fact is that the salt does deliquesce. And worse
14 than that is it does it episodically.

15 First, it deliquesces. then it
16 effloresces. And then it deliquesces the next
17 evening. Then you get this cycling thing where your
18 chemistry is going into the realms that are difficult
19 for people to take long-term.

20 VICE CHAIRMAN ARMIJO: Yes, yes.

21 MEMBER POWERS: I mean, you probably know
22 more about this than I do.

23 VICE CHAIRMAN ARMIJO: I get salt on my
24 car, I wash the hell out of it.

25 (Laughter.)

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBER POWERS: The trouble is that, you
2 know, any kind of simplistic solution to this, the
3 garden hose up the vent and things like that, it is
4 going to not wash the part that is probably most
5 vulnerable to attack.

6 VICE CHAIRMAN ARMIJO: Well, it would be
7 design-specific. You have to look at those things
8 like crevices and stuff like that.

9 I mean, I just hate to see a problem creep
10 up on the industry without any --

11 MEMBER POWERS: I think they are doing the
12 right thing here. I mean, one of the problems that I
13 would pursue if I were the industry and you confronted
14 me with this and I thought it was a credible attack --
15 and I think what you have done in accelerated aging is
16 the right way to go screen this problem, then worry
17 about --

18 MR. HORNSETH: Yes.

19 MEMBER POWERS: -- whether the
20 acceleration caused the problem or not.

21 MR. HORNSETH: Right.

22 MEMBER POWERS: After you find out that
23 there is indeed a problem, then --

24 MR. HORNSETH: Yes. I mean, I welcome
25 industry to challenge this report.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBER POWERS: Yes. I mean, it's --

2 MR. HORNSETH: We are well-aware that
3 there are potentially some weaknesses and it may be a
4 potential false positive. And that's fine.

5 MEMBER POWERS: The easiest thing for them
6 to do is as they evolve when they think about coastal
7 sites where this is a problem -- and, trust me, when
8 you live next to the coast, this is a problem --

9 MR. HORNSETH: Yes. Okay.

10 MEMBER POWERS: -- is to switch alloys and
11 get away from the classic stainless steels to those
12 that are immune.

13 MR. HORNSETH: That's right. And that's
14 another potential solution, such a myriad of potential
15 solutions that we decided that being -- you know,
16 making the decision was not appropriate.

17 MEMBER POWERS: You don't want to
18 prescribe the solution,

19 MR. HORNSETH: No, we do not. Then it's
20 up to industry to come on --

21 MEMBER POWERS: Let the corrosion engineer
22 handle this. He's better at it than we are.

23 MR. ISTAR: Okay. Thank you. I am going
24 to the last page, which is a summary, "Preliminary
25 guidance 2001 successfully applied to three ISFSI

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 renewals."

2 And preliminary guidance is the basis for
3 the SRP. SRP provides structure and consistency to
4 the technical review process. SRP identifies core
5 technical aging issues. SRP incorporated public
6 comments. SRP is concurrent with the 10 CFR Part 72
7 final rule. And staff is proactive with research or
8 industry, as I indicated earlier.

9 For that, I conclude my presentation. And
10 thank you very much.

11 MEMBER RYAN: Mr. Chairman, any other
12 questions from members or comments?

13 (No response.)

14 MEMBER RYAN: Okay. We have a lot
15 prepared, I think, for the subcommittee's
16 recommendations and the full Committee to go ahead and
17 issue this guidance. So we will take that up later in
18 letter writing.

19 CHAIRMAN ABDEL-KHALIK: Okay.

20 MEMBER SIEBER: It's handed out already.

21 MEMBER RYAN: And I sent out the --

22 MEMBER SIEBER: The draft.

23 MEMBER RYAN: -- the NASA salt reports and
24 addendums to every member and to Chris as well.

25 CHAIRMAN ABDEL-KHALIK: Thank you.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBER RYAN: So you have that you can
2 follow.

3 Anything else?

4 (No response.)

5 MEMBER RYAN: All right. Gentlemen, thank
6 you very much.

7 MR. HORNSETH: Thank you.

8 MEMBER RYAN: It was an informative
9 discussion, as was the subcommittee meeting. Thank
10 you very much.

11 CHAIRMAN ABDEL-KHALIK: At this time we
12 will go off the record.

13 (Whereupon, the foregoing matter went off
14 the record at 9:35 a.m. and went back on the record at
15 10:15 a.m.)

16 CHAIRMAN ABDEL-KHALIK: At this time we
17 will get to item number 3 on the agenda, draft final
18 revision 2 of NUREG-1801, "General Aging Lessons
19 Learned Report," and NUREG-1800, "Standard Review Plan
20 for Review of License Renewal Applications for Nuclear
21 Power Plants." And Dr. Bonaca will lead us through
22 that discussion.

23 MEMBER BONACA: Thank you, Mr. Chairman.

24 3) DRAFT FINAL REVISION 2 OF

25 NUREG-1801 AND NUREG-1800

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 3.1) REMARKS BY THE SUBCOMMITTEE CHAIRMAN

2 MEMBER BONACA: The GALL report, which
3 formed the SRP, NUREG-1800 and NUREG-1801, were issued
4 in 2001. And they have been really the reference
5 documents for technical support of license renewal
6 program.

7 Aging lessons learned from the review of
8 NARA and the operating experience, the two documents
9 were updated in 2005. And we as the ACRS commented on
10 that and supported the issuance.

11 Over the past five years, there have been
12 significant changes that have occurred in operating
13 experience. And so we have in front of us now another
14 update.

15 And we turn to Mr. Holian to introduce
16 speakers here.

17 MR. HOLIAN: Good. Good. Thank you, Dr.
18 Bonaca and Chairman. Thank you.

19 3.2) BRIEFING BY AND DISCUSSIONS WITH
20 REPRESENTATIVES OF THE NRC STAFF

21 MR. HOLIAN: It is our pleasure to be here
22 again before the full Committee on the GALL update.
23 We had a very good subcommittee meeting several weeks
24 ago. And we are glad to be back.

25 I would just like to do brief

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 introductions. And then I will turn it over to the
2 staff. Up at the table is Mr. Jerry Dozier. He's a
3 Branch Chief on the Technical Branch, one of three
4 technical branches in the Division of License Renewal.

5 He was here for the last GALL update. We
6 pulled him kind of out of the line organization. And
7 he has been able to concentrate, really, for the last
8 six months on this rev. 2, GALL update. So that has
9 been a help for us as it has been an awfully big
10 project.

11 Also up there now is Bob Gramm, a senior
12 reviewer in License Renewal and a long-time NRR
13 technical reviewer. Bob has also had the lead on this
14 project, which is multi-discipline teams through all
15 of NRR and other organizations.

16 With that, I want to introduce, to my
17 left, Ms. Amy Hull. Amy has also worked on the
18 previous GALL update. She is in research and provides
19 a lot of input from that organization to our update.

20 We had a good subcommittee, and we will
21 talk a little bit about that. I am the presenters
22 will. It will be the presenters will come up and some
23 of the technical areas. And Jerry will introduce them
24 when they come up.

25 One item in particular we think we're very

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 proud of is the buried piping improvements that we
2 have made on the revised GALL. The subcommittee
3 picked at us a little bit for small bore piping not
4 being as I'll say descriptive or as logical or pick a
5 couple of words as the buried piping.

6 We took it to heart. We made a couple of
7 improvements in that since this subcommittee. Part of
8 that issue is that small bore piping the Committee
9 probably realizes from the last four or five months of
10 license renewal meetings that have come through, that
11 has been more of an evolving issue a little bit on
12 plant. And you get a wider variety maybe in the op.
13 experience, but we think we have a good solution to
14 that also.

15 The last item I would like to mention is
16 NRR and NRC just finished the International Regulatory
17 Review Service team that was here for a couple of
18 weeks. I don't know how much the Committee has heard.

19 I am sure there will be more briefings review on the
20 results of that. It is a very successful mission
21 here. The report, draft report, is still to come out
22 in a few weeks.

23 One of the items they looked at hard is
24 license renewal. You know, they always are comparing
25 to their periodic safety review process in European

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 countries. But one of the items that was a good
2 practice was the GALL issue itself. And they're aware
3 of it. They use it over there. And they have also
4 started an international GALL That we are helping them
5 with. So I just wanted to highlight that also.

6 I know the ACRS themselves have been a
7 push behind the GALL and a help to us on that. So I
8 wanted to highlight that.

9 With that, I will turn it over to Jerry
10 Dozier.

11 MR. DOZIER: Good morning. As Brian said,
12 I am Branch Chief of the Aging Management of Reactor
13 Systems and Guidance Update Branch.

14 We think the subcommittee actually -- when
15 they came, they provided some good suggestions. We
16 did take those to heart, as Brian had indicated. One
17 of those issues was in the small bore piping area. We
18 have provided that back to the ACRS.

19 And I want to thank a lot of the people
20 that have been part of this guidance update. Bob and
21 I are here in the front, but there were so many inputs
22 into this. There were over 120. And Bob will get
23 into this in the presentation, but we had over 120
24 people that were involved with this GALL update from
25 research, from NRR, and our contractors, the national

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 labs. So we are just one showing, but it was a lot of
2 people behind this effort.

3 So, with that, I will turn it over to Bob
4 Gramm.

5 MR. GRAMM: Thank you, Jerry.

6 MR. HOLIAN: Hey, Bob. If I can just
7 briefly interrupt again? I forgot one introduction.
8 Just in the audience there is Julie Keys from NEI.
9 And NEI has taken a lead role in kind of organizing
10 the industry response to this. And we mention that in
11 the subcommittee, and I just wanted to mention it
12 again at the full Committee.

13 They have worked on Bob had mentioned, you
14 know, many of the technical meetings we have had. So
15 I wanted to highlight that. Thank you.

16 MR. GRAMM: Good morning, Mr. Chairman.
17 We are very happy to be here today to talk about the
18 two draft documents that have been basically the
19 fruition of a year and a half's worth of work on the
20 part of many, many staff members, as Jerry indicated,
21 from across multiple headquarters organizations and
22 regional staff.

23 We are going to preview some of the major
24 changes that were made in the document. There was a
25 multitude of changes. We can't go into all of the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 details because we don't have enough time, but we will
2 drill down in specific topic areas here. And we will
3 be joined by other presenters as we delve into the
4 electrical, structural, and mechanical facets.

5 And so these are the line items that we
6 will be discussing. And we will get some feedback on
7 the explicit changes we make in response to the staff
8 or the subcommittee comments that we received earlier.

9 We formed our groupings of staff personnel
10 into what we call expert panels. So we took our
11 subject matter experts from across the organization
12 and really brought to bear the best expertise that we
13 could as part of this update.

14 And then we took these panels. And we
15 looked at the AMP content. We focused on the aging
16 management programs in the documents to identify which
17 changes were appropriate to make given the intervening
18 five years of experience and lessons learned. And so
19 that was the principal focus of the effort.

20 As Brian had indicated, we had extensive
21 interaction with our external stakeholders. During
22 2009, the industry had proposed a number of comments
23 and suggested changes to the documents to us. So we
24 took those into consideration into some early drafts
25 we published for interactions.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 We held two multi-day workshops that
2 provided a very, very conducive forum for a
3 give-and-take interaction between ourselves and our
4 stakeholders. So we could explain the changes that we
5 were proposing to make and the staff's thoughts behind
6 those changes and the industry could provide their
7 verbal comments in reaction to the changes.

8 We had a formal comment period that lasted
9 for 45 days. And we received about ten letters from a
10 variety of organizations, both industry, PWR owners'
11 group, and other interested parties, as well as public
12 stakeholders, who had an interest in the changes that
13 were being made.

14 So it has been a very open and transparent
15 process. And we are very appreciative of the
16 constructive comments we received from external
17 parties because that did give us food for thought and
18 we incorporated many of the changes that were
19 suggested. We felt they had a sound basis and were
20 appropriate to do so.

21 Finally, we had several focus meetings on
22 the topic of buried piping. That sparked a
23 considerable amount of commentary. And so we broke
24 that out as a separate topic and had several telephone
25 conferences and public meetings where those proposed

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 changes were discussed.

2 We will be putting together a NUREG that
3 summarizes the public comments and the bases for those
4 changes that we made in response to the comments in
5 our evaluation. And that will basically form a third
6 document in this set.

7 It is not a guidance document. It is a
8 knowledge management transfer document. And that will
9 come out approximately the same time that we propose
10 to issue the GALL and the SRP. But it will follow
11 somewhat. And, again, that is a tool that will be
12 used.

13 As Dr. Bonaca indicated, we looked
14 extensively at operating experience. This included
15 both foreign and domestic. Searches were made of
16 licensee event reports. We interrogated the
17 international databases for failures that have
18 occurred in passive components. And there were a
19 couple of line item changes that we made in response
20 to the identification of that information as well as
21 going through each aging management program.

22 We would pull in generic communications or
23 the relevance of the topic and address and fine-tune
24 the aging management review line items as well as the
25 AMP content in response to that operating experience

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 that has occurred.

2 There were some new programs that were
3 identified, primarily in the area of buried piping,
4 for example. Many of the changes were driven by
5 recent operating experience. And Dave Alley will talk
6 about that later on.

7 As Brian indicated, we looked at
8 precedents from recent license review applications as
9 well as our safety evaluation reports to reflect those
10 changes of staff position that have occurred since the
11 last revision of the GALL report.

12 We integrated staff guidance documents,
13 so-called ISGs, that have been promulgated in the
14 interim. And we'll talk about a couple of specific
15 examples of those.

16 We believe we streamlined the documents.
17 We consolidated what were two GALL reports into a
18 single volume and migrated the information so that it
19 is a more seamless movement for people to go from the
20 standard review plan and use the GALL report. So we
21 believe we have made that a much more user-friendly
22 document by consolidating.

23 We looked at the template that defines the
24 content for the ten elements of a typical aging
25 management program. And that was refined and then

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 taken out into the AMP content. And all of that was
2 harmonized with our new template.

3 So there were extensive rewrites for many
4 of the aging management programs, where they did not
5 previously follow a ten-element program. And they
6 have been reformatted to do so. And we have done that
7 across the board for all the aging management
8 programs.

9 There were changes made in the GALL report
10 to reflect with greater clarity what additions and
11 addenda of ASME code documents are available for use
12 until we have expanded that definition and made moving
13 forward in time with changes in 50.55(a). So it's no
14 longer a static definition. It migrates with further
15 Newark staff endorsements of later code additions. So
16 that is an improvement that we made.

17 We have also added some additional
18 guidance in the document to reflect use of later codes
19 and standards and other industry documents that are
20 referenced and where that can be appropriate to do so,
21 rather than specifying a specific year of an EPRI
22 standard.

23 In many cases, further evaluation topics
24 have been found to be not necessary. We have either
25 expanded information within each aging management

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 program as appropriate so we no longer need a further
2 evaluation or with the passage of time, we found that
3 our AMPs -- we have confirmed that they are adequate.

4 And so that is not necessary.

5 So in a fair number of instances, the
6 licenses will now refer to a specific aging management
7 program. And the necessity of further evaluation is
8 no longer required.

9 And we also found a few cases where there
10 was content in the aging management program. So it
11 was not related to passive component aging
12 degradation. This is where some things in fuel oil
13 and lube oil operational testing programs for
14 contaminants that affect active equipment had slipped
15 into the AMP content. And so we specifically drew
16 that out.

17 Now, that is not to say that licensees
18 don't have to do it. It is simply not part of the
19 aging management program. It's not relevant.

20 I am now going to invite Cliff Doutt and
21 Matt McConnell to the table. And they are going to
22 get into more specifics on changes we made in the
23 electrical arena and specifically on the topic of
24 submerged tables.

25 MR. DOUTT: Good morning. Cliff Doutt

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 with DLR. I am just going to go through some major
2 changes. The first one is XI.E3, which is
3 inaccessible power cables, not subject to 50.49 EQ
4 requirements. Major change to the scope of work,
5 which was revised to include all inaccessible or
6 underground cables of greater than 400 volts, that was
7 done based on operating experience, results of a
8 generic letter 2007-01, and audit and inspections that
9 have occurred since 2007. And some background from
10 some information notice in 2002 also addressed this
11 issue. So based on failures and things, we expanded
12 the scope.

13 To go with that, we revised the cable
14 testing frequency not to exceed six years. It was
15 previously ten. That is to go along with some
16 operating experience, again from the generic letter.

17 We revised the revised inspection
18 frequency of water collection to be one year. That
19 had to do with some operating experience with going
20 back and looking at one year, going back and thinking
21 full again and some inspections that also talked about
22 that. So we increased that.

23 In addition to that, since there are
24 event-driven occurrences where the one-year periodic
25 inspection may not cover what we like, we also added

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 in the event-driven, which looks for such as rain
2 flooding and manholes. So those are the major
3 changes.

4 Go to the next slide. The next one, E1,
5 the major change for that one, it used to -- I have a
6 reference to sampling. We removed the sampling
7 criteria. If you are looking for an adverse localized
8 environment and you find that you are trying to
9 determine the inaccessible cable condition, you do
10 that by looking at the accessible cables in that area.

11 Basically what was going on already was
12 that those were all being looked at. So we changed,
13 got rid of the sampling. That eliminates what is
14 methodology, what cables to look at, what connections,
15 and how to group them. And that was a major change
16 there. It doesn't really from a practical point of
17 view increase scope of work. It is not that big a
18 change.

19 The other change is in E6. And that just
20 incorporated the ISG-2007-02, which puts a one-time
21 testing, where it used to be periodic. That is based
22 on operating experience, essentially saying that
23 current programs are adequate, there aren't that many
24 failures of connections.

25 One time should confirm that existing

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 programs are okay. However, visual inspections are
2 used as a periodic inspection. If, in fact,
3 plant-specific was different, that would invoke
4 periodic as well or could. So there are options in
5 there. But basically this was done. We were getting
6 exceptions. It eliminates some exceptions we were
7 getting while the ISG was out as obvious. And that's
8 pretty much it.

9 We also got a couple of comments from the
10 ACRS in the subcommittee meeting. One was on the
11 definition of water trees. We fixed that as well. It
12 had "continuous" in the definition. That turned out
13 to be an artifact from version 1, actually. So we
14 fixed that.

15 The other one was a comment on the last
16 paragraph in the descriptions, which was describing
17 why we needed the AMP for that particular component.
18 There were references to either instrumentation or
19 connections or testing, whatever. We made those
20 consistent for E1, E2, and E3. They now read,
21 "consistent with whatever the subject matter of the
22 AMP is."

23 That is the major changes. See if there
24 are any questions.

25 CHAIRMAN ABDEL-KHALIK: Go back to the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 previous slide. You indicate that the cable testing
2 frequency has been revised not to exceed six years.
3 Do we have an agreed-upon testing procedure?

4 MR. DOUTT: There is. That way to answer
5 setup is actually no but with qualifications. We're
6 going through it in the AMP going forward, there are
7 suggested test procedures.

8 One of the changes in this was that most
9 likely one test wouldn't be adequate and that you
10 would probably need a group of tests to determine
11 cable health. So that is the specification. The
12 actual type and methodology are only suggested there.

13 That is to be determined at the time of license
14 extended period of operation, so going forward.

15 Part 50 work, if you want to go into that
16 area, we can. There is work in that area as to what
17 will be done, what an appropriate condition monitoring
18 program is. There is some work on our reg guides and
19 some other things going on in that area.

20 CHAIRMAN ABDEL-KHALIK: Go ahead.

21 MEMBER STETKAR: Cliff, we discussed this
22 a little bit in the subcommittee meeting, but for the
23 benefit of the other members who weren't there, you
24 have expanded the scope now to include cables down to
25 400 volts and remove and 25 percent energize part of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 the time.

2 MR. DOUTT: Right.

3 MEMBER STETKAR: So, in principle, the
4 scope now could be substantially larger than what it
5 was under the GALL report, both in numbers of cables
6 because of the different voltages, and in some
7 conditions because applicants in the past had argued,
8 "Well, certain cables were not energized 25 percent or
9 more of the time. So they were excluded."

10 What feedback have you had from industry
11 in terms of concerns about the expanded scope? Have
12 there been any?

13 MR. DOUTT: There are two parts to that.
14 One is in the current review. What we have done is
15 issued some generic REIs. To ask this question, the
16 scope has not been that large in some -- I mean, it's
17 maybe had 11, maybe got 20.

18 I mean, it's not a huge number. It does
19 add in additional manholes which weren't inspected
20 prior. It does add in additional cables, obviously.
21 In some cases, the manhole also had the same voltage
22 level. So you're essentially from the same place. So
23 at this point it's not an extensive accretion.

24 MEMBER STETKAR: If I hear what you are
25 saying, you have not had any substantial reluctance on

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 the part of the industries. You have said that you
2 worked pretty closely with NEI and other stakeholders.

3 MR. DOUTT: Initially a year and half ago,
4 there was a lot of discussion about increasing the
5 scope and what that would mean as we went forward and
6 based on operating experience. And what we were
7 finding, I think everyone is in agreement that we need
8 to do this.

9 MR. HOLIAN: This is Brian Holian. Just
10 to maybe bring it away from cable specifically but to
11 all of the issues in the GALL, you know, there was
12 maybe a little bit of reluctance from the industry on,
13 Brian, should or, DLR, should license renewal be
14 leading on these issues?

15 And, you know, we want part 50 to lead.
16 And then license renewal should kind of follow along
17 with the GALL, but it doesn't work that way, you know,
18 in reality. And industry understood that. And to,
19 like Barry's piping initiative, that's in with NRR
20 review.

21 There are a lot of things going on there.
22 They have added tanks in there with the revision to
23 that initiative. But here in license renewal, we are
24 issuing licenses for this month, next month, and the
25 GALL is being timed this year. So the right thing to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 do is to lead.

2 So you're going to hear in a minute with
3 one of our staff who actually went to the part 50 side
4 of the house. And he was working for us. And we work
5 with NRR. And we have a good template for them.

6 I will mention one other item, though,
7 which is the timing issue. It bothers industry a
8 little bit that we're trying near the end of the
9 reviews that we have been doing on these in-house
10 plants, we're kind of pushing them to they came in
11 under GALL, rev. 1 and I'm applying some GALL, rev. 2
12 issues. That is fair.

13 We listened to that. We understand that.

14 But, once again, it is the right thing. We have them
15 in-house now. This is not just GALL. It's not just
16 guidance. It's the latest staff positions on these
17 issues. And we haven't really delayed a license yet
18 or anything, but we're causing a little bit of angst
19 on them and their staffs to respond to us on that.

20 MEMBER STETKAR: Okay. Thank you.

21 MEMBER BROWN: I got one. When we did the
22 subcommittee, there were -- when you were doing the
23 buried pipe and underground piping, you had a series
24 of tables, where you described the materials that
25 could constitute the buried pipes, you know, from

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 stainless to titanium, copper, et cetera.

2 And you then listed a set of types of
3 protection, the backfill quality, and then you also
4 went into preventive actions, types of preventive
5 actions. It's tabularized relative to the type of
6 material that you had to deal with.

7 And when you look at the electrical ones,
8 which I did after the meeting, -- excuse me for that
9 -- I know it's just text that says, "Hey, you know, go
10 test them and get some data and look at them," but
11 there's nothing that really addresses the different
12 types of insulation materials. For instance, this
13 would be -- I think it's 11-E1 and 2 primarily.

14 And there are a lot of different
15 variations in cable insulation material, particularly
16 from older ones towards the more newer cables, which
17 could potentially change the review process or the
18 expected action process based on the types of
19 materials that are used.

20 Was that considered at all in terms of
21 like you did for the materials for the pipes? It
22 didn't really address material variations for cables,
23 of which there's considerable change from the '50s to
24 today, for instance, in terms of the insulation types.

25 MR. DOUTT: For E1 and E2, it's generally

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 a visual inspection. So it was along the lines of
2 what you would look at in general for visual
3 inspection.

4 And it's focused on an adverse localized
5 environment.

6 MEMBER BROWN: Okay.

7 MR. DOUTT: So GALL hasn't done that.
8 Where you would see that difference would be in E3
9 with testing. That would obviously be variations on
10 how we had done the cable type in installations.

11 MEMBER BROWN: I might have the wrong E,
12 but --

13 MR. DOUTT: No, but E1/E2 are set up such
14 for visual inspection. And those are attributes from
15 the E. So you are looking for the aging mechanism.
16 You are looking for the aging effects.

17 And that's either from -- it could be more
18 radiation, could be heat, but that is generally what
19 you are looking for there. And it's all-encompassing
20 or bounding, but basically if you were doing
21 thermography or something like that or if you're
22 looking for cracking, it's essentially similar.

23 And usually what happens in those areas,
24 wherever the defining temperatures are, that will
25 define the cable type. So whatever the temperature

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 variation area, there is going to be a bounding cable
2 type for that area. And that will be defined within
3 the AMP within the basis document. We would know what
4 that is. And they have already identified that would
5 be the limiting one to go look for. So that would be
6 defined there.

7 You would look at it from -- you end up
8 looking at it, say, well, this area has this
9 particular environment. What cables are in that area?

10 Find out what those are. And then find out those
11 material types. What's the bounding one you need to
12 worry about or it may be all of them? But then you go
13 look.

14 MEMBER BROWN: But you know that is the
15 type as well. I mean, you know what's the area that
16 it's in, --

17 MR. DOUTT: Right.

18 MEMBER BROWN: -- if it's buried, et
19 cetera, what is the bounding condition. You could
20 have used the same technique, but, instead, you were
21 fairly explicit in the table --

22 MR. DOUTT: Right.

23 MEMBER BROWN: -- in terms of defining
24 types and what the backfill quality with a bunch of
25 notes to go look at and types of protection -- I was

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 just looking for a way to just -- how do you enhance,
2 how do you ensure that you get a good inspection when
3 there are considerable variations relative to what you
4 look for?

5 And I agree if you can go look at the
6 cables specifically and see it where it's accessible,
7 that's one thing. When you have buried cable or --

8 MR. DOUTT: Right.

9 MEMBER BROWN: -- inaccessible, that's
10 another --

11 MR. DOUTT: And if it is E3 and it is
12 buried or inaccessible cable, then that's testing.
13 And that was watering in there, too, but the testing
14 then in that case, cable type just takes test results.

15 And that's --

16 MEMBER BROWN: Which is right now the --

17 MR. DOUTT: It doesn't --

18 MEMBER BROWN: You don't care what the --

19 MR. DOUTT: Right.

20 MEMBER BROWN: You just run some tests,
21 period. If it meets the tests, that's it. You don't
22 worry about the --

23 MEMBER SHACK: Yes. He's suggesting a
24 table that would have those cable types in the tests.

25 MR. DOUTT: Yes. If you did that --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MR. HOLIAN: Go ahead. Yes. I just
2 wanted to -- Brian Holian. It's not a very good
3 comment. I don't know if it's something we could do
4 in the short term, but it would probably go along with
5 coupling. Cabling is another item. I think we did
6 such a good job on the buried piping, you know, start
7 from a blank page. Everybody said, "Now, that is the
8 model for a bunch of areas."

9 PARTICIPANT: That was very good.

10 MR. HOLIAN: And that is a fair comment.
11 You know, it might be GALL, rev. 3 by the time we get
12 there. The experience would also hopefully drive us
13 there.

14 MR. DOUTT: Since we did know the
15 particular tests in the cable type with the AMP going
16 forward in E3 and what will happen, we don't know that
17 specifically. Installation isn't done. The test
18 isn't defined. In fact, going forward, what tests
19 will be run? I don't know. However, I think it's the
20 NUREG-7000 does have insulation types or jacket types
21 in aging mechanism. In fact, there is that type of
22 description in an aging management program going
23 forward, part 50.

24 So there is work going on in that area.
25 We just didn't incorporate in the AMP at this time

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 based on the implementation period.

2 MEMBER BROWN: Just a suggestion to try to
3 get, like Bill mentioned, a better inspection and two
4 more readily identified. What you're dealing with
5 covered the decades and the changes. If the stuff
6 were changed markedly, that's --

7 MR. DOUTT: Right. Well, obviously cable
8 -- you know, that's manufacturing techniques from 1970
9 to 1990, the significant differences and improvements
10 and things like that.

11 MEMBER BROWN: I'm not suggesting you
12 should hold this off.

13 (Laughter.)

14 MEMBER BROWN: You could include a gold
15 standard approach to doing this. It just seems to me
16 something that ought to be considered in terms of
17 something to try to make it a little bit more crisp
18 for the reviewer and enhance your ability to know and
19 make sure the utility or the licensee knows what
20 they're expected to provide.

21 MR. DOUTT: Okay. Appreciate it.

22 MR. GRAMM: Thanks. I'm briefly going to
23 cover the changes made to a number of structural AMPs.
24 In some cases, we changed the inspection frequencies
25 and defined specific intervals; for example, masonry

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 walls, five years of cracking observed or if there's
2 loss of material. We did incorporate an interim staff
3 guidance document for steel containments looking for
4 loss of material in inaccessible areas of the Mark I
5 containments.

6 And we have made some changes for the
7 coatings to make sure that we are looking at the full
8 scope of coatings and accessing those that are coating
9 on concrete as well as coating on metallic inside
10 surfaces so we can look at any potential effects on
11 the loss of some function.

12 We did also incorporate a recent reg guide
13 that came out in October of this year. And so we are
14 trying to keep this current with our guidance
15 documents in this arena, too. So reg guide 1.54,
16 revision 2 is incorporated.

17 So that's just a brief overview of the
18 structural changes. And Hans Ashar is here if you
19 have any particular questions.

20 MEMBER POWERS: Let me ask a question
21 about coatings. On coatings, do we have a useful
22 technique for determining if a coating is adequate
23 beyond visual examination? In other words, is there
24 an instrumental way to go by and check a coating and
25 say, "Yeah. This is pretty good coating and will meet

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 our requirements" or not or do I just use my eyeballs?

2 MR. DOZIER: I think you may be referring
3 to holiday detection. Let Hans answer that.

4 MR. ASHAR: Better people than me are in
5 the audience to answer it, but I will try to answer
6 your question that the reg guide 1.54 and the coating
7 program did both recommend that they should look for
8 the various types of degradation of coating. And
9 since that is being spread out in even the S1, which
10 is the IEEE program, the same thing.

11 The type of degradation they look for is
12 braiding or brazing or come out or there might be some
13 places in the steel membrane. There might be some
14 spot of closure showing up, which may not show up
15 everywhere else. And that way they will detect any
16 defect in the coating. There is a fairly new
17 procedure to visually examine.

18 MEMBER POWERS: I don't know everything
19 about coatings. I don't know very much about
20 coatings. I know how to look at paint, and I know
21 what I look for in paint. I look for bubbling. I
22 look for surface oxidation. I look for crazing. I
23 look hard for alligatoring because I love the term and
24 things like that, but I just look.

25 And, you know, my eyeballs are getting

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 worse with age. And I can't think that I am very
2 reliable that having looked, it may not be that that
3 coating is any good the day after I look; whereas, if
4 I had an instrumental technique, I would at least have
5 the comfort that three significant figures give you on
6 something.

7 MR. DOZIER: Dr. Hiser?

8 DR. HISER: Yes. I'm Allen Hiser,
9 Division of License Renewal.

10 There are some destructive tests that are
11 done with the coating and assessing the condition of
12 it, but that clearly is destructive. Visual is the
13 main technique that is used. The kinds of conditions
14 that you cited, including discoloration, things like
15 that, are the main things that are looked at.

16 There is no quantitative test. Some
17 plants have done pull tests of coatings and found --

18 MEMBER POWERS: I'm sorry?

19 DR. HISER: Pull tests. You attach a --

20 MEMBER POWERS: Got you. I couldn't hear
21 the word.

22 DR. HISER: You attach a dolly to the
23 coating. And then you pull it off and assess the
24 strength for the force that is required to pull the
25 coating. And in some cases, you pull the concrete as

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 well as the coating. So the coatings are very
2 adherent.

3 My understanding from the industry results
4 was that that seemed to validate the visual
5 examinations.

6 MEMBER POWERS: Well, the trouble is that
7 we still have coatings that fall off.

8 DR. HISER: That is correct.

9 MEMBER POWERS: I did ask the Air Force
10 how they decide when to repaint their airplanes. You
11 know, an airplane has got coating on it. And you have
12 to figure out when to repaint it and whatnot.

13 And the guy gave me this hilarious story,
14 went through all of the research they had sponsored at
15 a variety of universities. And he says, "But, in
16 truth, we just look at it."

17 He did, however, send me off to
18 Electricite de France, where a very nice man sent me a
19 set of viewgraphs, which showed that they were trying
20 some infrared techniques and had found that when a
21 carboxylate signal started getting large, that the
22 paint was aging. And I asked him, "What does that
23 mean it's aging? Is it losing adherence?"

24 And he said, "I don't know. All I know is
25 that bad paint has a big carboxylate signal. And good

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 paint has a small carboxylate signal."

2 So I was just asking you guys if you had
3 any answers on the -- I think what you're telling me
4 is that you look at it.

5 MR. ASHAR: Yes. To start with at least,
6 to look for the degradation, it will be the visual
7 examination. And then it defines something that is
8 there to look into.

9 Then they might use some other techniques
10 to figure out as what is the regulation and how much
11 is it affected so far and what they will do in the
12 future. But it will be part of the program.

13 MEMBER POWERS: Do we know when we see
14 paint that is falling off or cracking or crazing or
15 bubbling, especially when it's alligatoring, what is
16 causing the paint to do those things?

17 MR. ASHAR: Let me give you an example of
18 one of the plants in which we have seen a throughwall
19 corrosion of a liner plate in the containment. And
20 that was Beaver Valley.

21 MEMBER POWERS: I am familiar with Beaver
22 Valley. I know Beaver Valley backwards and forwards.

23 MR. ASHAR: Right. So what happened is
24 that they started seeing a very small amount of rust
25 spots. They exploded. They found out that -- they go

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 deeper. And they started finding more and more area
2 which was covered by rusting. And then they found
3 that there was a full hole, about two-inch by
4 three-inch or --

5 MEMBER POWERS: I mean, the only thing
6 that bothers me about that is I walk into any plant,
7 any containment in America. And you give me long
8 enough there. And I don't roast inside. I will
9 eventually find someplace paint is falling off.

10 MEMBER SIEBER: Yes.

11 MEMBER POWERS: And I would hope that's
12 not because the steel underneath of it is corroding.
13 And, in fact, when you pull paint off, you look
14 underneath it. And very seldom is it corroding
15 underneath of the paint and whatnot. Something is
16 causing the paint not to adhere. And I just wondered
17 if we knew.

18 Is there a literature on how paint fails?

19 PARTICIPANT: What about Dr. Alley?

20 DR. ALLEY: It depends on the paint and on
21 the circumstances, of course, but in many instances,
22 the adhesion of paint is more related to the surface
23 preparation that has preceded the application of the
24 paint than anything else. If there is oil or grease
25 on the metal before you put the paint on, it's not

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 going to stick very well.

2 Some of the pull-off tests are designed to
3 measure those sorts of things as well as the adhesion
4 of the paint or the chemistry of the paint.

5 In addition to that, we have to remember
6 that one of the fundamental rules in corrosion is that
7 there is no such thing as a perfect coating. All
8 coatings will have flaws in them, have what in the
9 corrosion world are called holidays.

10 In piping systems, there are detectors
11 called holiday detectors that electrically will
12 identify the locations of these spots. On concrete or
13 on non-conductive surfaces, that opportunity is not
14 available. So the failure of the paint if it wasn't
15 caused by poor preparation may very well be the result
16 of these holidays that exist in the coatings and the
17 ability of the environment to penetrate through these
18 coatings and, therefore, start a delamination process,
19 either by corrosion or by hydrostatic pressure or any
20 number of other possibilities from there.

21 So we have some general ideas as to why
22 this occurs but not necessarily real specifics on any
23 given application without some destructive work.

24 MEMBER SIEBER: In the case of Beaver
25 Valley, it was the liner itself that failed.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBER SHACK: The coating was fine.

2 MEMBER SIEBER: Before the coating failed,
3 there were some things that we learned in the
4 construction of Beaver Valley that the paint was put
5 on as a system, more than one layer of paint.

6 And if you missed one of the under years
7 of paint that applied to the surface coat, it would
8 look the same as though you had done all of the layers
9 perfectly at the place where the underlying coats was
10 either not dense enough or didn't exist at all would
11 show up as a defect later on, which was detectable by
12 visual examination.

13 And so we ended up in the application
14 inspecting after each underlying coat as an approval
15 step before the next layer of coating was applied.
16 And I think in critical areas of nuclear power plants,
17 to my knowledge, the practice had been to apply
18 multi-layer coats to the surface.

19 MR. DOZIER: Especially in the area of
20 service level 1 coatings that were inside containment
21 --

22 MEMBER SIEBER: That's right.

23 MR. DOZIER: -- and basically various NDE
24 techniques that were used for service level 1 coatings
25 included meal thickness gauges to make sure that it

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 was applied to correctly and then, as we have
2 mentioned, the holiday protections, especially for if
3 you wrap things like that -- the reason it is called
4 holiday is because they say the painter was not doing
5 a good job and was on holiday. And so it became the
6 holiday detector. So that was one of the NDE
7 techniques that is sometimes used for coatings.

8 MEMBER SIEBER: And the inspection that
9 takes place after the fact is not an inspection of the
10 entire surface but a spot inspection here and there.
11 And because of the variability in the applying of
12 various layers, you may not always be able to defer
13 continuous integral coating just by examining of a set
14 of samples of locations.

15 MEMBER POWERS: Presumably failure to do
16 the paint properly by omitting something or surface
17 preparation emerges over time. The issue I am
18 wrestling with more is supposed that I did all of the
19 surface preparation correctly, I got my layers of
20 paint down correctly, and now it's aging in service.
21 How do I know? How do I know that, okay, I've got
22 half a useful life out of this paint so that I can go
23 ten more years without inspection or now I had better
24 chip this off and repaint here pretty quick?

25 MR. ASHAR: This happened, you know, at

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 two Mark I containments in which those two
2 containments were because of the zinc sulfide that
3 they used in there, it was protecting the steel. At
4 the same time, it was getting away.

5 So the surface was staying there in those
6 areas. And that's why this is such an extent of
7 corrosion in the torus that we said, "Hey, you had
8 better do some recoating or something. This is not
9 acceptable."

10 And after a number of REIs that we went
11 back and forth, both the applicants agreed that they
12 will be performing a recording of the --

13 MEMBER POWERS: Yes. That's interesting.

14 Do you have some photographs of that?

15 MR. ASHAR: I think we do have it here.

16 MEMBER POWERS: If you do, I would like to
17 look at them.

18 MEMBER STETKAR: There's a video if you
19 want to have a really exciting afternoon.

20 MEMBER SHACK: I still have it on my
21 computer if you want.

22 MEMBER POWERS: Yes. Send it to me.

23 MR. ASHAR: I can send you. I have got
24 some pictures.

25 MEMBER POWERS: That would be useful.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBER BLEY: This whole discussion
2 brought something to mind. And I think I know the
3 answer, but let me ask. As you did this revision to
4 the GALL, was there any effort to look at the new
5 designs that are about to be certified to see if there
6 are AMPs that might not apply to current plants but
7 would apply to the new ones that you would need to
8 incorporate?

9 MR. GRAMM: No. We did not explicitly
10 look at the new reactors as part of this revision to
11 the GALL. So it is focused on the operating fleet.

12 MEMBER BLEY: Okay.

13 MEMBER SHACK: But the reg guide 1.54,
14 rev. 2 does reference essentially modern ASTM
15 standards for coatings, which are basically what are
16 going to be used for the new plants.

17 MEMBER POWERS: You look at the ASTM
18 qualifications. They are formidable, 109 rad doses
19 with high temperature steam and things like that. I
20 mean, they are worried about things that I am not so
21 worried about there.

22 MR. ASHAR: Well, the class one coating
23 has to be qualified against the LOCA temperature and
24 pressures, having tested for that applied. So there
25 are some parameters that it will stay for at least 10

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 years or 15 years or so. But after that, anything can
2 happen.

3 MEMBER POWERS: Yes. I mean, the 109 rad,
4 who came up with that number? I mean, that's a
5 serious -- well, it's 7,000 hours at one megarad.

6 MEMBER BONACA: Okay. We need to move on.

7 MR. GRAMM: Okay. Thank you very much,
8 Hans.

9 We are going to transition into the
10 mechanical areas. I am going to be joined by Dr.
11 Allen Hiser. He is going to discuss the aging
12 management program for class I ASME small bore piping
13 and specifically some changes we are going to make in
14 response to the subcommittee comments.

15 DR. HISER: Good morning. As Bob said, my
16 name is Allen Hiser, senior technical adviser in
17 Division of License Renewal.

18 The small bore piping program has
19 revisions as described on the slide. The first thing
20 that we did to the program description was to make it
21 explicit that socket welds are included in the
22 program. Previously it was worded as welds, and there
23 was confusion as to whether that included both socket
24 welds and butt welds. So we put it as explicitly as
25 in there.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 Program applicability. We came out with
2 three ways to describe how this one-time program is
3 applicable to plants. The first is for those plants
4 who have identified no cracking throughout the
5 lifetime of the plant, the socket welds, butt welds.
6 There have been no failures. Those plants qualify for
7 the one-time inspections.

8 For plants that have had high-cycle
9 fatigue issues that generally occurred early in plant
10 lifetime or soon after plant modifications that
11 indicated the need for additional supports, things
12 like that, and if the plant had those kinds of
13 failures, made design changes to mitigate the loading
14 and subsequently had no failures, they also qualified
15 for this one-time program.

16 For other plants that have had maybe
17 stress corrosion cracking, thermal fatigue, things
18 like that, maybe have had high-cycle fatigue but they
19 didn't make design changes, those would not be covered
20 by this one-time program, but they would be required
21 to have a plant-specific program.

22 And the plant-specific program, right now
23 there is nothing in GALL to address that. That would
24 potentially be something that we would consider as
25 interim staff guidance before the next revision of the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 GALL report.

2 In terms of detection of aging effects,
3 for socket welds, we indicate that a volumetric
4 examination or what is termed an opportunistic,
5 destructive examination is acceptable to assess the
6 condition of the socket weld. For full penetration
7 welds, butt welds, those would be inspected through
8 volumetric examinations.

9 Only we would not anticipate that butt
10 welds would be removed for destructive examination,
11 unlike the socket welds, which if one is replacing
12 valves, things like that, frequently, one ends up
13 harvesting some socket welds as well. And they could
14 be destructively examined.

15 Volumetric exams would be generally
16 performed using techniques that have been demonstrated
17 capable of detecting the aging effects of concern. In
18 the case we're really looking at go/no go tests, do
19 you have degradation or not, there is no need to do an
20 ASME code qualification where one is generally looking
21 at sizing and depth location sorts of characteristics
22 from the qualification. So these would be more go/no
23 go sorts of tests.

24 Now, the next page we didn't have at the
25 subcommittee meeting. We did hear the message very

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 clearly on what the subcommittee was looking for. So
2 this lays out in a little bit of detail. This is not
3 going to be in the GALL report itself, this table, but
4 the information that is in the table is explicitly in
5 the GALL report.

6 So taking maybe the best case scenario on
7 the right-hand side, a plant that has an extensive
8 operating history, in this case we think of that as at
9 least 30 years of operating experience, has had no
10 problems from their small bore piping.

11 We have from our recent reviews determined
12 that if those plants look at a minimum of three
13 percent of the welds with a maximum of ten welds of
14 each type, so in this case if you have butt welds,
15 socket welds, you would be looking at a minimum of
16 three percent of each with a maximum of ten that would
17 be necessary.

18 And these would be focused inspections.
19 These would not be a random selection. It would be a
20 plant looking at the areas that have maybe the highest
21 loads, the worst temperature conditions, things like
22 that that make the most susceptible to degradation.
23 They would be the ones that would be the focus of this
24 examination.

25 This one-time inspection would be within

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 six years of the plant entering the period of extended
2 operation. So it would be inspections from 34 years
3 to 40. We don't want them earlier than that because
4 this would provide a maximum opportunity for the
5 degradation to occur.

6 And in the case for socket welds, we have
7 weighted destructive and volumetric examinations a
8 little bit different because of the greater
9 information one can get from a destructive
10 examination. We say that they have the weight of two
11 volumetric examinations. So if a plant was doing
12 destructive exams only, then, for example, the maximum
13 would be five welds that they would need to look at
14 for each type.

15 For plants that have identified failures,
16 for plants that maybe have had high-cycle fatigue
17 problems that they have mitigated, in that case a
18 population of ten percent of the welds would be
19 considered an acceptable population.

20 Again, this is a targeted, focused
21 examination, not a random process. I think you may
22 have seen 20 percent on the general one-time program.

23 That generally is a fully random exam. This is
24 focused. So we think a reduced population is
25 acceptable.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 The maximum of 25 welds again focuses in
2 on the 90/90 sort of a characteristic with a very
3 large population. The 25 welds gives you an adequate
4 sample. Again, one-time inspection within six years
5 of the PEO and one destructive exam are equivalent to
6 two volumetrics.

7 For other cases, if you had high-cycle
8 fatigue that you have not mitigated or stress
9 corrosion cracking, thermal fatigue, any other
10 degradation, then you would be in a mode of submitting
11 a plant-specific program.

12 VICE CHAIRMAN ARMIJO: Would you consider
13 the use of, let's say, in the BWR hydrogen water
14 chemistry as a form of mitigation for stress corrosion
15 cracking of socket welds or does the better water
16 chemistry really protect those things which are far
17 away and maybe have crevices and things like that or
18 not?

19 DR. HISER: Well, in the case of SCC, in
20 particular, we don't credit any mitigation that may
21 have been performed. Water chemistry likely reduces
22 the propensity for cracking. But if a plant has had
23 stress corrosion cracking, the expectation would be
24 that they would have a plant-specific program. And
25 likely that would be a periodic program.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 VICE CHAIRMAN ARMIJO: So they would be
2 ongoing?

3 DR. HISER: Right. So every ten years or
4 at some other frequency, that's important. Well, you
5 know, the question is, you know, in some cases people
6 have completely replaced their piping systems with
7 better alloys and instituted noble metals and
8 hydrogen. They don't get any credit for that?

9 VICE CHAIRMAN ARMIJO: In particular, with
10 the better material, I think that would likely put
11 them into a position of --

12 MEMBER SHACK: You only get to wait 30
13 years?

14 DR. HISER: Well, maybe in the ten percent
15 range.

16 VICE CHAIRMAN ARMIJO: So you have the
17 flexibility to adjust that --

18 MEMBER SHACK: I assume you're talking
19 about you're only crediting mitigation for high-cycle
20 fatigue; whereas, I guess the thought should be that
21 there could be certain -- you know, maybe you wouldn't
22 credit hydrogen water chemistry by itself as a
23 mitigation thing, but you would certainly credit
24 material and HWC.

25 VICE CHAIRMAN ARMIJO: Hydrogen gets to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 everything. The water gets to everything. But I'm
2 not so sure about socket welds. You've got crevices.

3 And they're far from the main -- you know, there
4 ought to be some credit for things that are proven to
5 be effective.

6 DR. HISER: This is one reason that we
7 didn't want to put this --

8 (Laughter.)

9 DR. HISER: There are many situations like
10 that. Some plants have done destructive exams
11 already. And it's very difficult to try to
12 pigeonhole. But what we found is we went back and
13 looked at the last half dozen to a dozen plants that
14 we have been reviewing. These numbers sort of are
15 consistent with the philosophy that we have spoken of
16 before. This is the philosophy that is really the
17 starting point.

18 Now, if one wanted to propose that they
19 were replaced with enhanced alloys or better water
20 chemistry, clearly that is something that would be
21 within the realm of what we would consider --

22 MR. DOZIER: And actually, for the
23 no-failures, that's really what you see there. When
24 we have a design change, we're looking at that. That
25 is the ultimate renewal. That is when you have made

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 it better, you know, you have corrected the problem
2 and you have made it new. Plus, you have made it
3 better.

4 And we want to credit them. And that is
5 really what we are attempting to do in the no-failures
6 area because, like you said, a lot of those high-cycle
7 fatigue cracks where a long time ago they made design
8 changes, and we want to credit those designs. That
9 was an attempt in this column on the right-hand side.

10 MEMBER SIEBER: I would be cautious about
11 giving credit, though, for changes in chemistry
12 because, you know, if you operate a plant for 15
13 years, there is a water chemistry that is not totally
14 passive in nature, and then you decide to change to a
15 better water chemistry, all the residuals from the
16 original water chemistry are still in all of the
17 purposes and so forth. That effect will last forever
18 as far as --

19 VICE CHAIRMAN ARMIJO: Well, if you have
20 already caused damage, sure, but if you haven't, you
21 know, I think it's like a whole body blood
22 transfusion. At least in the BWR, it's very
23 effective. And there ought to be some credit for that
24 to encourage people to protect their plants with both
25 by environment control and by material control.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 You know, you answered my question. You
2 do take that into consideration?

3 DR. HISER: Yes. And I guess it goes
4 without saying that if plants find degradation from
5 this one-time program, they then become periodic
6 inspection plants or the one-time program no longer
7 applies.

8 CHAIRMAN ABDEL-KHALIK: Ms. Hull?

9 DR. HULL: From a practical point, the two
10 times that we use as line items the 11M-35 one-time
11 inspection, we couple that with M2, water chemistry.
12 Water chemistry does specifically reference hydrogen
13 water chemistry and normal metal additions as well.
14 So they're very complementary.

15 VICE CHAIRMAN ARMIJO: Thank you, Amy.

16 DR. HISER: Thank you.

17 MEMBER STETKAR: I obviously like this.
18 Thanks. I like it in the sense that it inserts a
19 sense of stability. At least applicants now going
20 forward understand some level of expectation and
21 reviewers understand some level of expectation that
22 kind of removes that negotiation.

23 You did mention, though, that this table
24 will not appear in the final version of GALL 2 but
25 that the philosophy will be apparently represented in

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 text.

2 DR. HISER: The numbers will be in GALL.

3 MEMBER STETKAR: The numbers will be in
4 GALL.

5 DR. HISER: Right.

6 MEMBER STETKAR: Okay.

7 DR. HISER: The table is really short-hand
8 and requires description.

9 MEMBER STETKAR: But there are descriptive
10 words.

11 DR. HISER: Absolutely. These numbers are
12 in, will be in the revised GALL AMP along with
13 appropriate description to tell you when each applies.

14 MEMBER STETKAR: Have you revised the text
15 yet to do that?

16 DR. HISER: We have.

17 MR. GRAMM: We do have a mark-up of the
18 text. Now we're --

19 MEMBER STETKAR: You know, I'd certainly
20 like if you have one to get a copy of that, --

21 MEMBER BONACA: Yes.

22 MEMBER STETKAR: -- to take a look at it.

23 MEMBER BONACA: We'll have to make sure
24 that we're reviewing the draft final, that you will
25 have a letter from us.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBER SHACK: Hope Creek's done a lot
2 more work than it had to.

3 MEMBER STETKAR: I think a few people have
4 done more.

5 MEMBER SHACK: That's okay.

6 DR. HISER: And that's correct. Hope
7 Creek, if you will, is 24 percent, instead of 10
8 percent. They're doing 100 percent of their
9 susceptible --

10 MEMBER SHACK: No. Aren't they a more 30
11 years no failures?

12 DR. HISER: No. Hope Creek? They had
13 high failures and recirc ones.

14 MR. DOZIER: For Hope Creek, they had
15 high-cycle fatigue in multiple cases. And they went
16 with a plant-specific periodic program.

17 MEMBER SIEBER: Right.

18 MEMBER SHACK: One percent non-periodic.

19 MEMBER STETKAR: Yes, but it's a
20 plant-specific program they want.

21 MEMBER SHACK: Yes, but it wasn't a
22 plant-specific periodic.

23 MEMBER SIEBER: Right.

24 DR. HISER: We're trying to get
25 clarification on that.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MEMBER SHACK: Oh, I see. You were
2 reading --

3 DR. HISER: We were surprised that they --
4 (Laughter.)

5 DR. HISER: We'll be getting clarification
6 of that prior to the final SER.

7 MEMBER BONACA: Okay.

8 MR. GRAMM: We are going to be joined by
9 Barry Elliot. Barry is going to talk about a new
10 aging management program for GALL, revision 2 for PWR
11 vessel internals.

12 MR. ELLIOT: The PWR Vessel Internals
13 Program is a departure from what was in GALL 2005.
14 GALL 2005, there was just a commitment by the
15 applicants to implement a program and to submit the
16 program for staff review two years before entering the
17 license renewal period.

18 We now after several years of
19 investigation by various owners' groups and materials
20 reliability people at EPRI -- they have come out with
21 a program. They started this investigation in 2002.
22 They submitted a program for staff review in 2009.

23 We expect to have the safety evaluation,
24 draft safety evaluation, out at the end of this year.
25 Final safety evaluation is scheduled for March 31st

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 of 2011.

2 MRP, the AMP is based upon the guidance in
3 MRP-227 and MRP-228. MRP-227 provides the aging
4 effects that needed to be managed or in license
5 renewal period and describes the inspections that need
6 to be performed.

7 MRP-228 describes the inspections and the
8 qualifications that are needed to do the inspections.

9 That's all I have on this slide.

10 The big departure as far as another big
11 departure is since we have a program now, we don't
12 have to wait for the applicants to submit it or future
13 applicants that use GALL 2010 aren't expected to
14 submit their inspection plan for the internals at the
15 time they put in their application.

16 VICE CHAIRMAN ARMIJO: I don't remember --

17 MEMBER BONACA: The question --

18 VICE CHAIRMAN ARMIJO: I'm sorry. Go
19 ahead, Mario.

20 MEMBER BONACA: Yes. The question I have
21 is you have a new problem here. And that is a big
22 enhancement to GALL. But the MRP documents are still
23 under review. So what is the likelihood that there
24 will be significant changes to this problem due to the
25 review ongoing right now.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MR. ELLIOT: Okay. First of all, I think
2 there will be changes. And the way we are
3 implementing those changes is, of course, through the
4 safety evaluation process and also through the AMP.
5 The AMP contains a requirement that we put in that
6 they have to implement any plant-specific action items
7 that we put in the safety evaluation. That would be
8 in the AMP.

9 The second thing is, as you see, we are
10 reviewing the inspection plans. So when people are
11 required to review the inspection plans, we are going
12 to be out looking to see they implement all of the
13 plant-specific action items that we expected them to
14 do as part of the plan. And that is the process.

15 I would say that there is one more item.
16 And you should know about this. Industry is
17 implementing this program by themselves.

18 MEMBER BONACA: Sure.

19 MR. ELLIOT: They are implementing it
20 through the NEI 0308 program. The inspections are
21 defined by MRP-227 as a needed program, which means
22 they are expected to implement the program, but they
23 could have deviations.

24 The deviations would be reviewed through
25 their NEI-0308 process. If they have deviations, it

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 should show up in the plan. And we at the NRC should
2 be able to review that.

3 MEMBER BONACA: Okay.

4 MR. ELLIOT: Now, there is a hole in the
5 thing. I just wanted to tell you. And there is
6 always a hole. Some of these plants go back to 1999,
7 early, you know, the first couple that we reviewed.

8 Some of them don't have a requirement for
9 submitting the plan. We are going to have to do
10 something about that the NRC. We know who they are.

11 (Laughter.)

12 MR. ELLIOT: And so we could handle it
13 through the safety evaluation process or we could
14 handle it through other NRR processes.

15 VICE CHAIRMAN ARMIJO: Do you believe
16 these particular plants that you're referring to are
17 not implementing the PWR vessel --

18 MR. ELLIOT: No. Everybody's committed.

19 VICE CHAIRMAN ARMIJO: Okay.

20 MR. ELLIOT: Everybody is committed to
21 implement it. But I am just saying, even though they
22 say they are going to all commit it, we would just
23 like to confirm it. And so we want to see something
24 more than just a commitment that you implemented it in
25 accordance with 0308.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 We want to see an actual plan that shows
2 every welder inspecting, when they're inspecting it,
3 and we want to see that. And we're going to get it
4 for the plants that have that commitment.

5 And we just need to do something for a few
6 -- there aren't many. There are only very early ones
7 that don't have that commitment. And we'll take care
8 of that individually.

9 VICE CHAIRMAN ARMIJO: Good.

10 MR. ELLIOT: Next. The other part of the
11 program, in addition to the AMP, is AMR line items.
12 In the past, all we had was a commitment. We didn't
13 have any spilled plant-specific inspection
14 requirements. So the Westinghouse, Combustion,
15 Babcock, and Wilcox members on the Committee submitted
16 line items for us to review. We reviewed them. And
17 we just started to make some substantial
18 modifications.

19 We decided each component that is
20 classified as a primary component, expansion
21 component, or existing component should be in GALL.

22 Let me explain to you something about
23 MRP-227. It is a process where they identified aging
24 effects through engineering evaluations and looking at
25 test data and all the data that they have available to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 them, neutron fluences for the internals, et cetera,
2 et cetera.

3 As a result of the process, we identified,
4 they identified, there are five categories. There are
5 primary components. There are expansion components,
6 existing components, and no additional measure of
7 components, "no additional measure" being there is
8 nothing they are going to do in addition, meaning that
9 the aging effects are not necessary to be looked at
10 during the license renewal process.

11 For the primary expansion components,
12 those are the first components inspected as part of
13 the license renewal process during the license renewal
14 as a result of the license renewal process.

15 The expansion components would be
16 inspected only after you find flaws that meet the
17 criteria in MRP-227. That is the process that we are
18 using. And we have done that. And what we have done
19 in the GALL is identified where those components are
20 that we are going to be doing this for.

21 We cross-reference all of the primary
22 expansion so that if you see something in the primary,
23 you know what to look for in the expansion.

24 We also identified further evaluation
25 items that we think are needed for all PWR internals.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 The first is inaccessible locations. Any location is
2 accessible. The question is, how much effort are you
3 going to do to get to it on the internals?

4 So there are going to be components
5 because a lot of these inspections -- not a lot.
6 There are a few inspections here that have never been
7 done. And they're going to go out. And they're going
8 to find out and they are finding out as they prepare
9 for this that there are inaccessible locations and
10 they may decide that "We don't want to really take the
11 internals totally apart just to inspect this. We'll
12 take it apart and then put a new component in. It's
13 easier for us" or they may evaluate it and say, "We
14 don't have to take it apart. We could operate it when
15 it was broken and it still maintain its function." I
16 don't know what they are going to do, but this is the
17 alternatives they have.

18 MEMBER SHACK: Well, he defined a highly
19 susceptible component that they -- if he finds a lead
20 component --

21 MR. ELLIOT: If they decide a lead
22 component, right now there are no inaccessible primary
23 components, but there could be. There are expansion
24 components that are inaccessible.

25 But if they find the primary component --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 and it's probably likely they will -- they would have
2 to be for the -- before they do the inspection, they
3 would have to give us a reason for that they don't
4 have to inspect it.

5 It may be that they are just going to
6 repair it or that they only had to repair some of it.

7 You know, I don't know. There may be multiple items
8 here, lots of bolts or something that they can't get
9 to. And they'll just repair enough to meet its
10 function.

11 They would also I would expect tell us
12 what they're going to do about expansion. We're just
13 not going to say you don't inspect it, you don't have
14 to expand it. We would think that they would have
15 some kind of an expansion if they can to a primary
16 component.

17 VICE CHAIRMAN ARMIJO: This sounds very
18 similar to the BWR vessel internals program, the same
19 philosophy of primary.

20 MR. ELLIOT: Many of the people who worked
21 on the BWR program are the same people who worked on
22 the PWR.

23 VICE CHAIRMAN ARMIJO: Okay. So I think
24 that's good.

25 MR. ELLIOT: Yes.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 VICE CHAIRMAN ARMIJO: There is
2 consistency in the approaches. And from a regulatory
3 standpoint, you know what you are going to get.

4 MR. ELLIOT: Yes. The other item that we
5 identified that needs further evaluation is there are
6 a couple of plant-specific programs that are not
7 covered by -- I've got it written down here.

8 We have two items that are plant-specific.
9 They are the Westinghouse guide tube support bins and
10 the CE lower in-core instrumentation thimble tubes.
11 These are highly specific programs for each plant
12 almost. So the MRP didn't think they should put in
13 guidance because it was too specific.

14 And then the last item we had for further
15 evaluation, we have a TLAA for reduction in ductility
16 and fracture toughness due to neutron irradiation for
17 Babcox and Wilcox reactor vessel internals. This is
18 an item that went back to the early days of the B&W
19 program. And they are the only vendor who has
20 identified this as a TLA.

21 MEMBER SHACK: But I mean, everybody's
22 going to lose ductility and fracture toughness.

23 MR. ELLIOT: Yes.

24 MEMBER SHACK: They're somehow depending
25 on it?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 MR. ELLIOT: No. What the difference is,
2 this is a TLAA. In other words, they have to do a
3 time-limit aging analysis. The other people who have
4 lost ductility and are screened in as a primary or an
5 expansion, they are going to use inspection as the
6 method for evaluating whether they have a problem.
7 This is in addition to an inspection.

8 MEMBER SHACK: What's different about them
9 that they have to do this in addition? I mean --

10 DR. HISER: They just have preexisting
11 analyses.

12 MEMBER SHACK: All right.

13 DR. HISER: So by definition, it comes in
14 as a TLAA.

15 MR. ELLIOT: Yes. For --

16 MEMBER SHACK: Okay.

17 MR. GRAMM: Thank you, Barry.

18 Next Dr. Dave Alley is going to join us to
19 walk through the aging management program. This
20 consolidated material that was in two preexisting
21 aging management programs and greatly augmented it and
22 changed the format as well. And so he will walk us
23 through the details of this.

24 DR. ALLEY: Good morning. For those of
25 you who were at the subcommittee, this is a

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 substantially similar presentation. For those of you
2 who weren't, you don't know any different. So that's
3 okay. And we'll leave it at that.

4 Anyway, what we're going to do is we're
5 going to discuss the objectives, the definitions, the
6 philosophies on which the AMP was founded, some
7 preventive actions, some inspections, and some summary
8 issues.

9 The objective to the program is, of
10 course, managing the aging of buried and underground
11 piping and tanks. The primary issue that we are
12 dealing with is external corrosion.

13 The two critical or most critical
14 definitions that we have to deal with in this AMP are
15 the definition of buried and underground. Buried
16 means those components that are in direct contact with
17 soil or concrete. Underground, on the other hand, are
18 components which are below grade, have limited access,
19 and are in contact with air. And that, of course,
20 means air with water in it and those sorts of
21 environments.

22 The primary objective here is to
23 differentiate these components from those in contact
24 with soil. Buried components can be cathodically
25 protected. Underground components cannot be

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 cathodically protected.

2 The first philosophical item that we
3 looked at in developing this AMP was that preventive
4 actions are the best approach to aging management.
5 Some subplots here or some inspection is still
6 required, even though you are going to do preventive
7 actions, and that more inspections are required if the
8 preventive actions that you're seeing at a given plant
9 are less than perfect.

10 The second philosophical point that we
11 considered was that we wanted to concentrate on
12 high-risk pipes, pipes, tanks, the whole works. Now,
13 at this point, we want to make sure that we define
14 risk in a general sense as used not only within the
15 nuclear industry but outside the nuclear industry.

16 This is not a probabilistic risk
17 assessment. This does not have anything specific to
18 do with core damage frequency. This is probabilities
19 of occurrences, consequences of occurrences.

20 So we are going to look at places that
21 have high probabilities of corrosion. And we are
22 going to look at places which have high consequences
23 of failure.

24 We are going to define those in two
25 contexts. One is code class and safety-related piping

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 -- those are traditional areas where safety issues are
2 of concern -- and then the hazmat areas, where we are
3 talking about piping or tanks which contain
4 radioactive materials or diesel fuel or other things
5 that you in general don't want in the ground.

6 We will go on with looking at this failure
7 concept. The preventive actions and the inspection
8 should be based on what the failure is that we are
9 looking at. And for code class and safety-related
10 piping, we want to make sure that those components
11 have sufficient water flow to accomplish their
12 intended safety function.

13 For hazmat piping, we want to make sure
14 that groundwater is not contaminated. And, of course,
15 if something falls into both categories, we're
16 treating it as a hazmat pipe.

17 The next philosophical item we wanted to
18 look at was the concept that excavating pipes can
19 cause damage to those pipes and that we might not want
20 to do that. So we wanted to, wherever we possibly
21 could, allow alternatives to excavations. For
22 example, we're allowing at various points
23 hydrotesting, internal inspections, or monitoring of
24 active components; for example, jockey pumps in fire
25 protection systems.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 Moving on to preventive actions, the
2 preventive actions are based on the materials
3 construction involved. And those recommendations
4 include issues regarding coatings, backfill, and
5 cathodic protection. And we have a table. And the
6 table has footnotes in it. And there are a lot of
7 footnotes.

8 In today's discussion, the only footnotes
9 that we really need to deal with are three, which is
10 in the "Coatings" column. For stainless steel and
11 cementitious or concrete pipe, that has to do with the
12 environment around the pipe.

13 For stainless steel pipe, you have to
14 supply a coating if the soil has chlorides or other
15 things that would cause the stainless steel to pit or
16 otherwise corrode. Otherwise you don't have to have
17 that.

18 Over in the "Backfill Quality" column, the
19 footnotes there have to do with whether or not
20 backfill quality is an issue. And that has to do with
21 whether coatings are provided or not. If coatings are
22 provided, you have to have the backfill quality
23 characteristics that you are looking at. And it has
24 to do with the size distribution of the backfill.

25 Obviously we don't want backfill that has

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 large rocks in it that will damage the coating. And
2 if we have a polymeric piping, we for sure want to
3 have very fine backfill so that we don't cause
4 cracking of those polymeric materials.

5 You will notice in the "Sensor" column
6 that cathodic protection is recommended as a
7 protective action for steel, copper, and aluminum.
8 Those materials were chosen because they were included
9 in the NASE standard SP01-69, which is the standard
10 for external corrosion control for buried and
11 submerged piping.

12 VICE CHAIRMAN ARMIJO: Steel, do you
13 include cast irons --

14 DR. ALLEY: Yes.

15 VICE CHAIRMAN ARMIJO: -- as part of the
16 steel?

17 DR. ALLEY: Yes. Moving on to
18 inspections, the inspections that we are going to talk
19 about apply to code class and safety-related piping as
20 well as hazmat piping. They're designed to
21 accommodate various levels of prevention the first
22 inspection period, which is between years 30 and 40,
23 but these inspections are designed based on an
24 expectation that good preventive action will be
25 provided in the remaining inspection cycles which are

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 between years 40 and 50 and 50 and 60.

2 We have a massive table here, which, of
3 course, you can't read. But since everybody is
4 interested in steel and buried pipe, we'll go to the
5 next slide, which looks at just that area.

6 Here you're going to see that we have the
7 inspections divided up into code class and
8 safety-related and into hazmat. The code class and
9 safety-related inspections are based on an inspection
10 basis. And an inspection here is defined as not less
11 than ten feet of piping. And it requires digging
12 holes. In code class and safety-related, we are
13 looking at discrete holes.

14 In the hazmat area, we are looking at
15 percentages of piping. And the philosophy here was
16 based on ensuring adequate flow through the code class
17 piping and ensuring groundwater does not -- ensuring
18 that leakage from the hazmat pipes does not
19 contaminate the groundwater.

20 You will see in the second column C, D, E,
21 and F. Those have to do with the levels of preventive
22 actions that have been taken by the applicant. C
23 refers to cathodic protection being in place, having
24 been there for a while and having a good track record
25 of availability. D refers to cathodic protection

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 being in place but its availability or its duration
2 has not been so long. E has to do with no cathodic
3 protection being provided but the backfill and the
4 coatings being good. And F is less than desirable on
5 all fronts.

6 MEMBER BLEY: Dave, do you define what
7 good reliability for cathodic protection is?

8 DR. ALLEY: We do. And it has to do with
9 90 percent availability. And there are about four
10 sentences as a footnote in the table in the AMP as to
11 exactly what those mean.

12 MEMBER BLEY: I don't need all of those.

13 DR. ALLEY: Yes.

14 MEMBER BLEY: I just wanted to know you
15 did the --

16 DR. ALLEY: Yes. We did do that at
17 nauseating detail.

18 MEMBER STETKAR: That's also consistent
19 with the NASE standards, right?

20 DR. ALLEY: Yes.

21 MEMBER STETKAR: Yes.

22 MEMBER BLEY: And since I started talking,
23 I can't just not say anything.

24 DR. ALLEY: Okay.

25 MEMBER BLEY: I am pleased that you have

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 focused on high-risk pipe by thinking of probability
2 and consequences. And as soon as you do that, that is
3 probabilistic risk assessment. You don't need core
4 damage. Go ahead.

5 DR. ALLEY: I stand corrected.

6 VICE CHAIRMAN ARMIJO: There are no
7 numbers. There's no --

8 MEMBER BLEY: It's qualitative, but it's
9 still --

10 DR. ALLEY: It's definitely --

11 MEMBER BLEY: Probability. So he's got
12 some quantitative --

13 DR. ALLEY: Yes.

14 MEMBER BLEY: -- thing somewhere in here.

15 DR. ALLEY: Yes. And what I was
16 attempting to make sure is that no one here had the
17 concept that we really were tieing this to core damage
18 frequency and that we really were working with 10-9
19 and 10-8, not quite so definitive.

20 MEMBER POWERS: Next he'll be asking you
21 for the uncertainty analysis.

22 MEMBER BLEY: Can I add --

23 DR. ALLEY: The uncertainty, of course, is
24 when we come up with these -- it's a group of people.

25 MEMBER POWERS: It's a slippery slope.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 We'll come in with the model uncertainty and then
2 omission uncertainty and things like that. Listen, I
3 am interested in you say a percentage of the pipe in
4 each of these categories. How do you select that
5 number?

6 DR. ALLEY: How did I get that number? I
7 got that number, in part, based on going to the ASME
8 code and looking at welds. They, generally speaking,
9 start looking at welds. Oh, let's look at 7 percent
10 of these or 25 percent of those.

11 So I use that as a background or as a
12 basis to then start looking at what numbers would be
13 reasonable and at least somewhat consistent with what
14 the ASME has done. And then, of course, I started and
15 said I want to look at more things where there are
16 less preventive actions and drop that down as
17 preventive actions.

18 MEMBER POWERS: I understand what you did,
19 as opposed to I've done thousands of inspections and I
20 find that if you do 10 percent of these really bad
21 pipes, you'll find a problem 90 percent of the time.
22 You did, by analogy, to the weld --

23 DR. ALLEY: Right, right.

24 MEMBER POWERS: I mean, you have no other
25 information. So it sounds as good as anything I can

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 call it.

2 DR. ALLEY: But we did. We did in all of
3 these issues. We looked at the industry buried piping
4 initiatives and tried to make sure that we weren't
5 doing anything here that was contrary to what was
6 being done there.

7 DR. ALLEY: As I indicated in the
8 philosophy section, we did look at alternatives
9 because of the possibility that we would damage pipe
10 in excavation. And we attempted to provide whatever
11 alternatives we could that we felt would be at least
12 equivalent in their protective capabilities or their
13 identification capabilities.

14 For fire mains, we looked at two
15 alternatives. One was an annual flow test just to
16 make sure that those fire mains were capable of
17 carrying the necessary water to do fire-fighting
18 activities.

19 The second one was to monitor jockey pump
20 activity. Of course, in a fire main system, you
21 maintain that system under pressure all the time, use
22 a very small pump. And, of course, if that pump
23 starts running more frequently or for greater lengths
24 of time, it is an indication that water is going
25 someplace.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 Now, most of those some places are not
2 leaks in buried piping. Most of them are the fire
3 hydrant is dripping someplace. It at least gives you
4 a point to say, "Go start to look at that point."
5 And, of course, if it is a leak from the buried pipe,
6 it gives you an instantaneous indication that you have
7 some change in your system.

8 For all pipes, we allowed hydrostatic
9 testing. And we allowed internal inspections when the
10 applicant can demonstrate that that internal
11 inspection is capable of detecting changes in the wall
12 thickness of the pipe that you're looking at.

13 So, in summary, the intent of the program
14 is to manage aging. And that is best accomplished
15 through preventive actions. The intent of the program
16 is also to be consistent with the management of other
17 buried piping systems. And, therefore, we made heavy
18 utilization of existing standards, such as the NASE
19 external corrosion control standard.

20 The intent is to concentrate on important
21 piping. We divided that up into code class,
22 safety-related piping, and hazmat piping and viewed
23 and worked with those in different manners in order to
24 achieve the objectives that we needed to achieve,
25 which is ensuring adequate water flow and ensuring

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 absence of groundwater contamination.

2 The next piece is inspections are
3 necessary. And the level, of course, depends on the
4 material involved, the material of the piping or the
5 tank, and the preventive actions that are involved.

6 I guess I would like to leave you with one
7 last thought. And that is in the full ACRS Committee
8 meeting a few weeks ago, Duane Arnold did an excellent
9 job of summarizing the importance of preventive
10 actions in relation to their buried piping. They said
11 we had had no problems with buried pipe and we have
12 had cathodic protection. Where we have not had
13 cathodic protection, we have had problems.

14 CHAIRMAN ABDEL-KHALIK: Thank you very
15 much.

16 MR. GRAMM: And then, just in summary, I
17 would like to thank all of the staff for their
18 presentations today and all of the many staff who had
19 worked hard on this document over the past year and a
20 half. It's really a much more user-friendly document.

21 We think it's greatly enhanced from revision 1 and
22 will pay great dividends going forward for license
23 renewal applicants as well as staff utilization.

24 We do have a requested waiver of CRGR
25 pending. We believe that's a pro forma thing. They

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 did not look at the prior two revisions. There are no
2 backfit considerations at all.

3 So, with that, that concludes our
4 presentation.

5 CHAIRMAN ABDEL-KHALIK: I had a question.

6 Were there any revisions to the BWR vessel internals
7 necessitated by the many power uprates and potential
8 impact on steam dryer integrity?

9 MR. GRAMM: Ganesh or Barry, would BWR
10 internals --

11 MR. ELLIOT: The big change in the BWR
12 program that I know of is we have included stress
13 corrosion cracking of stainless, pH-hardened stainless
14 steels and X750. That is the big change.

15 As far as internals, the steam dryer, I'm
16 pretty sure Erach is here. He will tell me more
17 because he -- were influencing the guidance in one of
18 the MRP documents. I don't know which. I forgot
19 which one it is, BWR --

20 MR. PATEL: This is Erach Patel. The BWR
21 inspection, we now include steam dryers and BWR
22 VIP-139 that addresses steam dryers. Steam dryers are
23 not part of BWR VIP, including 11.M9.

24 And we also have a statement within 11.M9
25 that when you go power uprate, you need to look at the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 BWR VIP programs to make sure that it doesn't affect
2 anything else.

3 MEMBER BONACA: If there are no other
4 questions, I would like to thank you for a very full
5 presentation. And, with that, I will turn it back to
6 you, Mr. Chairman.

7 CHAIRMAN ABDEL-KHALIK: Thank you.

8 At this time, we will break for lunch.
9 And, according to our schedule, we will be back at
10 1:00 o'clock to look at the long-term cooling approach
11 for the revised AP1000 designs. We're off the record.

12 (Whereupon, the foregoing matter was
13 concluded at 11:46 a.m.)

14
15
16
17
18
19
20
21
22
23
24
25

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701



NUREG-1927
Standard Review Plan for
Renewal of Spent Fuel Dry Cask Storage
System Licenses and
Certificates of Compliance

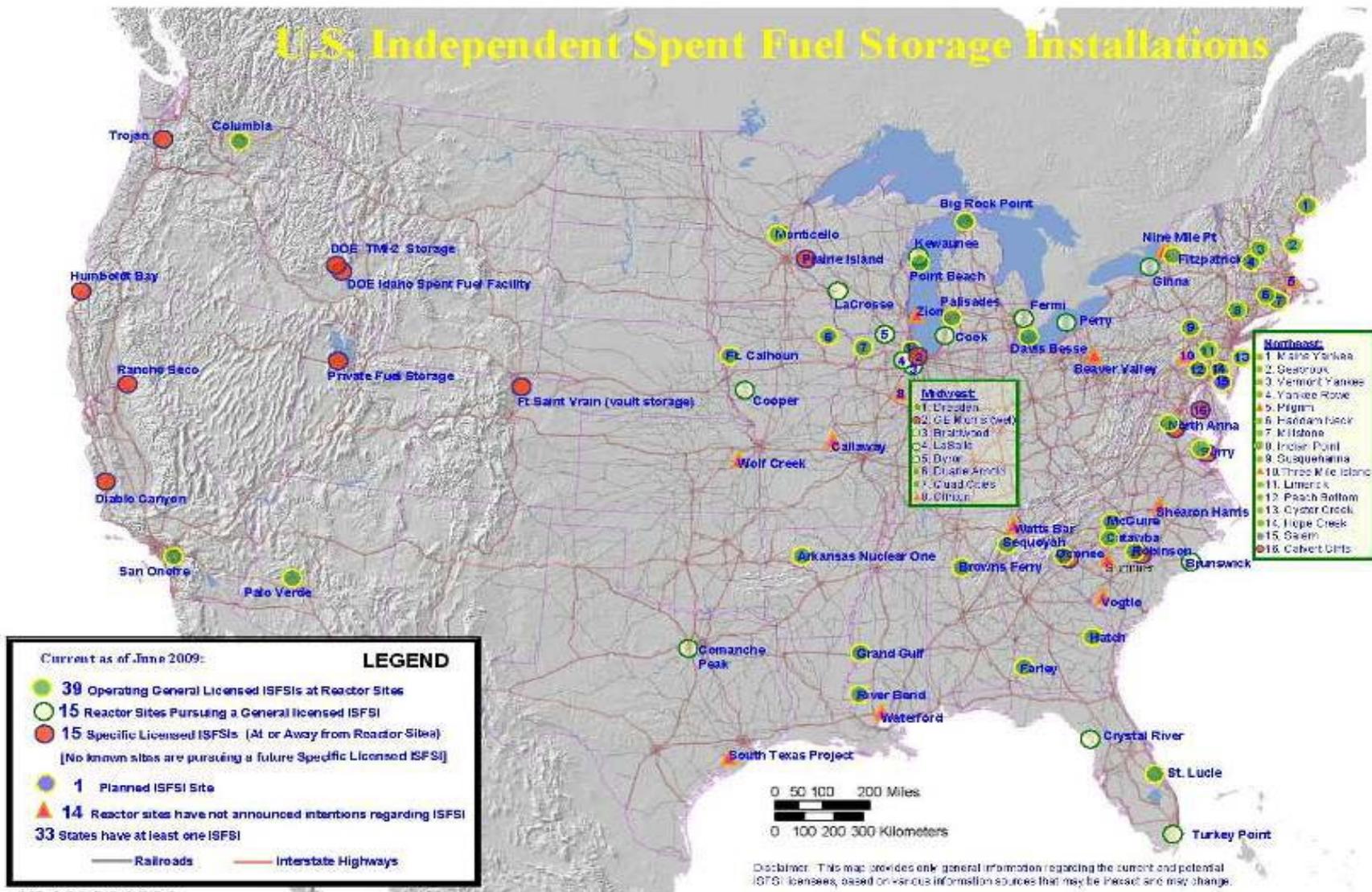
Ata Istar and Geoffrey Hornseth
U.S. Nuclear Regulatory Commission
November 4, 2010

- Introduction to DCSS
- License Renewal Background
- Technical Basis
- License Renewal Process
- Ongoing Activities Supporting Aging Management
- Summary

Abbreviations:

- **AMA** Aging management activity
- **AMP** Aging management program
- **AMR** Aging management review
- **CC** Criticality control
- **DSC** Dry storage cask/canister
- **DCSS** Dry cask storage system
- **HT** Heat transfer
- **ISFSI** Independent spent fuel storage installations
- **PB** Pressure boundary
- **RS** Radiation shielding
- **RAI** Request for additional information
- **SAR** Safety analysis report
- **SRM** Staff requirements memoranda
- **SRP** Standard review plan
- **SS** Structural support
- **SSCs** Structures, systems and components
- **TLAA** Time-limited aging analysis

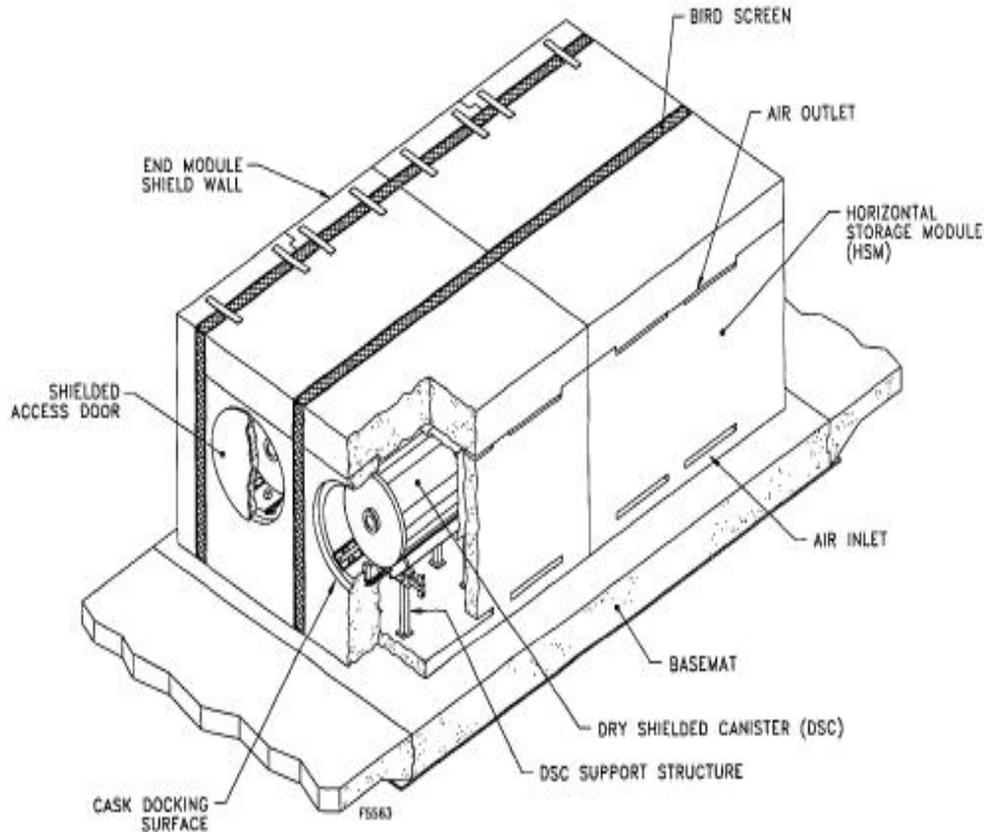
U.S. Independent Spent Fuel Storage Installations



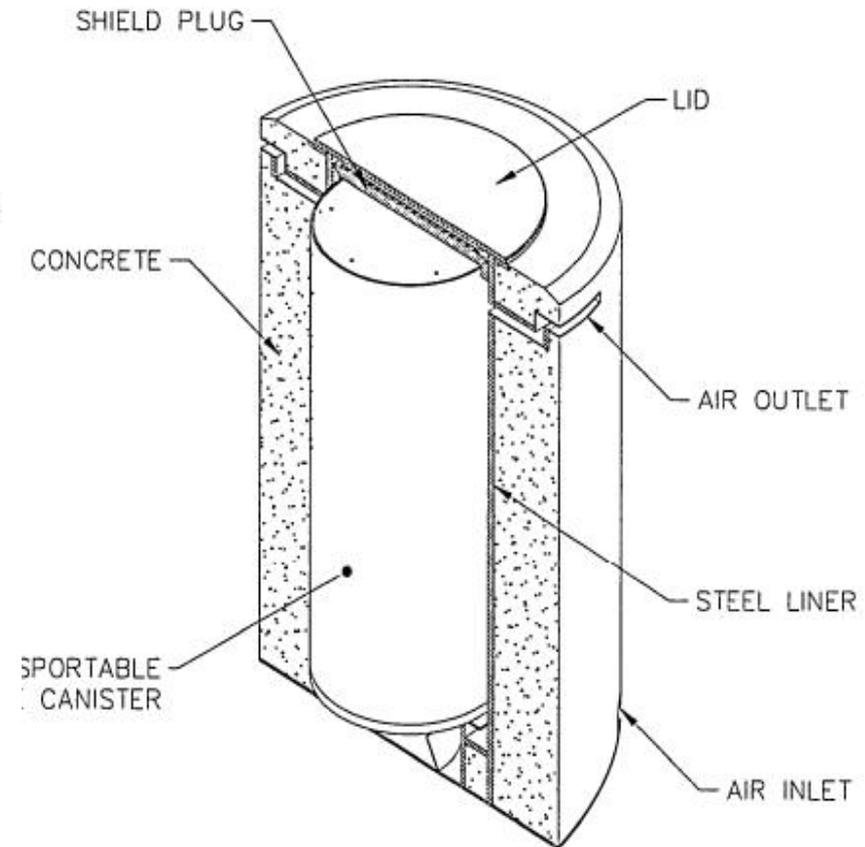
ML091530088

Storage Cask Designs

Horizontal Cask



Vertical Cask







License Renewal Background:

- | | |
|-----------|---|
| 2001 | Letter to VEPCO (Dominion Power) “Preliminary NRC Staff Guidance for 10 CFR Part 72 License Renewal.” |
| 2002 | Surry ISFSI, VEPCO, application with 40 year exemption request. |
| 2004 | Staff Requirements Memoranda (SRM) approves 40-year renewal for Surry and H. B. Robinson. |
| 2006 | Commission directed staff to proceed with Part 72 rulemaking, 40 year terms, and develop SRP. |
| 2009-2010 | Oconee, Fort St. Vrain ISFSI renewal reviews. |
| 2009-2010 | Draft SRP based on preliminary guidance. |
| 2010 | Commission approved 10 CFR Part 72 final rule. |

Technical Basis

Preliminary Guidance and SRP:

- Experience with power plant license renewal,
- INEEL Cask opening & examination (low burn-up fuel, 15 years of storage):
 - NUREG/CR-6745, “Dry Cask Storage Characterization Project - Phase 1; CASTOR V/21 Cask Opening and Examination,” Sept. 2001.
 - NUREG/CR-6831, “Examination of Spent PWR fuel Rods after 15 years in dry Storage,” Sept. 2003.
- Review of original licensing basis.

Preliminary Guidance and SRP, cont.:

- Review environment and potential degradation mechanisms.
- Review of operational and maintenance history.
- Review time-dependent issues (thermal fatigue).
- 20-year interval external visual examination of inaccessible areas of “lead canister.”

Key Renewal Issues:

Predominately assessment for material degradation

- Canister:
 - Corrosion
 - Thermal fatigue
- Concrete shielding:
 - Cracking/spalling
 - Thermal fatigue
- DCSS is passive, static.

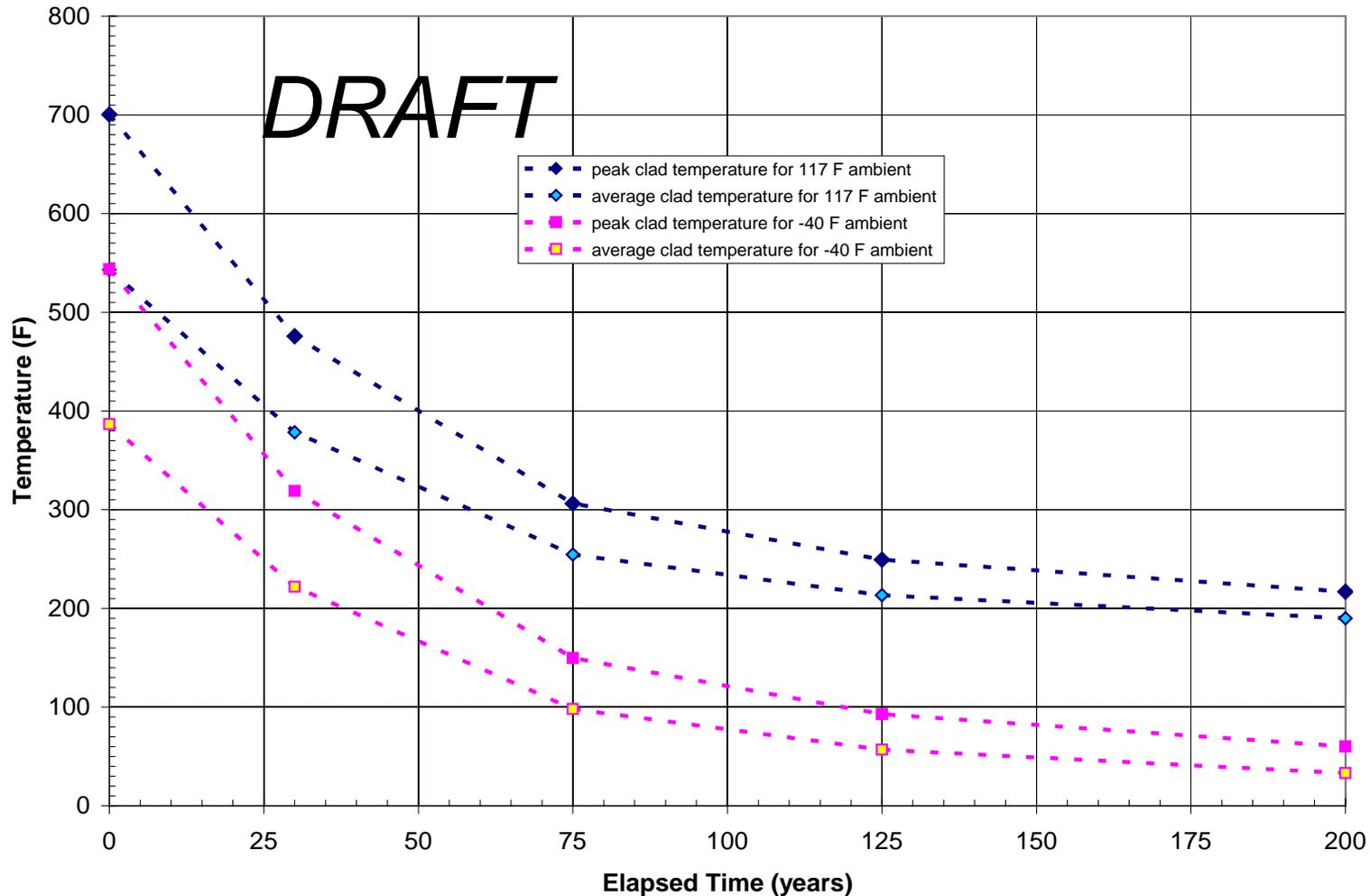
Canister Exterior Environment:

- Indoor (shielded from precipitation)
- Decay heat
- Temperature changes
- Dose

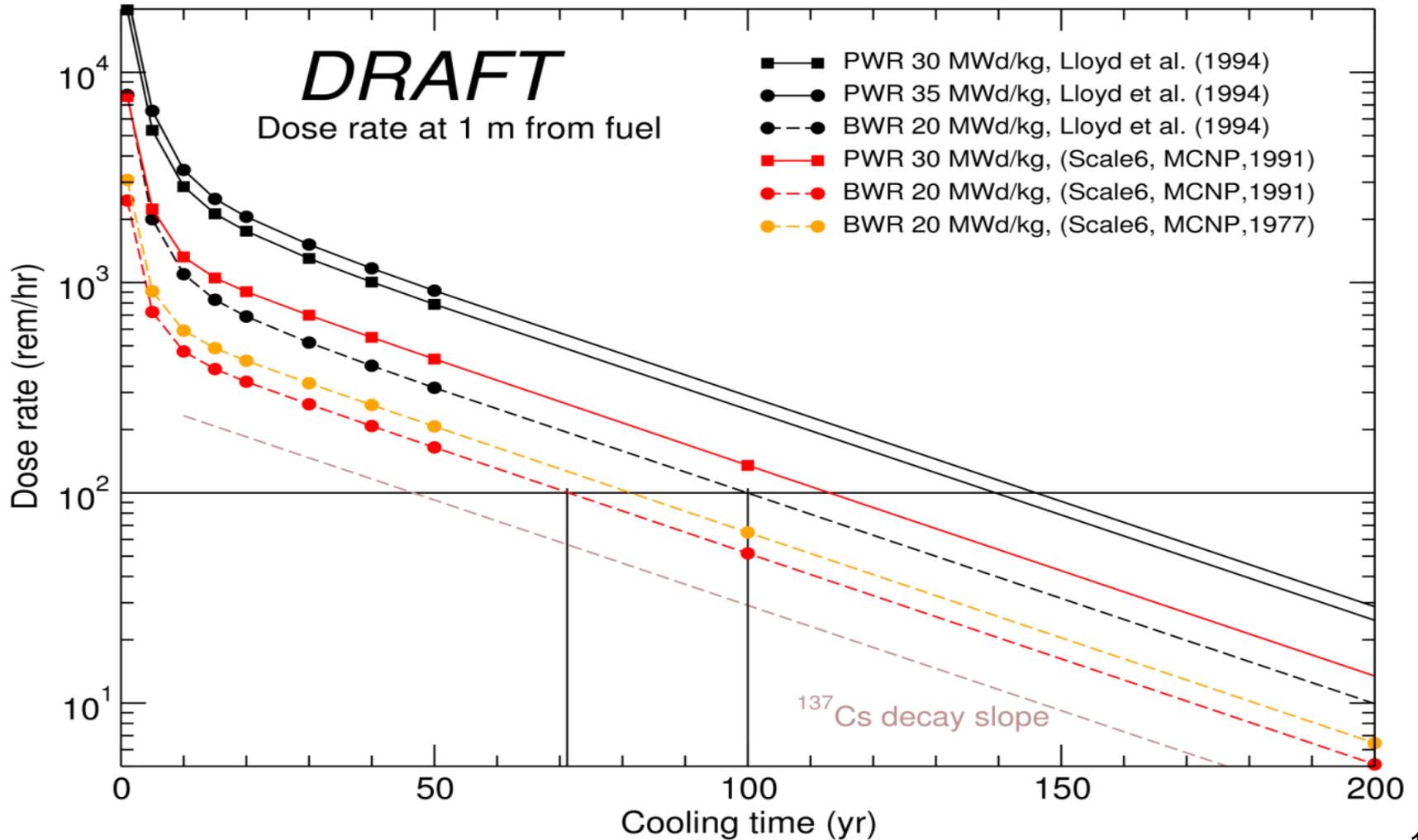
Shield Environment:

- Weather
- Decay heat
- Temperature changes
- Dose

Representative Cladding Temperature



Representative Dose Rate



Renewal Experience (to date):

- No degradation observed.
- Thermal fatigue not limiting.
- Underlying assumptions/operating-conditions upheld.
- 40 year term justified by technical findings from the first two renewals.

License Renewal Process

General Information Review



Scoping Evaluation



Aging Management Review (AMR)



Aging Management Activity (AMA)



Time-Limited Aging Analysis (TLAA)

Aging Management Programs (AMP)

AMR					AMA
SSCs in-Scope	Intended Function	Material	Environment	Aging Effects Requiring Management	TLAA or AMP
Concrete (Above Grade)	HT, RS, SS	Concrete	Weather	Spalling, Cracking, Change in Mat. Properties	Site-Specific AMP
DCS Support Assembly	SS	Carbon Steel	Indoor	Loss of Material	Site Specific AMP
		Stainless Steel	Indoor	None Identified	None Required
Seismic Restraints	SS	Carbon Steel	Indoor	Loss of Material	Site-Specific AMP
Canister	Confine.	Stainless Steel	Indoor	Corrosion	Lead DCS Inspection
Canister	Confine.	Stainless Steel	Indoor	Thermal Fatigue	TLAA

Aging Management Activities (AMA)

[1] Time Limited Aging Analysis (TLAA):

- **Thermal Fatigue - Analysis**

[2] Aging Management Programs (AMP):

- **Prevention** – concrete & cladding temperature limits.
- **Mitigation** - coatings/corrective actions.
- **Condition Monitoring** - inspections.
- **Performance Monitoring** – surveillances.

Ongoing Activities Supporting Aging Management:

- Staff/EPRI task-force for storage issues.
- Staff sponsored research – coastal marine atmosphere effects – NUREG/CR-7030.
- The applicant may provide new data demonstrating DCSS performance.

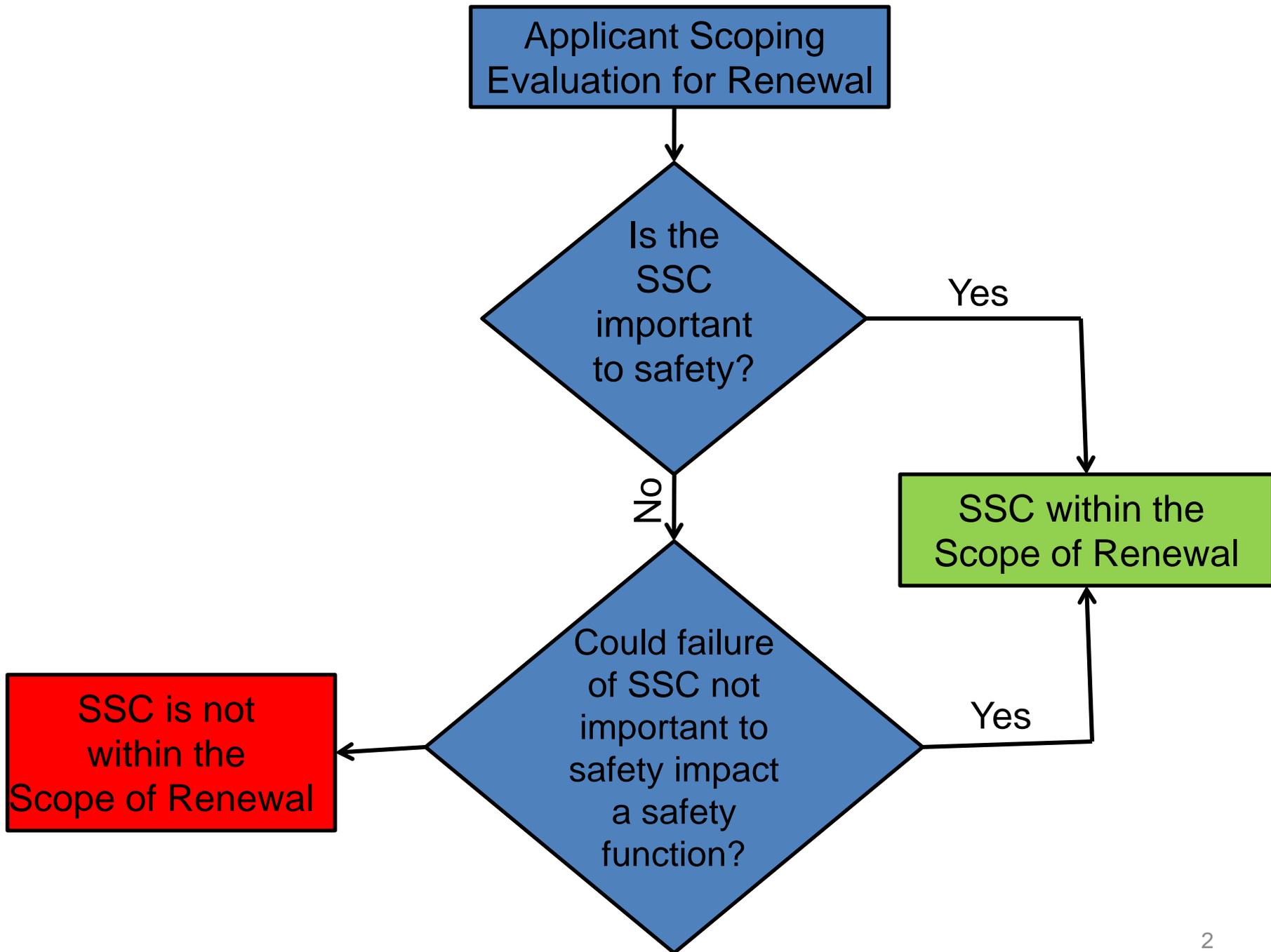
Summary:

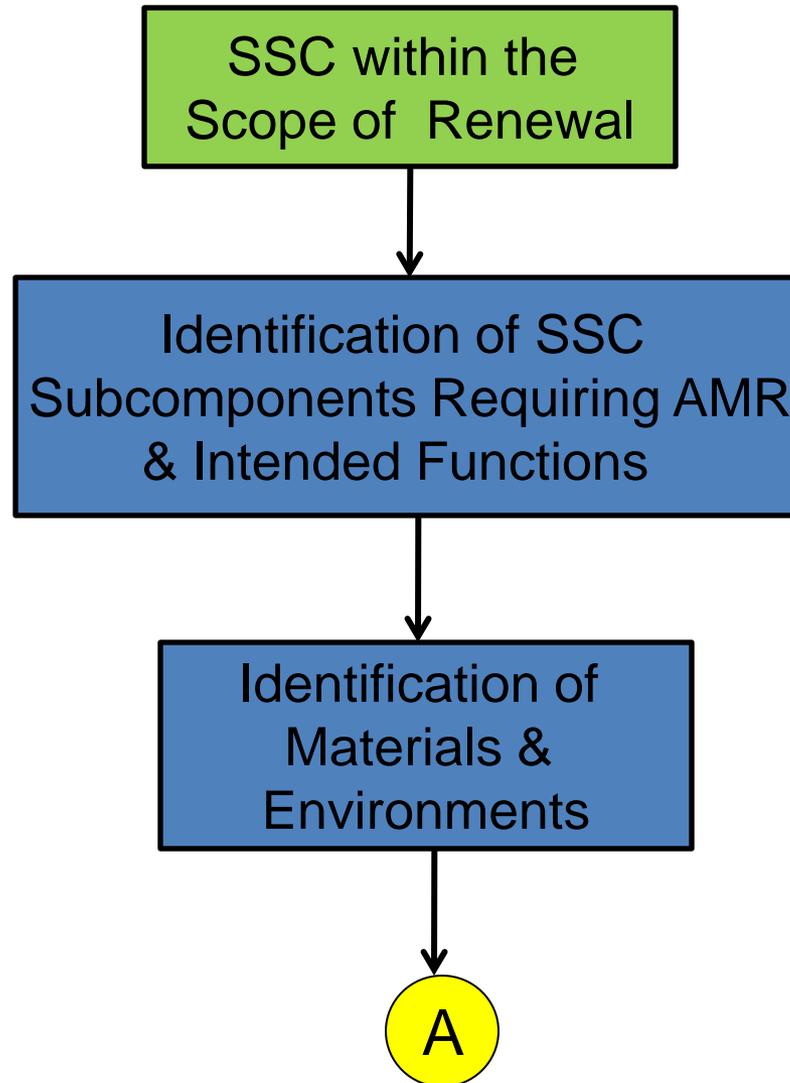
- Preliminary guidance (2001) successfully applied to three ISFSI renewals,
- Preliminary guidance basis for SRP,
- SRP provides structure and consistency to the technical review process,
- SRP identifies core technical aging issues,
- SRP incorporated public comments,
- SRP concurrent with 10 CFR Part 72 final rule,
- Staff proactive with research/industry.

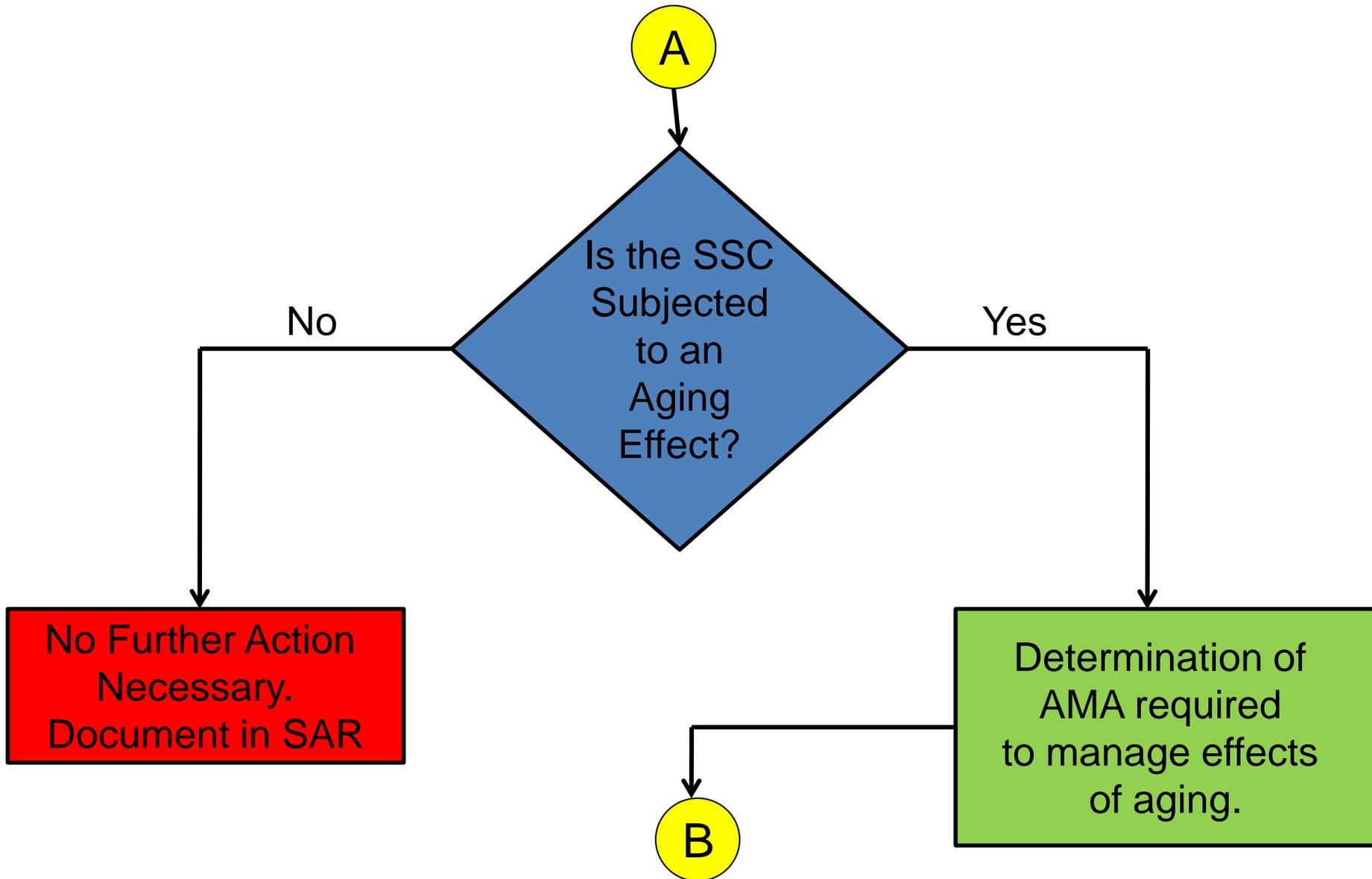
Supplemental Slides

NUREG-1927 Standard Review Plan for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance

Ata Istar and Geoffrey Hornseth
U.S. Nuclear Regulatory Commission
November 4, 2010







B

Determination of
AMA required
to manage effects
of aging.

Is the SSC
subjected to
TLAA
review?

Is the SSC
within an
existing
AMP?

Is TLAA
demonstrated
adequately
for the period
of renewal?

Is identified
aging effect
managed by
existing AMP
for the period
of renewal?

C

D

D

C

TLAA

AMP

No

No

Yes

Yes

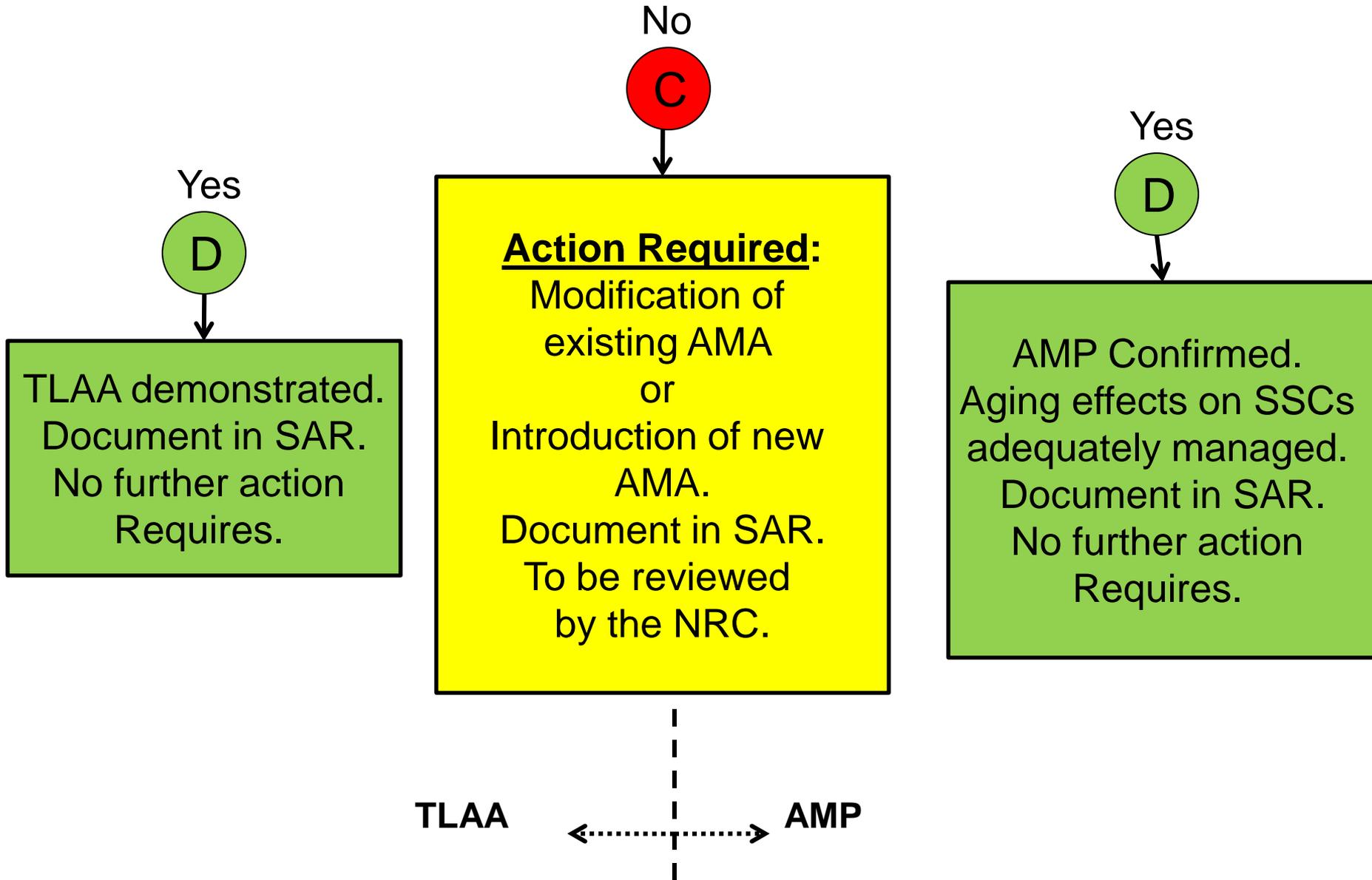
Yes

Yes

No

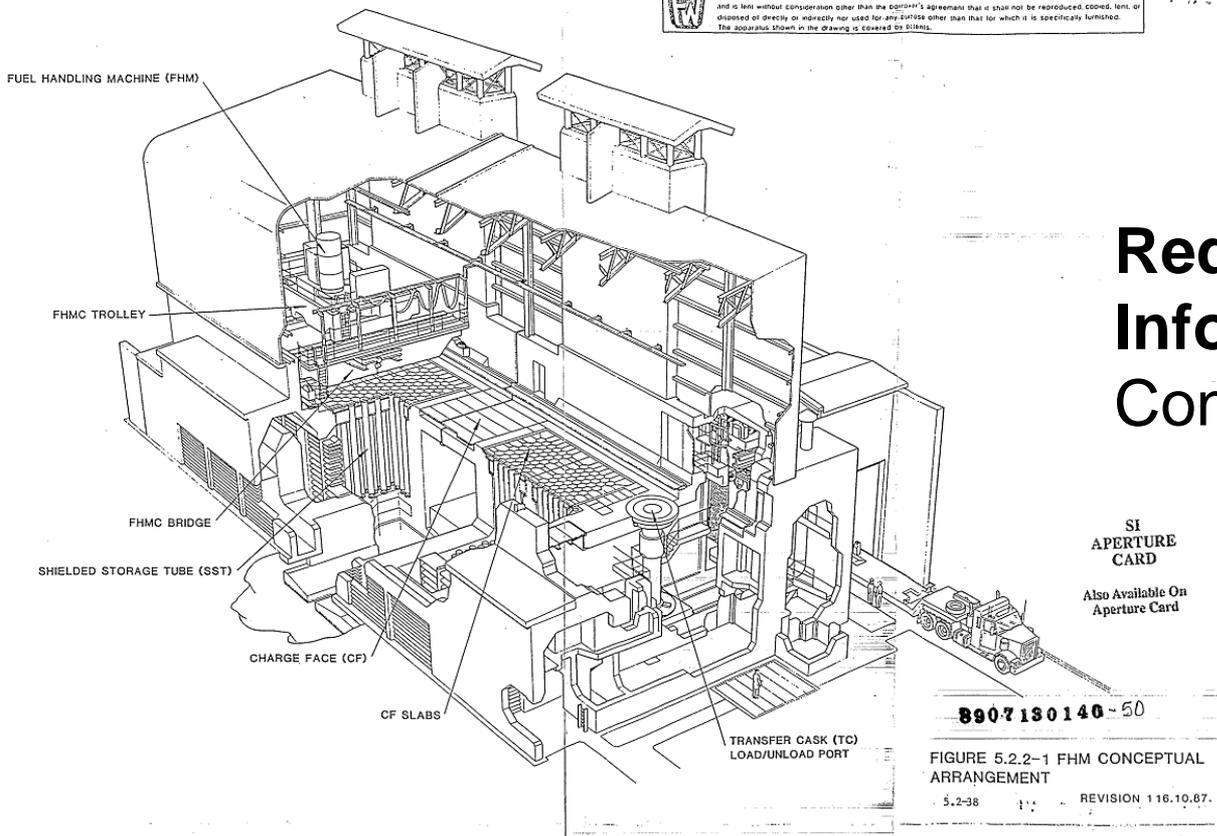
No







This Drawing is the Property of the FOSTER WHEELER CORPORATION, 110 SO. ORANGE AVE., LIVINGSTON, N.J. and is lent without compensation other than the copyright's agreement that it shall not be reproduced, copied, lent, or disposed of directly or indirectly nor used for any purpose other than that for which it is specifically furnished. The apparatus shown in the Drawing is covered by patents.



Request for Additional Information (RAI): Concrete Inspection, AMP

SI
APERTURE
CARD
Also Available On
Aperture Card

8907130140-50

FIGURE 5.2.2-1 FHM CONCEPTUAL ARRANGEMENT

5.2-38 REVISION 116.10.87.

Fort St. Vrain ISFSI

Spent Fuel Cladding Acceptance Criteria

ISG-11 Criteria	Normal Condition of Storage	Normal Handling Condition	Off-Normal and Accident Condition
Low Burn-up Fuel	Temperature Limit: ≤400° C (752° F)	a- Short Term Temp. Limit: 400° C - 570° C (752° F) - (1058° F) b- Cladding Hoop Stress Limit: ≤90MPa (13.05psi)	Temperature Limit: ≤570° C (1058° F)
High Burn-up Fuel	Temperature Limit: ≤400° C (752° F)	Temperature Limit: ≤400° C (752° F)	Temperature Limit: ≤570° C (1058° F)

NON-QUANTIFIABLE PHRASES

SRP for ISFSI License Renewal

“Screening Criteria for Non-Quantifiable Phrases (Terms)” was developed as guidance to provide quantitative measures/information.

- large
- small
- slight
- slightly
- significant
- significance
- moderate
- moderately
- low
- minor
- many
- few
- little
- routine

ACRS FULL COMMITTEE MEETING UPDATED LICENSE RENEWAL GUIDANCE DOCUMENTS

Division of License Renewal, NRR

11/04/10

Bob Gramm

NRR/DLR/Aging Management Reactor Systems and
Guidance Updates (RARB)

License Renewal Guidance Document Update Presentation - Agenda

- Background (Bob Gramm/NRR)
- Overview of general changes to license renewal guidance documents
- Major changes to electrical aging management programs (Matt McConnell and Cliff Doult/NRR)
- Major changes to structural aging management programs
- Major changes to mechanical aging management programs
 - One Time Inspections of Small Bore Piping (Allen Hiser/NRR)
 - PWR Internals (Barry Elliot/NRR)
 - Buried Pipe (Dave Alley/NRR)
- Summary

Level of Effort

- Involvement of over 90 staff/managers
 - NRR Div. Of License Renewal, NRR technical divisions, RES, regional staff, and contractors
- NRC expert panels
- Interaction with external stakeholders (industry and public)
 - NEI suggested changes (2009)
 - Public workshops (January and May 2010)
 - Formal external stakeholder comments (2010)
 - Buried pipe public meetings (2010)

General Changes to License Renewal Guidance Documents

- Focus on AMP content
- Update AMPs for recent operating experience and reference documents
 - Domestic and foreign operating experience reviews (2004-2009)
- Update AMPs to reflect precedents from recent LR applications/SERs
- Update AMPs to capture Interim Staff Guidance
- Consolidated GALL Report into a single volume
- Revised SRP-LR 10 Element Template for AMPs and updated AMPs

General Changes to License Renewal Guidance Documents - continued

- Revised GALL for application of the ASME Code
 - AMPs are based on the 2004 Edition of the Code; other editions and addenda are allowed
 - Clarified use of Code Cases and Relief Requests
- Revised GALL to provide guidance on the use of later revisions of industry documents
- Eliminated "further evaluation" as appropriate
 - Based on augmentation of AMP content and/or better understanding of operating experience
- Eliminated AMP content not related to aging

AMP XI.E3, Inaccessible Power Cables not Subject to 10 CFR 50.49 EQ Requirements

Significant changes to XI.E3 are based on plant specific and industry operating experience (IN 2002-12), responses to the GL 2007-01, LR inspections and audits, and Division of Engineering and Office of Research input and include:

- *Scope of Work*
 - revised to include all inaccessible or underground power cables greater than or equal to 400 Volts (typically 480 V) within the scope of license renewal subjected to significant moisture
 - revised to include energized and de-energized cables
- *Detection of Aging Effects*
 - revised cable testing frequency not to exceed 6 years
 - revised inspection frequency of water collection is based on plant-specific operating experience, but not to exceed one year
 - event driven water accumulation inspections - such as rain or flood.

Other Electrical AMP Changes

- XI.E1 (insulation material not subject to EQ) – Removed references to sampling - all accessible cables in adverse localized environments will be inspected
- XI.E6 (cable connections not subject to EQ) - Incorporated Final License Renewal Interim Staff Guidance LR-ISG-2007-02, which provides for one-time testing

Changes to Structural AMPs

- Relocation of high strength structural bolting provisions
- XI.S1 (IWE) - incorporate interim staff guidance (LR-ISG-2006-01) related to monitoring the MK1 drywell corrosion
- XI.S2 (IWL) - revised to include additional tendon monitoring when containment cutout made
- XI.S5 (masonry walls)- revised inspection frequency
- XI.S6 (structures monitoring) – revised inspection frequency
- XI.S8 (containment coatings) Clarified importance of coating assessments and inclusion of coatings on concrete; revised reference to RG 1.54, Revision 2

AMP XI.M35, One-Time Inspection of ASME Code Class 1 Small Bore Piping

- *Program Description:*
 - Socket welds are included
 - Program applicability
 - Cracking has not occurred
 - Cracking due to high cycle fatigue has been mitigated
 - Plant specific program required for other cases
- *Detection of Aging Effects:*
 - Socket Welds
 - Volumetric exam (VE) or destructive exams (DE)
 - Full penetration welds
 - Volumetric exams
 - Volumetric exams performed using demonstrated techniques
 - ASME Code qualification not required

AMP XI.M35, One-Time Inspection of ASME Code Class 1 Small Bore Piping - continued

Failures			No Failures
High cycle fatigue-mitigated	High cycle fatigue – not mitigated	Stress corrosion cracking or thermal fatigue	More than 30 years
10% of welds; max. of 25 welds of each type	Plant-specific periodic program	Plant-specific periodic program	≥ 3% of welds; max. of 10 welds of each type
OTI within 6 years before PEO			OTI within 6 years before PEO
1 DE = 2 VE			1 DE = 2 VE

AMP XI.M16A, PWR Vessel Internals

- AMP is based on guidelines for examination of vessel internals in EPRI report, “Materials Reliability Program (MRP): Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-Rev. 0)” and “MRP: Inspection Standard for PWR Internals (MRP-228)”
- MRP-227-Rev.0 is currently being reviewed by the NRC staff

AMP XI.M16A, PWR Vessel Internals - continued

- GALL 2005 did not contain a generic AMP for PWR vessel internals:
 - GALL 2005 recommended applicants to commit to participate, evaluate and implement an industry program for vessel internals and to provide an inspection plan no less than 24 months before entering the period of extended operation
 - GALL 2010 recommends applicants submit an inspection plan for vessel internals to the NRC for review and approval with the application for license renewal

AMP XI.M16A, PWR Vessel Internals - continued

- MRP submitted proposed AMR line items for Westinghouse, Combustion Engineering, and Babcock and Wilcox designed vessel internals, based on MRP-227-Rev.0
- NRC staff modifications to the proposed MRP AMR line items:
 - Each component that is classified as a primary component, expansion component, or an existing program component in accordance with MRP-227-Rev.0 is included in GALL
 - Cross reference primary and expansion component in accordance with MRP-227-Rev.0
 - Further evaluation for (a) inaccessible locations, (b) plant-specific programs that are not included in MRP-227, (c) TLAA for reduction in ductility and fracture toughness due to neutron irradiation for Babcock & Wilcox reactor vessel internals

AMP XI.M41

Buried and Underground Piping and Tanks

Objective

- Managing aging of buried and underground piping and tanks
 - Primary issue is external corrosion

Buried Pipe

Definitions

- Buried
 - In direct contact with soil or concrete

- Underground
 - Below grade
 - Limited access
 - In contact with air
 - e.g. pipes in trenches or vaults

Buried Pipe - continued

Philosophy

- Preventive actions are the best approach to aging management
 - Some inspections still required
 - More inspections required if prevention is less than perfect

Buried Pipe - continued

Philosophy – continued

- Concentrate on high “risk” pipe
 - Higher probability of corrosion
 - Higher consequences of “failure”
 - Code Class or safety related
 - Hazmat
 - Radiation, diesel fuel etc.

Buried Pipe - continued

Philosophy – continued

- Preventive actions/inspections based on “failure”
 - Code class/safety related
 - Must have sufficient water flow
 - Hazmat
 - Must not contaminate groundwater

Buried Pipe - continued

Philosophy – continued

- Excavations can damage pipe
 - Permit alternatives to excavations whenever possible
 - Hydrotests
 - Internal inspections
 - Monitor active equipment (jockey pumps)

Buried Pipe - continued

Preventative Actions

- Based on material of construction
- Recommendations concerning
 - Coating
 - Backfill
 - Cathodic protection

Buried Pipe - continued

Preventative Actions - continued

Material ¹	Coating ²	Cathodic Protection ⁴	Backfill Quality
Titanium			
Super Austenitic Stainless ⁸			
Stainless Steel	X ³		X ^{5, 7}
Steel	X	X	X ⁵
Copper	X	X	X ⁵
Aluminum	X	X	X ⁵
Cementitious or Concrete	X ³		X ^{5, 7}
Polymer			X ⁶

Buried Pipe - continued

Inspections

- Apply to
 - Code Class/safety related
 - Hazmat
- Designed to accommodate
 - Various levels of prevention in first inspection (yrs 30-40)
- Expect
 - Good prevention in remaining inspections

Buried Pipe - continued

Inspections - continued

Material ¹	Preventive Actions ²	Inspections ³	
		Code Class Safety Related ⁴	Hazmat ⁵
Titanium			
Super Austenitic Stainless ⁷			
Stainless Steel		1 ⁶	1 ⁶
HDPE ⁸	A	1 ⁶	1 ⁶
	B	2	1%
Other Polymer ⁹	A	1 ⁶	1 ⁶
	B	2	1%
Cementitious or Concrete		1 ⁶	1 ⁶
Steel	C	1 ⁶	1 ⁶
	D	1	2%
	E	4	5%
	F	8	10%
Copper	C	1 ⁶	1 ⁶
	D	1	1%
	E	1	2%
	F	2	5%
Aluminum	C	1 ⁶	1 ⁶
	D	1	2%
	E	1	5%
	F	2	10%

Buried Pipe - continued

Inspections - continued

Material ¹	Preventive Actions ²	Inspections ³	
		Code Class Safety Related ⁴	Hazmat ⁵
Steel	C D E F	1 ⁶ 1 4 8	1 ⁶ 2% 5% 10%

Buried Pipe - continued

Inspections - continued

- Alternatives
 - Fire mains
 - Annual flow tests
 - Monitor jockey pump activity
 - All pipe
 - Hydrostatic tests
 - Internal inspections

Buried Pipe - continued

Summary

- Intent is to manage aging
 - Best accomplished through preventive actions
- Intent is to be consistent with management of other buried pipe
 - NACE external corrosion control standard

Buried Pipe - continued

Summary - continued

- Concentrate on important piping
 - Code Class/safety related
 - Hazmat
- Inspections necessary
 - Level depends on material and prevention

License Renewal Guidance Document Update: Summary

- Enhancements made to the GALL Report and SRP-LR will improve their usefulness
- Guidance documents will provide appropriate framework for applicants to develop programs that will continue to provide reasonable assurance to manage aging effects
- Requested waiver of CRGR review pending

Consideration of Revision 2 Changes on Current Applications

- Using experienced personnel, public and industry comments, operating experience, and lessons learned over the past 5 years have resulted in improved information in the GALL Report Revision 2 aging management programs.
- The staff is reviewing the Revision 2 changes to identify significant issues that warrant review in the current in-house applications.
- Where applications do not have the information needed, the staff is asking Requests for Additional Information (RAIs).
- The staff will review the applicants' information, RAIs, and/or commitments to make reasonable assurance determinations that the effects of aging will be managed in the extended period.

