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Materials and Metallurgy & Plant Operations
Joint Subcommittee Meeting

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

MATERIALS AND METALLURGY AND PLANT OPERATIONS

SUBCOMMITTEES

+ + + + +

VHP CRACKING AND RPV HEAD DEGRADATION

+ + + + +

WEDNESDAY,

APRIL 23, 2003

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The Subcommittee met in the Commissioner's Conference Room (O-1G16), 11545 Rockville Pike, Rockville, Maryland, at 8L30 a.m., F. Peter Ford and John D. Sieber, Co-Chairmen, presiding.

PRESENT:

- F. PETER FORD CO-CHAIRMAN
- JOHN D. SIEBER CO-CHAIRMAN
- THOMAS S. KRESS MEMBER
- STEPHEN L. ROSEN MEMBER
- WILLIAM J. SHACK MEMBER
- GRAHAM B. WALLIS MEMBER
- MAGGALEAN W. WESTON STAFF ENGINEER

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SPEAKERS :

ALLEN HISER NRR

BRENDAN MORONEY NRR

CAYETANO SANTOS NRR

A G E N D A

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INTRODUCTORY REMARKS

Co-Chairman F.P. Ford, ACRS 3

Co-Chairman J.D. Sieber, ACRS

NRC INSPECTION REQUIREMENTS AND GUIDANCE

Allen Hiser, NRR 3

LLTF ACTION PLANS:

Brendan Moroney, NRR 142

Cayetano Santos, RES 176

GENERAL DISCUSSION AND ADJOURNMENT 188

P R O C E E D I N G S

(8:31 a.m.)

CHAIRMAN FORD: The meeting will now come to order. This is the second day of the meeting of the ACRS Joint Subcommittees on Materials and Metallurgy and on Plant Operations. I'm Peter Ford, Chairman of Materials and Metallurgy Subcommittee. My Co-Chair is Jack Sieber, Chairman of the Plant Operations Subcommittee.

Mag, I notice that most people in the room, in fact all of them in the room were here yesterday, so I would suggest that we don't go through all of the things. Yesterday, we covered presentations from Arlington Industry and some from NRC Research. Today we're concentrating on presentations from the reactor vessel head inspections from Allen Hiser, and also some work on the LLTF results. Allen. Any comments from the Committee Members before we start? I shall be asking the Committee Members for advice to the NRC for their presentation at the Full Committee next month.

MR. HISER: Good morning. I'm Allen Hiser with Materials and Chemical Engineering Branch of NRR. If you want to go to the next slide, Steve. Two days ago I thought this was going to be about eight or ten

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1 slides, but what I've done is tried to pull together
2 a lot of information from the last two refueling
3 outage inspection seasons that I think have some
4 significant results that you guys might be interested
5 in, a lot of photos from some of the visual
6 inspections and things like that.

7 What I want to do first of all though is
8 go through some background. There was some talk
9 yesterday about where we've been the last two years,
10 a little over two years. And what I want to do is go
11 through some of the more significant findings, and
12 where the NRC has interjected itself with various
13 communications, bulletins and the order. I would
14 endorse what Larry said yesterday that, you know, this
15 has been predominantly a reactive mode.
16 Unfortunately, I think we're still in that mode a
17 little bit with some of the findings at South Texas
18 and Sequoyah. We'll talk about that in a little bit.

19 After going through backgrounds, I want to
20 go through in some detail the orders that we issued
21 two months ago in terms of the inspection
22 requirements, and then describe some of the relaxation
23 requests that we've received, and show some graphics
24 that illustrate some of the issues that have been
25 raised in some of the inspections. Then I want to go

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1 through some recent plan experience dating back to
2 last fall with photos and things like that. Then
3 finally, I want to look forward to where we think we
4 will be with this issue in the regulatory framework
5 over the next few years. And then I want to -- the
6 last slide is sort of a bone to industry, with just
7 some things that we've been involved with them on, and
8 just some ideas on activities that we think that they
9 need to be involved in.

10 So flipping to the next slide, Slide 3,
11 within the United States, the main inspection findings
12 really started in the Fall of 2000, when Oconee Unit
13 1 identified deposits, and identified a nozzle with an
14 axial leak. The next season, Spring 2001, well, this
15 is when we became aware of the existence of problems.
16 Unfortunately, we keep -- the industry keeps finding
17 more problems as they look more and more, and that
18 trend will probably continue. But then in the Spring
19 2001, the first identification of circumferential
20 cracks occurred at Oconee Unit 2 and Oconee Unit 3.
21 To alleviate any concerns that this was an Oconee only
22 problem, ANO Unit 1 identified a leaking nozzle in
23 that same season. The NRC, in August 2001, issued a
24 bulletin that was focused on the safety issue, mainly
25 identification, prevention of circumferential cracks,

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1 and the emphasis of the bulletin was really on high
2 susceptibility plants.

3 And to take it a step further, at that
4 point in time, the accepted inspection approach was
5 visual inspections of the top of the head. For the
6 most part, these had never been performed before on
7 plants, and I think many licensees were surprised at
8 the items that they identified on their head from
9 Boron, from canoseal leaks, flange leaks, things like
10 that, to washers, screws and things like that from the
11 original --

12 MEMBER SHACK: But that surprises me a
13 little bit. I mean, ever since 9701 weren't they
14 doing visual inspections looking for the hundreds of
15 pounds of Boron?

16 MR. HISER: I think the hundreds of pounds
17 of Boron were generally looked for on the flange area
18 as a downstream location outside of the insulation.
19 I'm not aware that there was a significant effort at
20 doing bare metal visual, and maybe Larry can comment
21 on that.

22 MR. MATTHEWS: My recollection is that
23 most of the B&W plants were doing some type of
24 inspection on top of the head, but most of the other
25 plants were looking at the insulation and outside the

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1 insulation. They weren't looking at --

2 MR. HISER: And I guess in at least one
3 case that visual wasn't implemented very well, so the
4 NRC issued this bulletin in 2001, August, 2001.
5 Again, the emphasis was high susceptibility plants
6 trying to determine whether there were other plants
7 that had this issue with circumferential cracking.

8 In response to the bulletin, there were
9 numerous bare metal visual inspections implemented.
10 In the fall, two additional plants identified
11 circumferential cracking. I guess one new plant and
12 one old plant that first identified circumferential
13 cracking in the spring now found an additional nozzle
14 with a circumferential crack in the fall.

15 In addition, so now we're away from cir
16 cracks only being at Oconee. Now we've pulled in
17 Crystal River. At this point, all the leakage, all
18 the cracks have been identified in B&W plants. Surry,
19 North Anna Unit 2 identified leaks, did repairs, and
20 now we're outside of the B&W plants.

21 If we go to the next slide, page 4, as
22 we're all aware, about a year ago, Davis-Besse
23 identified head wastage, and in addition, they
24 identified at least one nozzle that had a
25 circumferential crack. In response to that finding,

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1 the NRC issued a bulletin in March of 2002, and in
2 this case, the focus was on the safety issue of RPV
3 head wastage. And this was the cracking issue again.
4 We thought we had some sort of an idea on
5 susceptibility so we had a priority ranking of plants,
6 high susceptibility, moderate, low susceptibility.
7 The concern that we identified here was that head
8 wastage may not be tied necessarily to nozzle leakage,
9 which is tied to susceptibility, but it could come
10 from other sources. You know, Boron from leaking CRDM
11 flanges, canoseals, canopy seals, you know, as we
12 found last fall. Other things, such as RVLIS valves
13 above the head, so this bulletin really encompassed
14 the entire PWR industry, all 69 plants. There was no
15 easy way to segregate the plants from --

16 MEMBER WALLIS: This is just RPV, it's not
17 the primary circuit. It's not the pressurizer, for
18 instance.

19 MR. HISER: Well, at this point, there
20 really were two emphases. One was on the head wastage
21 and a separate part of the bulletin addressed the rest
22 of the RCS. And the review of that is actually still
23 ongoing, and if you want more information on that, we
24 can provide that later.

25 CHAIRMAN FORD: Allen, I wonder if you

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1 could educate me. As I understand it, the monitoring
2 aspect of this up to this point was leakage rate,
3 which I understand the technical specification is one
4 gallon a minute. And I also understand that that is
5 based on allowable leakage rates coming from steam
6 generators.

7 CHAIRMAN SIEBER: It's based on what you
8 can detect, because it's done -- the leakage is
9 determined by doing a water balance.

10 CHAIRMAN FORD: Well, could you comment --
11 my French friends keep telling -- I recognize I keep
12 plugging this, but they do have a long experience, so
13 keep plugging it, one gallon per minute tech spec for
14 leakage rate is inappropriate for vessel head
15 penetrations. And they use acoustic monitors, et
16 cetera. Now has there been any thought process as to
17 why they've changed their tech specs, as regards to
18 leakage rates in the head, and the monitorings that
19 they use? Has any thought been put to that?

20 MR. HISER: Well, yeah. We have had some
21 discussions with them. I think everybody in the
22 United States would agree that one GPM is not
23 appropriate to the vessel head, the upper head or the
24 lower head. You look at --

25 CHAIRMAN FORD: The reason why I bring

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1 that up, I remember when Davis-Besse, giving a
2 presentation and they said oh, that was all right
3 because it was within the tech spec.

4 MR. HISER: Well, it's within tech spec
5 but there also are tech specs that say no reactor
6 coolant pressure boundary leakage, which you guys
7 discussed a little bit yesterday.

8 MEMBER WALLIS: One GPM is over a thousand
9 gallons a day. You think you'd find that somewhere.
10 It doesn't just disappear.

11 MR. HISER: Well, I think most of it ends
12 up --

13 MEMBER WALLIS: Well, the Boron doesn't
14 disappear. I mean, the steam does.

15 MR. HISER: Yeah. The water shows up in
16 various ways, in condensers, containment coolers.

17 CHAIRMAN FORD: I guess -- I'm not trying
18 to put you on the line, Allen. I'm just asking the
19 question for curiosity, that if other people who
20 operate a large number of PWRs, I understand have
21 changed that tech spec as it applies to the vessel
22 head penetration, and have put in monitoring devices
23 to control to a much lower rate. We haven't thought
24 along those lines at all. Is that correct?

25 MR. HISER: No. I think we've thought

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1 about those lines, and I think in the Lessons Learned
2 Task Force presentation this afternoon, you'll hear
3 more about the activities that we have to address
4 that.

5 CHAIRMAN FORD: Great.

6 MR. HISER: One of the concerns though is
7 that the leak rate is not -- that you get from nozzle
8 penetrations is not one GPM, it's not a tenth of a
9 GPM. It's on the order, at least from Oconee, ten to
10 the minus six GPM. That's a pretty small number, and
11 I'm not sure that there is any sensing, monitoring
12 that would enable you to identify that. This is -- I
13 think what we found is that these head penetrations
14 are very sensitive. The leakage just is not very
15 high, an additional attention is needed. Exactly what
16 form that takes, I think the -- and once the Lessons
17 Learned Task Force Action Plan is implemented, I think
18 we'll get to some reasonable answers on that.

19 CHAIRMAN FORD: Someone in NRC has gone
20 down that thought process.

21 MR. HISER: Well, I think at this point,
22 we have a process to go down that path. That's
23 exactly right.

24 MEMBER SHACK: Allen, as part of this --
25 I mean, did anybody discover any other serious defects

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1 in Boric Acid control programs and inspections, and
2 reports? Not just the RPV wastage, but I assume
3 people were looking at other aspects of the Boric Acid
4 control programs.

5 MR. HISER: Yeah, there is a large effort
6 that is looking at the programs that licensees have
7 implemented. We're doing audits at a few plants to
8 see how they have implemented what they've described
9 on paper. My understanding is that there is a wide
10 variety of plans. Some of very robust, very
11 aggressive. I think South Texas described to us that
12 their findings on their lower head were part of their
13 normal Generic Letter 88-05 inspection. Not many
14 plants had that sort of access, so there is a variety
15 of programs, implementations, access. If you do want
16 more information, there is other staff that's working
17 more involved in that area, so if that would be of
18 interest, we can arrange for some information on that.

19 MEMBER SHACK: It's of interest to me. I
20 mean, it seems to me there was a serious breakdown in
21 their 88-05 program at Davis-Besse.

22 MR. HISER: I think -- my understanding is
23 that the findings from Bulletin 2002-01 from the
24 Request for Additional Information, the audits, I
25 think overall the programs are being implemented in a

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1 fairly rigorous consistent manner. I think part of
2 the problem is that there may be differences in the
3 scope of the programs in terms of, you know, going
4 under insulation, having various access opportunities
5 at some plants, so there may be a wide variety of
6 results that one can get. So that is one of the areas
7 that I know other staff is looking at, is trying to
8 determine what best practices are, and try to overall
9 upgrade the qualities inspections and these programs
10 to a common level. Okay?

11 After the NRC -- after we issued Bulletin
12 2002-01, in that same inspection season, Millstone
13 identified part through- wall cracks in several
14 nozzles and did repairs. This was the first CE plant
15 that found cracking.

16 In response to -- so pretty much the
17 state-of-the-art at that point, last summer we issued
18 Bulletin 2002-02. Hopefully, as you'll see, the bar
19 is being raised a little bit as we issue these
20 bulletins. The focus this time was the overall
21 inspection programs for the head predominantly, not
22 the bulk of the RCS, mainly looking at the inspection
23 methods that were being implemented, and the frequency
24 of inspections in particular for high susceptibility
25 plants. The bulletin was providing guidance that

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1 non-visual NDE is necessary, and for high
2 susceptibility plants in particular, frequent
3 non-visual NDE.

4 Now the licensee responses were generally
5 vague on -- not so much on the next refueling outage,
6 but subsequent inspections. There weren't a lot of
7 commitments to any specific inspections or
8 frequencies. And many licensees cited the MRP-75
9 Program.

10 CHAIRMAN FORD: Now just to turn back to
11 the MRP-75 Program, there was an initial one which has
12 been not formally reviewed by you because it was
13 withdrawn. Is that correct?

14 MR. HISER: That's correct.

15 CHAIRMAN FORD: I think you mentioned
16 yesterday that on the revised REV-1 of the MRP-75, the
17 second version, you have received that and you are
18 reviewing it?

19 MR. HISER: No.

20 CHAIRMAN FORD: Is that correct? No.

21 MR. HISER: No. The -- I think zero is
22 the current revision. Correct, Larry? I'm getting
23 MRP-55 and 75.

24 MR. MATTHEWS: Yeah.

25 MR. HISER: One of them we already had --

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1 MR. MATTHEW: I may be getting them mixed
2 up too, but it seems like the first one we sent in was
3 dubbed REV-1, because just publication issues.

4 CHAIRMAN FORD: Well, the one I'm
5 referring to --

6 MR. MATTHEWS: They have not received the
7 revised one. That's what we intend to try to get to
8 the staff by the end of the summer.

9 CHAIRMAN FORD: Okay. And the original
10 MRP-75 which you started and then stopped, was the one
11 that we heard about in the summer of last year.

12 MR. MATTHEWS: Yes.

13 CHAIRMAN FORD: You presented this idea of
14 inspection periodicities. Okay. So that's been
15 withdrawn, and you're about to get a revised version.

16 MR. MATTHEWS: It should probably -- the
17 main reason it was withdraw was that it was based on
18 the premise that a visual inspection was completely
19 adequate, and North Anna 2 kind of brought that into
20 question in the Fall of '02.

21 MEMBER WALLIS: Are you folks concerned
22 with the precision and sensitivity, and so on of these
23 inspection methods?

24 MR. HISER: Yes. Clearly.

25 MEMBER WALLIS: I think that would be very

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1 important.

2 MR. HISER: Yes.

3 CHAIRMAN FORD: Will you be talking about
4 that, because remember yesterday we showed some
5 concern about quantification of the techniques in
6 terms of sensitivity, real versus observed, and the
7 question of the qualification of the inspectors. And
8 will you be talking that at all today?

9 MR. HISER: I don't have plans to talk
10 about that. I think sort of to summarize, I think as
11 the industry representatives pointed out yesterday,
12 that statistics really aren't there to do any formal
13 POD calculations.

14 CHAIRMAN FORD: I think several of the
15 members are roughly coming around to the conclusion
16 that the key to this -- the management of this whole
17 issue is adequate inspection at adequate timing. And
18 the timing aspect comes under MRP-75 arguments. The
19 technique --

20 MR. HISER: Right now it comes out of the
21 order.

22 CHAIRMAN FORD: Correct. But the
23 technique, you know, we need to understand. We need
24 to understand how well qualified are those techniques,
25 and who is qualified.

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1 MR. HISER: Yeah. I think the
2 state-of-the-art, the ability to quantify will
3 improve. I think at the present time, we believe that
4 the inspections are effective, and are appropriate.
5 Clearly, there will be room for improvement. We can
6 maybe talk about presenting some information in the
7 future.

8 CHAIRMAN FORD: Well, maybe at the --
9 because if you say it's adequate and appropriate are
10 rather qualitative phrases.

11 MR. HISER: Yes. Okay. If you turn to
12 slide 5, this past fall had several new findings, if
13 you will. North Anna Unit 2 identified prevalent weld
14 cracking in the J-groove welds. They did find a leak
15 from a repaired nozzle, and I do have some information
16 on that, that I'd like to share with you later. And
17 in addition, as Larry pointed out yesterday, in at
18 least one, and I guess several nozzles, there appears
19 to be circumferential cracking on the OD of the
20 nozzles at or below the weld groove, without Boron
21 deposits on the head. And clearly, this is a
22 structurally very significant location. If that crack
23 were to propagate sufficiently, then you could end up
24 with a nozzle ejection sort of event.

25 In addition, last fall, ANO Unit 1

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1 identified the leak from a repaired nozzle. I have
2 some information on that, on how that repair was made
3 and the location of the probable leak path. Similarly
4 to North Anna 2, Oconee Unit 2 identified nozzles, or
5 at least one nozzle I guess that had through-wall
6 cracking, and apparently path from the inside of the
7 RCS to the outside, but there were no deposits, Boron
8 deposits on the RPV head.

9 MEMBER WALLIS: Was it leaking?

10 MR. HISER: I don't believe -- no, there
11 were no deposits visible on the head.

12 MEMBER WALLIS: You say it wasn't leaking,
13 it's not clear to me -- you might not have certain
14 cracks that, as I said yesterday, would spit out the
15 Boron in some other form that you wouldn't actually
16 see on the head. It could actually be carried out in
17 the steam as particles or something.

18 MR. HISER: This is the first nozzle that
19 I'm aware of that the industry has identified as from
20 the MDE measurements, you would conclude that it has
21 a through-wall leak path, but no deposits on the head,
22 so I'm not -- at least from experience to date and
23 with many of the high susceptibility plants at this
24 point, they have performed NDE of 100 percent of their
25 nozzles. So this is -- this may be a quirk of the

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1 ultrasonic uncertainty, or it may be that we have some
2 sort of a new phenomenon going on. Unfortunately,
3 before this was identified as a potential issue, the
4 repair had been made, and the material was machined
5 away, so we don't have -- other than the UT data,
6 there really is not a good way to go back and do
7 additional work on this.

8 In addition, at the Sequoyah Unit 2
9 facility, there was upper head corrosion identified.
10 And in this case, the source was not nozzle leaks, but
11 it was from a source above the head. And again on
12 this, I want to show you some photos later that go
13 into a little bit more detail on that.

14 MEMBER WALLIS: These research programs,
15 are they trying to figure out why it's popcorn, or why
16 it's spaghetti, or what other forms the Boron might
17 take from a leak?

18 MR. HISER: I'm not aware that the NRC
19 research is looking at that.

20 MEMBER WALLIS: Is there someone looking
21 at the various forms that Boron could take from a
22 leak? It seems to me, assuming -- first of all, we
23 thought it was popcorn, then we see spaghetti, and
24 there could be all sorts of other ways in which the
25 Boron could form and could go someplace.

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1 MR. HISER: Yeah. I'm not aware that our
2 Office of Research is doing anything in that area.

3 MEMBER WALLIS: I think you should monitor
4 what's going on. So you're not aware that industry is
5 doing something similar?

6 MR. HISER: I'm not aware of any work that
7 the industry is doing. As far as the NRC is
8 concerned, we want to avoid leaks. We think that's
9 the --

10 MEMBER WALLIS: So basically, you assume
11 that if there was a leak you'd see Boron popcorn.
12 This is a question that we've raised before.

13 MR. HISER: I think the assumption maybe
14 at this point is not that popcorn would be the
15 evidence, but you would see some sort of record of
16 Boron on the head. And again not to jump ahead, but
17 there are some findings at North Anna Unit 1 that I
18 want to talk about later, of maybe a transition in the
19 form of the Boron deposit on the head from one cycle
20 to another. And I think two years ago, we thought
21 popcorn was really what the industry should look for.
22 I think as we're finding now, almost any sort of
23 deposit requires some additional attention to
24 determine whether there is a leak path.

25 MEMBER ROSEN: Allen, have we got

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1 sufficient regulatory controls in place now to prevent
2 the disturbing phenomenon of people finding leaks and
3 destroying the evidence with repairs and so on? Have
4 we got enough in place to make people pause and let us
5 look at this thing? We're in the middle of a research
6 program. We don't want this stuff disturbed before we
7 get our arms around it, and decide how to look at
8 things.

9 MR. HISER: At this point, we don't have
10 any regulatory ability to prevent them from doing
11 repairs.

12 MEMBER ROSEN: And disturbing the
13 evidence.

14 MR. HISER: And disturbing, destroying,
15 yes. We had a commitment a year and a half ago from
16 Davis-Besse that if they identified cracks, they would
17 take all reasonable measures to preserve the evidence,
18 if you will. Well, when it came time to do the
19 repairs they found that there were no convenient
20 measures to preserve the evidence, and so it was
21 destroyed. It's -- what it really comes down to I
22 think is an economic decision by licensees.

23 MEMBER ROSEN: Well, we can help them with
24 that decision. Right? With enough regulatory --

25 MR. HISER: At this point, I don't think

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1 that there is a sufficient regulatory, I won't say
2 interest, but for an individual licensee it's not
3 sufficiently in their interest to --

4 MEMBER ROSEN: Well, I see that as a
5 weakness of our program.

6 MR. HISER: I would not disagree. I think
7 -- in all honesty, I think --

8 MEMBER KRESS: They would never pass it
9 back to them though. And it's not a compliance issue,
10 I don't think.

11 MR. HISER: I'm sure Larry would agree, as
12 well, that we would love to have more information on
13 all of these leaks, and cracks, and things, because it
14 makes our job easier, it makes the industry's job a
15 lot easier. The more information, the better you can
16 understand and hopefully be able to predict what's
17 going to happen next. We're somewhat hamstrung by
18 that, but we do have other regulatory requirements
19 that intercede, such as backfit.

20 Okay. Then this past February, the NRC
21 did issue an order, February 11th, and that provides
22 specific inspection requirements for all PWRs. The
23 next few slides, I'll go through the various
24 parameters and requirements in the order. More
25 recently, this past spring, we continue to see new

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1 things. Sequoyah Unit 1 identified a Boron deposit on
2 a nozzle or at a nozzle. Sequoyah Unit 1 is a low
3 susceptibility plant. I believe out of 69 plants
4 they're like number 67, something like that. I'll
5 talk more about that, and how they appear to have
6 resolved that finding.

7 In addition, some discussion yesterday
8 about South Texas Unit 1, Boron deposits on the lower
9 head. Again, this is a low temperature condition. I
10 have some information on the EDY level of that, and
11 how that fits in overall. Okay?

12 MEMBER ROSEN: Not quite. Could you go
13 back a minute. Is this South Texas situation the
14 first time that Boron deposits have been reported on
15 the lower head anyplace?

16 MR. HISER: No. There have been several
17 instances of Boron identified on the lower head, or on
18 the insulation below the lower head. One -- probably
19 the most publicized situation at this point is
20 Davis-Besse, where there were streaks of Boron and
21 rust running down the sides of the head onto the lower
22 head.

23 MEMBER ROSEN: Let me rephrase my
24 question. Is this the first report of Boron deposits
25 on the lower head that came from the lower head?

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1 MR. HISER: This appears to be. This
2 appears to be. Every other instance where Boron has
3 been identified on the lower head, there's been some
4 uncertainty about the source of it. At South Texas,
5 we have been told that there are no streaks or trails
6 that lead from higher elevations down to these
7 nozzles.

8 MEMBER ROSEN: Now isn't it a little
9 curious to you that a plant with 2 EDY would be the
10 first place to report this?

11 MR. HISER: There are many things that --
12 many parts of this that we may not -- you know, they
13 may be plant-specific situations. South Texas did a
14 bypass flow conversion four years ago. The Boron they
15 dated dates back four years. Is there some tie to
16 that? It may be fabrication related. I mean, there
17 are many aspects of this, and that's one of the
18 reasons right now with South Texas we have
19 observations. We don't have any real understanding of
20 where the leakage is coming from, be it from the weld,
21 from the nozzle base material. Is it fabrication
22 related? Is it a stress corrosion cracking sort of
23 mechanism? Is it a fatigue mechanism? Is it
24 vibration related? I mean, there are many
25 possibilities, and the implications of each of those

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1 are radically different.

2 MEMBER WALLIS: But you can date the
3 Boron, so you know when it was deposited.

4 MR. HISER: Well, we can date the Boron
5 that's available on the surface of the head. The
6 J-groove weld is about 7 inches up inside the head.
7 You have that full length that probably is full of
8 Boron, and we can only sample the surface right now.
9 It may be that the Boron at the top of that annulus
10 may be younger.

11 MEMBER WALLIS: Based on the stuff inside
12 could be younger.

13 MR. HISER: Right.

14 MEMBER WALLIS: Or it could be that it
15 came out four years ago and nothing happened since.

16 MR. HISER: Given the low leak rates, I
17 would be surprised that you'd get something, and then
18 nothing over four years.

19 MEMBER WALLIS: In the paper I think
20 yesterday or the day before, somebody from NRC - I've
21 forgotten his name - did report there were no other
22 incidences of bottom head cracking. And I assume he
23 meant in PWRs worldwide. I guess that was based on a
24 fairly extensive look at the operating records
25 worldwide.

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1 MR. HISER: I'm not sure what the basis of
2 that statement would have been.

3 MEMBER WALLIS: I agree with you. I
4 haven't heard of any, but that doesn't mean to say
5 that --

6 MR. HISER: Our understanding is that the
7 French have identified some fabrication-related
8 defects.

9 MEMBER WALLIS: Yes.

10 MR. HISER: There was a Japanese situation
11 recently. I don't -- I believe they identified that
12 possibly as cracking. It was a very shallow --

13 MEMBER WALLIS: Yeah, but in relation to
14 the potential unusualness of this event, maybe we need
15 to do a lot more looking into the literature and
16 records before we come to the conclusion that this is
17 a one-off situation, and it could never occur again.

18 MR. HISER: Well, I'm --

19 MEMBER WALLIS: I know you didn't say
20 that.

21 [THE DISCUSSION HAS BEEN REMOVED DUE TO
22 PROPRIETARY INFORMATION]

23

24

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MEMBER WALLIS: Are there any plans at all within NRR to look at BWR bottom head penetrations --

MR. HISER: I am not --

MEMBER WALLIS: -- which are predominantly operating under hydrogen water chemistry?

MR. HISER: Hopefully sometime later this morning we'll have another staffer who can provide you with an update on the situation with BWRs.

MEMBER WALLIS: Okay. Someone has that. That's fine.

MR. HISER: Yes.

MEMBER WALLIS: Good.

MR. HISER: Okay? If we turn to slide 6, just to -- what I want to do now is just go over the orders, the inspection requirements, and the orders, and some of the reasons that we thought it was necessary to issue orders. The orders were issued February 11th to all PWRs, all 69 plants. The basis was adequate protection. In particular, ASME Code Inspections of the upper head are inadequate, revisions to inspection requirements in the ASME Code are not imminent. I guess maybe what I should say is

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1 acceptable revisions. The ASME Code has been
2 considering MRP-75 as the basis for possible
3 revisions, and we have many exceptions to what's in
4 MRP-75 as it was issued last summer. Clearly, RPB
5 head degradation and nozzle cracking pose safety risks
6 if they're not promptly identified and corrected. And
7 I think we have ample evidence of that.

8 The orders that when we were in the mode
9 of issuing bulletins, bulletins do not have
10 substantial regulatory weight. In effect, what we've
11 done with the bulletins is we've induced commitments
12 from licensees to do voluntary inspections. There
13 were no regulatory teeth to the bulletins. We were
14 able to get many plants to do inspections that they
15 had not intended to do, and I think that's a credit to
16 those plants, maybe a credit to our management's
17 ability induce action from licensees. The basis of
18 the orders was to put clear regulatory weight behind
19 requirements in this area. And I guess just to be
20 clear, as well, we do not intend the orders to be a
21 permanent part of the regulatory structure.

22 Clearly, the regulations, 10 CFR 50.55a is
23 the appropriate place to put permanent requirements.
24 These orders are interim until we have requirements
25 that we can either reference within 50.55a, or we may

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1 have to put in specific requirements in 50.55a. We
2 prefer to endorse ASME Code. If that's not possible,
3 then we'll have to have some alternates to 50.55a.

4 Turning to the next page, just to outline
5 the requirements in the order, there is a requirement
6 to calculate the effective degradation years as an
7 estimate only of the susceptibility of plants to
8 cracking. We do not perceive EDY as having a very
9 high precision. What it is, is a way to relatively
10 bin plants, to put them into appropriate inspection
11 regimes. Time and temperature are the only two
12 parameters, and it is -- you know, it may be that the
13 first decimal or the digit to the left of the decimal
14 is not very accurate, but I think at this point that
15 we're comfortable with the way that it's binning
16 plants, and with the findings of plants so far.

17 For high susceptibility plants, the order
18 requires bare metal visual examination at each
19 refueling outage, and also non- visual NDE of each
20 nozzle at each outage. For moderate susceptibility
21 plants, it again calls for bare metal visual and
22 non-visual NDE, but these are at alternating refueling
23 outages. And each moderate susceptibility plant must
24 do one inspection each outage. You can do a bare
25 metal visual this outage, the next time you do

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1 non-visual, bare metal non-visual. You have to
2 alternate between the two. You can't do both this
3 time, and then next outage not do anything. We didn't
4 think that was appropriate given the susceptibility of
5 these plants.

6 For low susceptibility plants, the
7 requirements are scaled down a bit. Bare metal
8 visuals must be completed by the next two refueling
9 outages, and then they are to be repeated every third
10 refueling outage, or every five years thereafter.
11 Non-visual must be completed initially by 2008, so
12 five years from now, and then repeated every fourth
13 refueling outage, or seven years thereafter.

14 CHAIRMAN FORD: This is a very
15 prescriptive approach, which I guess is the only way
16 you can do it. The only thing that would worry me is
17 waiting two refueling outages before doing a bare
18 metal visual, where we now know that the bare metal
19 visual is not absolutely reliable, given the North
20 Anna experience. Surely, that must be backed up by
21 some fairly sound rationale, i.e., an extreme case,
22 I've got a new head. Doesn't that have to be backed
23 up by some sound reasoning, I would imagine, as to why
24 you would not expect -- beyond the prioritization
25 algorithm.

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1 MR. HISER: Yeah. I think the basis of
2 that is findings to-date, and the low susceptibility
3 of these plants. It's not considered to be a likely
4 event that you'll have a crack --

5 CHAIRMAN FORD: But the likeliness is
6 based solely on this algorithm, which we are now
7 questioning?

8 MR. HISER: Well, I think there's -- in
9 terms of binning for the purposes of this order, I
10 don't think that there are a lot of questions that the
11 susceptibility model is a reasonable way to relatively
12 bin the plants, based on that reasonableness, and the
13 experience to-date. I think for the low
14 susceptibility plants, there is a low expectation of
15 findings for leakage. And clearly, as additional
16 inspections are performed, we need to go back and look
17 at that, the assumptions that go into that. That is
18 why the Sequoyah findings earlier this year, South
19 Texas now on the lower head, you know, they have the
20 potential for major upsets to the process that's laid
21 out right now. But with the findings that we have to
22 -date, and I think Bill Cullen's chart yesterday
23 showed that fairly well, you know, the problems have
24 been at high EDY levels, with circumferential cracks,
25 leaks, and many nozzle cracks.

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1 There still are plants up there at high
2 EDY levels that found no cracking. In spite of very
3 intensive inspections of both the welds and the
4 nozzles, they found nothing.

5 CHAIRMAN FORD: I agree with you that the
6 order, my personal opinion that the order is
7 absolutely appropriate as it was drafted at the time.
8 Since then, we've had Sequoyah, which has now gone
9 away, and we've got South Texas, and we don't know
10 whether it's going to go away or not. If it doesn't
11 go away, then there's a big question on where you
12 stand on these random tables until you know why -- if
13 it does occur.

14 MR. HISER: Well, that's --

15 CHAIRMAN FORD: And I'm assuming that you
16 are going through either this talk or the next talk to
17 show how your plan is going to be compliant enough so
18 you can respond to these new phenomena as they occur.
19 Is that in the next talk that we're going to be
20 hearing of your's, just looking through the hand-
21 outs. They are talking about the plan as to where
22 they're going to go?

23 MR. HISER: Yes.

24 CHAIRMAN FORD: Correct. Good. Okay,
25 then.

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1 MR. HISER: Yeah, I think that plan though
2 maybe is more forward looking than where these orders
3 are right now.

4 CHAIRMAN FORD: And that's what I'm
5 looking for.

6 MR. HISER: We have told the industry, and
7 I think a clear expectation is that as new information
8 becomes available, we may need to revise the orders.
9 And I think that that may take various forms. It may
10 be to relax generically some of the requirements of
11 the orders. For example, the nozzle coverage that's
12 in there right now. It may be that for some classes
13 of plants, that more aggressive inspections may be
14 necessary. But, you know, it more or less is a
15 continuous process, as new information becomes
16 available. Sequoyah became available. What's the
17 impact? What do we need to do to the orders? South
18 Texas, what's the impact? What do we need to do?

19 I mean, it's sort of hard to speculate
20 because the potential sources, you know, for Sequoyah
21 or south Texas are -- there are too many aspects to
22 it, so in one sense I think we need to let the
23 information mature, let the licensees develop a little
24 bit more information.

25 For Sequoyah, it appears that there may

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1 not have been nozzle leakage, so all the speculation
2 related to that was for naught. You know, with South
3 Texas, you know, maybe we need to start thinking a
4 little more seriously, but we still need the
5 information. Where is the leakage coming from? Is it
6 fabrication, service-induced? You know, those are the
7 kinds of answers that we can't come up with. The
8 licensee has to be able to develop that information.

9 MEMBER KRESS: What is your view on the
10 relative safety significance of leak in the instrument
11 tube and the bottom head versus a leak in the control
12 rod drive mechanisms in the top head?

13 MR. HISER: I'm not a risk person, but I'm
14 told that the risk consequences are much different
15 between the two. On the lower -- and my understanding
16 is that --

17 MEMBER KRESS: The lower head has a chance
18 of draining the vessel, and interfering with TCCS.

19 MR. HISER: Right.

20 MEMBER KRESS: The upper head has a chance
21 of interfering with the control rods and just
22 depressurizing. I think the risk implications are
23 much different.

24 MR. HISER: The one way it was described
25 to me was that on the upper head, if you are venting

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1 steam, you're losing -- you're releasing a lot of
2 energy, and you can depressurize, which allows you to
3 get more water sources to fill the vessel.

4 MEMBER KRESS: Right.

5 MR. HISER: On the lower head, you're now
6 draining water. You know, the energy that you're
7 draining out is not --

8 MEMBER KRESS: How fast can you drain it
9 is an issue.

10 MR. HISER: Right. So there's -- clearly,
11 the challenges are much different between the two.
12 But again, I'm not a risk person, so I really can't
13 talk in too much detail on that.

14 MEMBER KRESS: Do you envision potential
15 inspections other than visual of the bottom head?

16 MR. HISER: At the present time, no U.S.
17 plant has done a non-visual on the lower head.

18 MEMBER KRESS: It would be hard to do.

19 MR. HISER: It is difficult. There have
20 been inspections in Europe that we're aware of. It
21 requires substantial dismantling of the core internals
22 to gain access there. For a routine, if you will, 100
23 percent lower head inspection, there may be different
24 steps you'd want to take versus, for example, for
25 South Texas where two specific nozzles are suspected,

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1 and you really need to find out what's going on. It
2 may be that you could apply different approaches to
3 this too. It has not -- the challenge I think is very
4 significant for South Texas, as an example.

5 But I guess in a similar vane, two and a
6 half years ago, nobody was doing UT inspections of the
7 upper heads, and as conditions warrant, and clearly
8 the inspection requirements and needs have to ramp up
9 to meet the challenges.

10 MEMBER KRESS: We had an internal
11 discussion on some potential acceptability of leaks,
12 and it seems like it may be more acceptable to
13 actually have a leak at the bottom head than the top
14 head, in the sense of the risk-benefit. Wait for a
15 leak and then fix it, as opposed to look for cracks
16 and fix the cracks before they leak.

17 MR. HISER: My only concern would be that
18 how far -- how close can you approach margins of
19 safety before you're able to identify the issue? If,
20 for example, one or two lower head nozzle ejections or
21 failures could lead you to an undesirable,
22 significantly undesirable state. You need to make
23 sure that you have sufficient margin time-wise between
24 when you would get to that potential ejection
25 condition, and you're able to identify it.

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1 I think one major problem with the lower
2 head is you have a small diameter nozzle, a thinner
3 wall. Assuming equal crack growth rates, which
4 clearly isn't the case if you're at much lower
5 temperature, although you may have stress issue -- I
6 mean, there may be a lot of specific issues on the
7 lower head. I'm not sure that I'd want to go out and
8 say that leakage on the lower head is not as
9 significant as on the upper head, because of those
10 kinds of considerations. What you want is a lot of
11 time margin from identifying to potential accident
12 conditions, and I'm not -- I don't know that we
13 understand the lower head enough to understand how
14 those parameters fit together, how much leakage you
15 get from cracks and things like that. There are a lo
16 of areas we haven't looked at.

17 MEMBER WALLIS: Well, what are the
18 requirements for inspecting the lower head?

19 MR. HISER: ASME Code says that you, in
20 effect, look at accessible areas. For many plants,
21 they have insulation. It's - -

22 MEMBER WALLIS: The Boron, management --

23 MR. HISER: It's for identification of
24 leakage and normally Boron deposits are the first
25 sign.

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1 MEMBER WALLIS: There's no NRC, there's no
2 new NRC requirement.

3 MR. HISER: At the present time, there's
4 nothing. It is one of the things that has been on our
5 radar with our interactions with the industry. The
6 upper head issues and new findings, you know, every
7 six months outage after outage has really preoccupied
8 us to focus on that area. South Texas, if confirmed,
9 is service-induced cracking that would be -- have a
10 significant impact on what we're doing.

11 MEMBER WALLIS: Well, I guess when this
12 started, we said you can bring out these orders. Have
13 you thought about what your response would be if you
14 started to find various things, and I think the
15 response was well, we'll sort that out when we get the
16 evidence.

17 MR. HISER: Right.

18 MEMBER WALLIS: Rather than thinking
19 ahead, that if we find something, this is what we're
20 going to do.

21 MR. HISER: Well, I think people have in
22 their own minds what would be appropriate actions.
23 But again, we need to have an understanding of what's
24 going on. I think to just have sort of a knee-jerk
25 reaction is not appropriate overall.

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1 MEMBER WALLIS: No, but it might be worth
2 it if we could figure it out ahead of time, is all.
3 Maybe you don't even want to tell us what you've
4 thought out ahead of time. It's a bit like the war
5 and the peace. When you fight the war, you have to
6 think about peace, so you've got to think ahead as to
7 what you're going to do when situations develop.

8 MR. HISER: The bottom of this slide we
9 talked earlier about non-visual NDE. And maybe,
10 Steve, if you go to the next picture, it's not real
11 clear. Unfortunately, it's in color but it's not
12 showing up real well. Yeah, it's sort of hard to see
13 the green area.

14 The bare metal visual inspection again
15 covers the entire upper head surface, sort of as
16 illustrated there.

17 MEMBER WALLIS: It doesn't cover the tube
18 though. You sort of just look at the head. You don't
19 look at what's going on along the tube? I think that
20 would be interesting too, if something is running
21 down, or something is spraying up, or anything. You
22 ought to look at the tube.

23 MR. HISER: Well, I think it's a natural
24 consequence that you look at the tube when you look at
25 the head. I mean, it's hard to avoid that. If you

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1 look at some of the videos from the remote
2 inspections, you see pretty much everything. You see
3 the insulation. I mean, you can get a real good
4 understanding of what's going on. But, you know, just
5 to illustrate the area that's covered by the bare
6 metal visual, then the ultrasonic inspection area
7 really is the inside diameter of the tube itself. The
8 order specifies two inches above the J-groove weld
9 down to the bottom, and the order also indicates that
10 you do -- that you look for cracks in the nozzle base
11 material, and you also have to do an evaluation of
12 leakage through the interference fit zone, as a
13 reminder that interference fit zone is located above
14 the J- groove weld.

15 Then the other alternative is a wetted
16 surface inspection, and it's nice to see if you can
17 see it in color. The red area is again two inches
18 above the J-groove weld down to the bottom, on the ID
19 of the nozzle, the OD of the nozzle up to the weld,
20 and then the surface of the J-groove weld is covered
21 by that.

22 MEMBER ROSEN: What keeps the wetted
23 surface area limited to just two inches above the
24 weld?

25 MR. HISER: That is the area that has --

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1 that covers the highest stresses from the J-groove
2 weld. Beyond -- actually, a little bit less, at two
3 inches the stresses are almost zero.

4 MEMBER ROSEN: But it's wet above that.

5 MR. HISER: Yeah.

6 MEMBER ROSEN: Well, it says "wetted
7 surface" inspection, but the wetness goes all the way
8 up, obviously.

9 MR. HISER: Yeah, absolutely. But in
10 terms of the significant area for this cracking issue,
11 two inches above the weld encompasses all the areas of
12 concern. But I guess the one point to make is that
13 the UT does not cover the J-groove weld, because it
14 addresses cracking in the nozzle base material itself.
15 It provides an assessment of whether there is leakage
16 from the J- groove weld. For example, if you have a
17 weld crack that's just broken through and started to
18 leak, you may not have deposits on the top of the
19 head, but you, in effect, already have a leak
20 starting. This leakage assessment provides sort of a
21 precursor indication of whether you have leakage
22 through the J-groove weld.

23 MEMBER SHACK: But again, how would you
24 see that in the UT?

25 MR. HISER: You see a pattern through the

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1 interference fit zone that is --

2 MEMBER SHACK: Looking at the back
3 reflection.

4 MR. HISER: Right. And that is a topic
5 all on its own on that. We've had a lot of
6 discussions with --

7 MEMBER SHACK: How about reliability of
8 inspection, reliability of detection of a leak path.

9 MR. HISER: Our understanding is that
10 nozzles that have had deposits on the head, they've
11 identified leak paths in every case. It is not a
12 standardized demonstrated approach, but it does
13 provide additional information about the condition of
14 the weld, without doing a direct examination of the
15 weld.

16 MEMBER SHACK: But is the guy looking for
17 -- every time he does the UT, he's looking for a leak
18 path also? He's looking for his cracked tip
19 reflection, obviously, but he's also doing an
20 inspection for a leak path?

21 MR. HISER: Absolutely. Yes. Under the
22 requirements of the order, they have to be able to
23 make that assessment. Now there are some nozzles,
24 such as the head vent line, that does not have an
25 interference fit. It has a clearance fit for the

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1 whole length of it. What licensees have done at
2 leakage assessment, is that they've done PTs of the
3 J-groove weld to demonstrate the integrity of the
4 weld.

5 MEMBER SHACK: Suppose he does the UT, and
6 he can't see a leak path. Does he then have to go
7 back and do a wet metal exam of the J-groove weld?

8 MR. HISER: Not by the requirements of the
9 order. But for a nozzle like the vent line that does
10 not have an interference fit, you can't do that leak
11 path assessment, so you need to do that leak
12 assessment through an alternative means, Pts or eddy
13 current of the J-groove weld is one way to do that.

14 MEMBER SHACK: If he can't establish a
15 leak path, why doesn't he have to go back and do that?

16 MR. HISER: If you cannot?

17 MEMBER SHACK: Yeah. I mean, I assume --

18 MR. HISER: Well, if you've interrogated
19 that area and do not find the characteristic
20 signature, so you appear to have metal-to-metal
21 contact, then it's not -- I mean, you've demonstrated
22 that there is no leakage through that area.

23 MEMBER SHACK: Well, the argument is that
24 the leakage creates a path, not that you're
25 demonstrating there is a path for leakage so that if

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1 you had a leak you would see a leak.

2 MR. HISER: Right.

3 MEMBER SHACK: That's not what you're
4 demonstrating. You're arguing that you've somehow got
5 some pseudo erosion of the --

6 MR. HISER: Erosion deposits, corrosion of
7 the ferritic head. Many possibilities. We've looked
8 at this in fairly good detail. We really need to look
9 at it in much greater detail at this point.

10 If we turn to the next page, there are
11 explicit requirements and criteria in the order for
12 inspection of repaired nozzles and welds. There may
13 be certain ASME requirements that would indicate that
14 you would not have to look at those, but the order
15 explicitly calls that out as a requirement. In
16 addition, in response to the Sequoyah findings last
17 fall of above-head Boron source, each licensee at each
18 refueling outage must look above the head to identify
19 possible Boric Acid leaks. If they do find something
20 coming down, then they have to do some follow-up
21 inspections of potentially effected head areas and
22 nozzles, which is to ensure that there aren't any
23 adverse effects. Again, I'll have some photos from
24 Sequoyah that will point out some surprises, I think,
25 that were not anticipated.

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1 Flaw evaluation is per -- as described in
2 the order is per NRC guidance. In particular, a
3 letter from Jack Strosnider to NEI dated Fall, 2001.
4 In addition, two weeks ago, we issued a revised set of
5 guidance, and I believe that's consistent pretty much
6 in detail with the ASME Code. Like I say, they
7 recently passed requirements for flaw evaluation.
8 This is consistent with that, although there are a few
9 places within this document that we've issued that we
10 explicitly say that repairs are necessary, whereas the
11 ASME Code leaves it as to subject to interaction
12 between the licensee and the regulator.

13 CHAIRMAN FORD: The velocity K-curve
14 that's given in this letter, the Jack Strosnider
15 letter, is that the same as the MRP?

16 MR. HISER: That's the 75-50 MRP curve.

17 CHAIRMAN FORD: Okay.

18 MR. HISER: And I think what's described
19 in the cover letter is that the staff has not
20 completed its review of MRP 55, so that would be
21 subject to modification should we find it necessary to
22 do that. At the present time, we think that's the
23 best representation of crack growth.

24 MS. WESTON: You all have copies of the
25 letter from yesterday.

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1 MR. HISER: Okay. One thing that caused
2 a little bit of stir I think in the industry, is that
3 the order requirements are applicable to new heads, as
4 well. That includes Alloy 600 nozzle heads, such as
5 the one that Davis-Besse has put on, and also the
6 Alloy 690 heads that North Anna 2, North Anna 1, and
7 over the next several years probably about two dozen
8 plants will have one on their heads. And I think
9 there was a lot of discussion yesterday about the
10 staff position on that, the need for additional
11 information to support specific orders for Alloy 690
12 heads. In addition, 60 days after restart, plants are
13 required to provide a post outage report with details
14 of their inspection findings.

15 Turning to the next page, licensees do
16 have various options in responding to the order. The
17 first item is already passed. Within 20 days they
18 could request a hearing, or request a time extension
19 to respond. No licensee did that. All 69 provided
20 responses indicating that they would implement the
21 order, as written.

22 Licensees can request the Director of NRR
23 to relax or rescind specific requirements of the
24 order. WE'll talk about that a little bit later with
25 the requests that we've had for relaxation at this

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1 point in time. Those relaxation requests are being
2 handled using the same process that we use for ASME
3 Code reliefs, but there are some specific changes to
4 that. As an example, our Office of General Counsel
5 has indicated that licensees must have relaxation
6 approvals in-hand before restart. That's a difference
7 from relief requests, where we're able to get verbal
8 reliefs.

9 One of the questions we've gotten from
10 many quarters is why did you guys need to issue
11 orders? As I talked about earlier, the past process
12 of regulating by bulletins really wasn't effective.
13 It didn't have the regulatory weight. In some cases,
14 it was inconsistent because we didn't have clear
15 requirements. Licensees may come in and say we're
16 going to do what the bulletin says. Other licensees
17 may come in with a lesser program, that still provided
18 some relevant information, so we had a little bit of
19 inconsistency. Frankly, it was a very unstable
20 environment, issuing three bulletins over the course
21 of a little over 12 months.

22 In addition, rule-making to implement
23 changes to 50.55a takes time. If we knew right now
24 what we wanted to put in 50.55a, it wouldn't be in
25 place for probably a minimum of two years. And orders

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1 have the regulatory weight. They also have some
2 flexibility to them. They can be revised or rescinded
3 as necessary, presumably not on a frequent basis.
4 But, for example, if we have new findings from spring
5 outages, we could modify the orders as appropriate to
6 address those findings.

7 In addition, based on Bulletin 2000-202
8 responses, the inspection plans for the next refueling
9 outages were generally acceptable, but the out years
10 beyond that, there was a lot of uncertainty as to what
11 the requirements would be. What we've done with these
12 orders is provided a clear field so that licensees can
13 plan their inspections. There's no uncertainty at
14 this point of is the NRC going to issue another order,
15 or another bulletin. Can we modify things? The
16 orders provide clear requirements.

17 In addition, a new item that wasn't
18 addressed by the prior bulletins was head leakage or
19 leakage from above the RPV head from flanges,
20 canoseals, or any other components up there that could
21 cause undetected RPV head degradation. The orders
22 clearly address that, and have specific requirements
23 in that area.

24 Now the next stage, and for the next
25 several pages I want to describe some of the

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1 relaxation requests that we've been presented with,
2 that show some graphics, just illustrating the kinds
3 of issues that licensees have had. There have been
4 limitations to nozzle access, both above the J-groove
5 weld and below the J-groove weld. Above the weld,
6 there are various features. One plant in particular
7 had centering tabs, and a step in the diameter of the
8 nozzle above the weld. Steve, if you put up the next
9 page, this just shows what we're talking about in this
10 area.

11 This is again above the weld. The
12 specific area is called a sleeve expansion point. The
13 curly area is in the annulus between the nozzle, which
14 is on the left, and the thermal guide sleeves, which
15 is in the middle. These expansion points have really
16 two parts. One is that they directly preclude
17 instrument insertion above that area. In addition,
18 there's a step in the nozzle inside diameter below
19 there that prevents coupling of the transducer to the
20 nozzle, so that creates, in effect, an inability to
21 inspect above that area.

22 Now there is one recourse for this sort of
23 a condition. You can remove the thermal guide sleeve.
24 You can use a different transducer that doesn't have
25 -- that is not affected by those limits. However, in

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1 the case of this plant, the dose requirements to
2 implement that were astronomical. This plant shut
3 down February 14th. The bulletin was issued three
4 days earlier, so there were various hardships
5 associated with that. The staff looked at the
6 stresses in the area that would not be inspected,
7 looked at crack growth for hypothetical cracks in that
8 uninspected portion, and we concluded it was
9 acceptable for them not to inspect.

10 CHAIRMAN FORD: Is that dimple that I see
11 in the left- hand side of the sleeve, is that
12 hydraulically applied? Is that achieved -- how is
13 that fabricated? The reason why I'm asking, it looks
14 awfully like the stress corrosion sample involving
15 dimples on specimens, created a stress raiser, cold --

16 MR. HISER: I believe that's a piece
17 that's on the guide sleeve itself. And it's sort of
18 forced in. I think the way the licensee described it,
19 it's sort of screwed in to get it located at the
20 proper elevation, so it's purely a mechanical -- I'm
21 not aware that it was hydraulically, you know -- I'm
22 not certain of that. I don't know. Larry, do you
23 have any --

24 MR. MATTHEWS: I'm not familiar with -- I
25 believe it's just a centering mechanism that probably

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1 is going around to keep that centered in the --

2 MR. HISER: Right.

3 MR. MATTHEWS: I believe it's just a
4 centering mechanism to keep the thermal sleeve
5 centered in the nozzle, because the thermal sleeve
6 really provides some guidance for the drive shaft for
7 the control rod. And on a lot of the Westinghouse
8 designed units, there's a tab that's welded on the
9 outside of the thermal sleeve. I'm not sure how
10 their's is put in, whether it's a press-out in the
11 stainless steel.

12 MEMBER WALLIS: I hope the record shows
13 centered, not sintered, because we don't get to edit
14 the record.

15 MR. MATTHEWS: Centering, with a center,
16 C-E-N-T-E-R.

17 MR. WALLIS: With your accent, they sound
18 the same.

19 MEMBER KRESS: In Alabama, they're
20 pronounced the same.

21 MR. HISER: This is one case. As Larry
22 mentioned, there are other plants that have centering
23 tabs that similarly restrict access above the weld.
24 And in actuality, one of Larry's plants, Farley, had
25 centering tabs. They prevented in some cases access

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1 to and above the weld.

2 MR. MATTHEWS: Actually, Farley had
3 centering rings which were completely 360 around, and
4 prevented any access up in there with a blade probe,
5 so we had to remove the thermal.

6 CHAIRMAN FORD: But there was analysis
7 done if this failed, by whatever mechanism. The risk
8 would be small.

9 MR. HISER: I'm sorry?

10 CHAIRMAN FORD: If the -- I mean, we've
11 having a lot of discussion about what this is, and no
12 one seems to know specifically what it is in this
13 room. But I'm assuming that analysis was done, if it
14 failed by whatever mechanisms.

15 MR. HISER: The sleeve expansion point?

16 CHAIRMAN FORD: Yes.

17 MR. HISER: We have not considered that.
18 This is a very -- the licensee in this case, this
19 created problems because the thermal guide sleeve was
20 so rigid that they had difficulty in gaining access to
21 their probe 360 around then nozzle, so I don't think
22 that there are any questions of the robustness of that
23 aspect of the assembly.

24 MR. SIMS: This is William Sims. The
25 thermal sleeve itself is not part of the pressure

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1 boundary, so if you had any crack or anything to go
2 with that, that wouldn't be a safety significant issue
3 anyway.

4 MR. MATTHEWS: And if it failed, all that
5 would happen was that lower part of the thermal
6 sleeves would -- and it wouldn't really be a loose
7 part. It would be captured by the drive shaft on the
8 control. I guess the worst potential I can imagine is
9 flock in one control room.

10 MR. HISER: But you can see, as well, with
11 the funnel on the bottom of the guide sleeve, getting
12 the probe up into that annulus, the annulus in this
13 case is about 175 mils, so it's -- I think Larry or
14 maybe Tom yesterday used the analogy of a venetian
15 blind, and that's about what these things are. They
16 have a lot of flexibility, very thin member to gain
17 access through a torturous path, but also to be able
18 to provide some spring action to get the transducer
19 under the nozzle, so that you can get data.

20 Okay. Go back to slide 12, and we'll end
21 up flipping back and forth a little bit. In addition,
22 there are limitations below the J-groove weld. There
23 again, some of these guide funnels, instead of on a
24 separate sleeve, in some cases are mounted in CRDM
25 nozzle itself. There's threads on the ID, on the OD,

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1 and in addition, at least one plant has identified
2 some tapers on the end of the nozzle.

3 In addition, with plants that are using
4 the time-of-flight diffraction approach, the
5 arrangement of the transducers is such that you end up
6 not inspecting part of the bottom of the nozzle.
7 Steve, if you flip maybe to page 14. Thank you.

8 This is a case in point where there are
9 external threads on the nozzle for the guide funnel.
10 In addition, there's a taper on the ID. Gaining
11 ultrasonic data in this area is meaningless, because
12 you don't know how to interpret the results. In this
13 case, the stresses down in this part of the nozzle
14 tend to be very low, so it really is not -- does not
15 have any quality or safety implications of not
16 inspecting that portion.

17 This is another plant. In this case,
18 these threads were located at least one inch beyond
19 the weld, that provided the licensee for a good
20 opportunity to demonstrate what the stress is, and
21 significance of not inspecting that area are.

22 Finally, page 16. This is hard to see.
23 It's better on the screen, I think. This is a
24 schematic arrangement of sensors for time-of-flight
25 diffraction measurement. We have two transducers.

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1 The sound beam comes out at an angle from this
2 transducer, for example, is captured here. There's
3 this part, this triangular part of the nozzle that you
4 can't see with this arrangement. Going back a little
5 bit to Tom Alley's description yesterday of the
6 inspections, this arrangement would be really
7 sensitive to circumferential cracks, and that's
8 generally what a lot of licensees have applied.

9 Again, this area is a low stress area. If
10 you assumed a hypothetical crack, the crack doesn't
11 grow very far in the one cycle that the plant would be
12 operating. So in general in these cases, even if
13 there is a hypothetical crack here that grows, when
14 you do your next inspection, you'd identify it up in
15 this portion before it would get to the pressure
16 boundary, so there is margin from that standpoint.

17 And if you go back again, Steve, bare
18 metal visual inspections are also an area that we've
19 had one relief request submitted, and an inquiry about
20 another one. Actually, several. In some cases,
21 they're localized insulation and support shroud
22 interferences that preclude access to 100 percent of
23 the head. These are generally outside of the head
24 area beyond where the CRDM nozzles are, so the -- what
25 licensees have proposed in this case is to examine the

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1 head above the interference, that there's no source of
2 Boron, at that point no leakage, then look below the
3 interference. Again, if there's no source of Boron,
4 then you have confidence that the integrity of the
5 head in that area is in tact. So that would be for a
6 localized situation.

7 MEMBER ROSEN: I don't understand.

8 MR. HISER: Okay. See, maybe if we
9 flipped to this. This is a different example, but as
10 an example, if the support, the shroud support
11 structure comes down and intersects the head at this
12 point, you really can't inspect the head right under
13 that. But you do an inspection of the rest of the
14 head, including all reasonable sources of leakage, for
15 example, through the nozzles. There really is no
16 source of leakage at the support structure itself, so
17 if you looked above, you know, uphill of it, and
18 there's nothing uphill, it's flowing down under the
19 support structure, and there's nothing below the
20 support structure that indicates that, you know, for
21 whatever reason you have a source of leakage. You
22 have assurance that there's nothing going on in the
23 head under that structure.

24 MEMBER ROSEN: Well, for instance -- I
25 understand that logic for that specific location, but

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1 what about for the uphill locations where all that
2 insulation is right up against the head? How is that
3 inspected?

4 MR. HISER: Okay. For the other
5 situations such as this, where insulation is directly
6 on the head, has a very limited access overall. In
7 this case, the licensee has proposed to take
8 ultrasonic measurements from the ID of the head,
9 through the head thickness to determine or confirm
10 that the head has integrity. So, for example, if the
11 head is supposed to be six and a half inches thick,
12 they'll take a map of the entire head 360 around to
13 demonstrate integrity of the head. They're coupling
14 that with ultrasonic measurements of the ID of the
15 nozzles, looking for cracks through the nozzles,
16 looking for a leak path. If there's no leak paths
17 through the nozzles, if they can confirm that there's
18 no leakage source from above, you don't have any way
19 to get Boron on the head to cause corrosion. That's
20 the sort of argument that they're putting forth.

21 MEMBER ROSEN: There's no way to remove
22 sections of that insulation package to confirm, to get
23 the bare metal visual in some locations, to provide
24 confirmation that that technique is adequate? I mean,
25 I believe all of that, but it would be nice if I could

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1 take off a place which is presumably clean based on
2 those things and say yeah, indeed, there it is. Clean
3 just as we've said.

4 MR. HISER: I don't believe that this
5 licensee has proposed any visual inspection because of
6 the access. I'm not sure what the exact arrangement
7 of the insulation here is, but there -- some plants
8 have removed insulation similar to this. It is, in
9 effect, asbestos block. There are concerns with the
10 asbestos abatement, and they have to replace it with
11 some other form of insulation. In some cases, blanket
12 insulation. In general, licensees are making
13 modifications to their insulation, but again the
14 planning process to be able to implement that is what,
15 in effect, creates a hardship for them.

16 MEMBER KRESS: Do you have any concerns
17 Boric Acid crystals sitting on top of the head?

18 MR. HISER: It depends on where they're
19 from, and whether you stop the source.

20 MEMBER KRESS: No, not talking about the
21 source. I know that's a concern, but from the fact
22 that Boron crystals corroding or eating away the head
23 itself.

24 MR. HISER: I think our experience has
25 been that if the Boron is dry, that it may create very

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1 minimal corrosion, where you have a source of water,
2 and I think Davis-Besse is the A- number one exhibit,
3 as well, when I talk about Sequoyah findings from last
4 fall, I think they're a very strong indication, as
5 well, that if you have wet Boron, you can develop
6 problems fairly rapidly.

7 MEMBER KRESS: So the purpose of the
8 ultrasonic, validating the thickness of that head is
9 in case you have a Davis-Besse problem somewhere.

10 MR. HISER: Well, in case you have
11 unanticipated conditions that exist. As Dr. Rosen
12 mentioned, you know, scientifically all that fits
13 together and makes sense, but if there's, you know,
14 some unanticipated hole in the logic, then maybe
15 there's a leakage source up here that you're not able
16 to identify. Then there's ultrasonic measurements
17 just to provide confirmation that you, you know, a
18 Davis-Besse issue, or any other sort of an issue
19 ongoing. Davis-Besse was a specific manifestation.
20 I think as was mentioned yesterday by Bill Cullen, it
21 was another nozzle at Davis-Besse that leaked, that
22 had a very small corrosion area pretty much in the
23 center of the head. Looking at the top of the head
24 really isn't going to tell you that that's ongoing
25 necessarily. As you get corrosion, you do end up with

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1 volume increases so, you know, the metal has to go --
2 the corroded metal has to go somewhere. Normally,
3 that's going to be up and be visible but, you know,
4 the proposal by this licensee takes some of that
5 uncertainty out of the way by making direct
6 measurements of what the head thickness is.

7 CHAIRMAN FORD: Is this the only licensee
8 who's made this sort of application?

9 MR. HISER: Only one licensee has
10 submitted a request at this point. We've had
11 discussions with another licensee, that I believe may
12 have a similar insulation arrangement.

13 CHAIRMAN FORD: I had the impression this
14 is a fairly common insulation arrangement.

15 MR. HISER: Numerous licensees have been
16 pulling their insulation off, have been abating -- you
17 know, they have asbestos, various problems. Some have
18 been doing that. Several, as an example, Point Beach
19 and Kewaunee, in particular, they've removed their
20 conforming insulation and have replaced it with
21 blankets that is more -- you know, then they just pull
22 the blankets off to do the visual inspection.

23 CHAIRMAN FORD: So there are not that many
24 plants left who've got this particular problem.

25 MR. HISER: There are numerous plants that

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1 still have challenges. You know, this is sort of an
2 extreme situation. There are other situations that
3 require highly specialized equipment, and I think the
4 licensees would say good luck, you know, in that their
5 insulation isn't compressed in some way that it could
6 limit access to the head.

7 CHAIRMAN FORD: How many of those plants
8 are moderate susceptibility plants?

9 MR. HISER: I'm not sure. I'd have to go
10 back and check. I'm not sure that we have full
11 knowledge at this point of every licensee that's
12 modified their insulation. But, you know, we are
13 aware that those steps are being taken, you know. In
14 addition, now that we're in order space, licensees
15 need to do bare metal visuals every outage if they're
16 high susceptibility. That creates a real strong
17 incentive to modify the insulation to make it easier
18 to do that kind of an inspection.

19 MEMBER ROSEN: What unit is that?

20 MR. HISER: Yeah, I think it's 2.

21 MR. SIMS: Going back to the question
22 about the other plant, the other plant that's in a
23 similar situation, that was ANO 2. Both these plants
24 are CE plants, and they are unique. And if you look
25 at the way the design of the top of the CRDM nozzles

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1 are, they're basically, the flanges conform to the top
2 of the head, instead of like the B&W plants, some of
3 those, all the flanges are up above. And so the
4 insulation for these and the shroud for this plant and
5 Arkansas ANO-2 is stair step. And that shroud
6 basically goes underneath the motor housing, so I
7 can't pick it up and pull that insulation out.
8 There's only a couple of inches or so gap between the
9 shroud and the insulation itself.

10 We're looking and trying to figure out a
11 way to pull that insulation off, but thus far we have
12 not been successful to figure that out with anything
13 that's reasonable. It looks like in order to be able
14 to do that, we would have to pull the motor housing
15 and everything completely out, and tear it apart piece
16 by piece. And then we're going to have to come up
17 with some method of putting new insulation on there
18 that we could remove on a cycle-by-cycle basis. And
19 it's not an easy task.

20 MEMBER KRESS: Can you put the insulation
21 on the inside?

22 MR. HISER: Do what now?

23 MEMBER KRESS: Put the insulation on the
24 inside of the dome?

25 CHAIRMAN SIEBER: Good idea.

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1 MR. SIMS: That would be a good idea. It
2 would be easier to get to. No, but right now, it is
3 -- you might be able to destroy it, get it out without
4 completely disassembling the head. But then to put
5 something back in is -- we haven't figured that out as
6 yet either, so we're looking at alternative options as
7 opposed to bare metal exam at this point.

8 CHAIRMAN SIEBER: Well, you don't have a
9 lot of clearance there anyway.

10 MR. SIMS: You what?

11 CHAIRMAN SIEBER: You don't have a lot of
12 clearance between the head vessel itself and the motor
13 housing anyway.

14 MR. SIMS: That's correct. Yeah, even if
15 I tried to lift it, I can't lift it maybe an inch or
16 so before it hits the bottom of the motor housing.

17 MR. HISER: And there are other plants
18 that don't have this extreme condition, that when we
19 were in bulletin space again, it was -- you know, they
20 were doing more best effort bare metal visuals, and
21 they were able to lift in some cases the insulation
22 sufficiently that they could gain access. And there
23 were some licensees that again thought they were
24 fairly fortunate in being able to do that.

25 In general, we have -- I think some of the

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1 hardship arguments hold water at the present time for
2 Spring, 2003 outages, because licensees clearly didn't
3 have time to put the assets in place, and do their
4 planning. For Fall, 2003 and subsequent outages, I
5 think the pieces may be a little bit harder to make
6 because the requirements are there in the order, as of
7 February 11th. Okay. Steve, if you'd flip to page
8 18.

9 MEMBER WALLIS: I'm just thinking, when
10 you make these orders, are you aware that there are
11 going to be these restraints?

12 MR. HISER: We're aware that there are
13 issues. We're also mindful of what's necessary to
14 demonstrate quality and safety.

15 MEMBER WALLIS: If you issue an order
16 which is impossible to fulfill because of these
17 restraints, it's a strange kind of order.

18 MR. HISER: Well, the -- we have numerous
19 plants with a variety of situations and conditions.
20 And I think what we've done within the orders is set
21 down what we think is necessary from an inspection
22 standpoint. If a licensee is able to demonstrate
23 either (a) that there is no impact on quality and
24 safety by not doing a part of the inspections required
25 by the order, or (b) that there's a sufficient

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1 hardship, that there's no commensurate increase in the
2 level of quality and safety by doing the inspection,
3 then the order allows us to provide relaxation in
4 those cases. You know, the intent is not to issue
5 orders that are impossible to fulfill. You know, it's
6 really intended to provide the inspections that are
7 necessary to demonstrate quality and safety.

8 CHAIRMAN SIEBER: Actually, you're better
9 off allowing the licensee to do his own engineering,
10 and solve his interference problems to try to comply
11 with the order, than for you to make a custom order
12 for them, and then give no relief.

13 MR. HISER: Right.

14 CHAIRMAN SIEBER: That would be a
15 disaster.

16 MEMBER WALLIS: But you could have
17 emphasized more the kind of inspection where possible,
18 maybe these ultrasonic make the visual less important
19 or something.

20 MR. HISER: Well, I think that one of the
21 points we made within the order is that the visual and
22 non-visual really go hand-and-glove. There was
23 discussion yesterday about probability of detection
24 and things like that. The non-visual NDE is not
25 perfect, and that's why the visual is a good

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1 complimentary approach, you know, not that one or the
2 other is sufficient, but they work together very well.
3 And I think one of the things that we're finding, the
4 order did say to inspect from two inches above the
5 J-groove weld down to the bottom of the nozzle. And
6 clearly, what we're finding is some consistent
7 limitations on that, for example, at the bottom of the
8 nozzles. The next two pages provide the relaxation
9 requests that have been received to-date. And again,
10 a lot of them are the bottom of the nozzle where the
11 stresses are low, and there just are inherent
12 geometric restrictions.

13 I guess one relaxation request that I just
14 want to mention, Turkey Point, a high susceptibility
15 plant, had two nozzles that are called for RVLMS,
16 Reactor Vessel Level Monitoring System. How high is
17 the water in the vessel? These nozzles provided
18 unique difficulties to them because they have the four
19 inch diameter CRDM nozzle, but then they had a plate
20 welded on the bottom that supported the Reactor Vessel
21 Level Monitoring equipment. They demonstrated or
22 indicated that there was a hardship due to dose, and
23 having to, in effect, grind off those welds, do the
24 inspection, and then re-weld the head plate back on.
25 They applied for relaxation. We were ready to approve

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1 that. We had a couple of conditions that we thought
2 were necessary. They ultimately decided to withdraw
3 their request, and so that relaxation did not go in
4 place.

5 I think other than that, for the most
6 part, relaxations have been fairly minor, looking at
7 the ends of the nozzles for the most part. Millstone
8 Unit-2 is probably going to be the most challenging
9 one that we're going to deal with in the short term.
10 They're the one that wanted to make the UT
11 measurements from under the head.

12 MEMBER SHACK: Just how many UT
13 measurements are they proposing?

14 MR. HISER: They talked about a map. They
15 have some sort of UT device on what they called a sled
16 that they're just going to roam all over. We have
17 sort of the bare description that they provided
18 to-date. We do have a request for additional
19 information that we've sent to them. I expect that
20 we're going to have numerous interactions to
21 understand the physical geometry of what they're
22 doing, what potential problems could be. We have
23 concerns.

24 Steve, if you go back to 17 for a minute.
25 For example, one concern we have is that, you know,

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1 ultrasonics likes to hit surfaces at 90 degree angles.
2 If I'm now inspecting here, how do I inspect the
3 downhill nozzle, the downhill side of that nozzle?
4 Those are the kinds of things that we need to
5 understand before we grant that relaxation. This
6 would be -- to my mind, this would be a big deal
7 approving this one. The others are sort of, you know,
8 around the edges. This would be a major perturbation
9 from the order.

10 CHAIRMAN FORD: So the request has been
11 put in, but it hasn't been approved on Millstone.

12 MR. HISER: No, it has not been approved.
13 Millstone, their outage is this fall, and they would
14 like a response from us very soon whether we will
15 grant this relaxation or not, so that they can take
16 other measures if we're not going to approve it. At
17 this point, I'd say we have about 2 percent of the
18 information that we need to make that decision, so we
19 have a lot of interaction that we're going to need to
20 have with them. Okay. Steve, if you --

21 CHAIRMAN FORD: Are you about to go into
22 North Anna now?

23 MR. HISER: Yeah, I think so.

24 CHAIRMAN FORD: What I would suggest is
25 that since you're about to start a whole new topic

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1 area, well a relatively new topic area, let's take a
2 break for 15 minutes now, and we'll resume.

3 MR. HISER: Okay.

4 CHAIRMAN FORD: So we're going to recess
5 until 20 past 10.

6 (Whereupon, the proceeding in the
7 above-entitled matter went off the record at 10:05:16
8 a.m. and went back on the record at 10:22:26 a.m.)

9 CHAIRMAN FORD: Okay. Let's come back
10 into session. I have been asking the last couple of
11 days, concerned whether there's proven indications on
12 BWR bottom head penetrations, and we've got Ms. Mina
13 Connor, who is just going to interrupt Al's
14 presentation just to address this issue. So, Mina,
15 thank you.

16 MS. CONNOR: Okay. I was asked to address
17 the BWR, the lower plenum internal components, just to
18 see what's going on with the BWRs. I put together
19 some background stuff. You probably already know a
20 lot of this, but I'll just try to briefly run through
21 it as quickly as possible.

22 Okay. For the BWR lower plenum internal
23 components, there is a topical report. That's
24 BWRVIP-47, and that's called "BWR Lower Plenum
25 Inspection and Valuation Guidelines." It provides a

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1 history of inspection data, inspection guidelines for
2 the lower plenum internal components.

3 When they were putting together this
4 report, they did a lot of field inspections, and from
5 those inspections, the BWRVIP review of the field
6 cracking data indicated that with the exception of
7 Nine Mile Point and Oyster Creek, they have step tubes
8 at Oyster Creek and Nine Mile Point. Basically,
9 besides those exceptions, the lower plenum components
10 were not experiencing significant field cracking at
11 all.

12 And in regards to Oyster Creek and Nine
13 Mile Point, there is a VIP report, that's 17, that
14 addresses weld expansion repair. We haven't approved
15 that generically. That's an ongoing issue, and
16 actually the licensees are trying to get that code
17 approved right now as far as the weld expansion -- as
18 permanent repair, but right now as a temporary repair
19 we have approved it for Nine Mile Point and Oyster
20 Creek.

21 CHAIRMAN FORD: VIP-47 has been approved.

22 MS. CONNOR: Well, actually we've done the
23 initial review on that. We've got several open items,
24 and we've already talked to them. We've discussed all
25 those open items, and they're just going to revise the

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1 report to address our concerns, which are mostly
2 clarifications.

3 CHAIRMAN FORD: Now if I remember rightly,
4 VIP-47 only reviews United States experience.

5 MS. CONNOR: That'S right.

6 CHAIRMAN FORD: There have been head
7 cracking indications abroad, in Japan, for instance.

8 MS. CONNOR: Right. We've seen that a lot
9 lately.

10 CHAIRMAN FORD: But that is not reflected
11 in this report.

12 MS. CONNOR: It's not, but then again, the
13 Japan plants do belong to the BWR VIP, but they have
14 not -- you're correct, they did not address the
15 Japanese plants at all.

16 CHAIRMAN FORD: Okay. And also the
17 Swedish plants too, there have been inspections. In
18 fact, positive in the terms that they have not found
19 cracking.

20 MS. CONNOR: Right. I think the ones that
21 I'm aware of are the problems that they've experienced
22 with Japanese plants. I think they deal with those
23 separately, but definitely, whatever is approved that
24 the BWRVIP guidelines, they are to follow them,
25 because they are a part of the BWRVIP. Okay.

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1 Before I address inspections, the largest
2 concern is really IGSEC, and what they're going to be
3 doing, what they have been doing is following Generic
4 Letter 88-01 so they do all the inspections in
5 accordance with Generic Letter 88-01. They have
6 several, I mean, many reports, many guidelines on
7 IGSEC but, you know, what we've approved in Generic
8 Letter 88-01 is definitely what they're following.

9 Okay. All of the inspections that they do
10 are -- whatever is required by ASME Code, they are
11 following, so all of the visual inspections that are
12 required to be performed under the CRD guide-tubes,
13 stub tubes and in-core housings are done in accordance
14 with ASME Code Section 11. The instrument
15 penetrations are pressured-tested. Visual inspections
16 are also performed --

17 CHAIRMAN FORD: Excuse me.
18 Pressure-tested when?

19 MS. CONNOR: AT normal operating
20 conditions. And they're done -- all of this is done
21 during refueling outages, but they will do -- once
22 they're getting ready to come up, then they will do
23 them. Okay.

24 CHAIRMAN FORD: 1.2?

25 CHAIRMAN SIEBER: Actually, the hydro is

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1 1.2.

2 CHAIRMAN FORD: Well, the reason why I'm
3 asking is that if they're pressure-tested, how sure
4 are we that we're going to see a leak? If it's not
5 over-pressure-tested, then is that going to be any
6 indication of whether you've got a through weld
7 penetration?

8 MS. CONNOR: Okay. I --

9 CHAIRMAN FORD: Is there any information
10 on that?

11 MS. CONNOR: I really wouldn't know. I
12 can definitely find out. I'll take that as a note,
13 and get back to you.

14 CHAIRMAN SIEBER: I think the distinction
15 that can be made is hydrostatic tests for code are
16 designed to test the structural integrity of the
17 vessel itself; whereas, the design pressure-test, and
18 that's 1.2 - design pressure-test is 1.0. And that
19 does not prove structural integrity from the bulk
20 standpoint. It will show leaks. Just the flow rate
21 is a little smaller.

22 MS. CONNOR: Okay.

23 CHAIRMAN FORD: Okay.

24 MS. CONNOR: Okay. I'll definitely
25 confirm that and get back to you guys on that.

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1 MEMBER WALLIS: Whether it's a hot or a
2 cold test doesn't make any difference to the flow
3 rate.

4 MEMBER SHACK: Well, I mean leaks from
5 cracks are also very sensitive to the pressure. I
6 mean, it's a non-linear relationship because you're
7 opening it.

8 MS. CONNOR: Okay.

9 CHAIRMAN FORD: Therefore, if the pressure
10 testing is done at pressure, at the operating
11 pressure, then how much leeway do we have before, in
12 fact -- and you'll see presumably very little leakage.
13 How much leeway do we have before you would see
14 appreciable leakage of safety margin, safety margin to
15 be defined as to when you get a through-wall weld
16 leak.

17 MEMBER WALLIS: Yeah. If it's the sort of
18 leak we're talking about, you have to wait for months
19 before you build up a deposit. If you just pressure
20 test and look at it for a few minutes, you won't see
21 anything at all.

22 MR. SHACK: You wait a long time in a BWR
23 for a deposit.

24 CHAIRMAN FORD: Just glancing through the
25 rest of your presentation, you make no indication of

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1 the various designs that exist for bottom head
2 penetrations in BWR2s up to the 6s. And some of them,
3 as you know, involve 600 step tubes running to weld,
4 attachment weld to the stainless steel tube. That
5 lack of distinction in your presentation, does that
6 detract anything from your conclusions?

7 MS. CONNOR: No, but I mean, as far as the
8 inspection findings, what I did -- what I was going to
9 discuss also was they have inspection summary reports
10 that they put out. And what we did was we looked at
11 all the lower vessel components findings, and there
12 were very few. And that's where we come to the
13 conclusion, you know, and so there have been no
14 indications on those. That's why I didn't really
15 separate the review.

16 Okay. So let me just continue. The GE
17 SIL 409, for some reason they found a lot of cracking
18 with the drive tubes. Almost every single plant has
19 had problems with the drive tubes and as I was
20 stating, pre-VIP-47, they did a lot of inspections.
21 And mostly, they were finding crackings in these dry
22 tubes, so they put out a GE SIL 409, and they're
23 required to do a BT-1 on the dry tubes. Most of them
24 have been replaced, so they haven't been having that
25 many problems.

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1 CHAIRMAN FORD: What did they do to no
2 longer have the problem?

3 MS. CONNOR: They're just replacing them.

4 CHAIRMAN FORD: The same --

5 MS. CONNOR: No, I'm sorry. A different
6 modification, but that is a different material. It's
7 a little -- it's a different design and modification
8 on the drive tubes.

9 CHAIRMAN FORD: Okay. So they went to
10 steel with low carbs content?

11 MS. CONNOR: I really don't know. I know
12 that they did make material differences, material
13 composition differences, and there's supposed to be
14 also a different design. I don't know the exact
15 details on that.

16 CHAIRMAN FORD: Okay.

17 MS. CONNOR: But they haven't had problems
18 since they've been replacing them. Okay. In addition
19 to VIP-47 -- I'm sorry. In addition to the ASME Code
20 requirements, that the BWRVIP do on these components,
21 they also added a few other weld inspections, and this
22 was -- all these were basically added as a result of
23 the inspection findings that they found. So for the
24 CRD guide tube sleeve to alignment lug weld, they're
25 doing BT-3, and this is done at every refueling

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1 outage. I'm sorry. They've got an inspection
2 frequency, and a scope, and sample size that is
3 recommended through VIP-47. Basically, it's a 12 year
4 frequency where they're supposed to inspect 10 percent
5 of a population of these. And for the CRD guide tube
6 body to sleeve weld and CRD guide base to body weld
7 they do an EBT-1 which is a .5 mil wire. And the
8 guide tube and fuel support alignment pin-to-core
9 plate weld and pin, they do a BT-3 on that. And the
10 bottom just says that the BWRVIP-47 provides
11 recommendations of sample size, frequency, acceptance
12 criteria for the inspection of those welds.

13 CHAIRMAN FORD: Just to confirm, because
14 of the construction of these, the main structural weld
15 is on the inside of the pressure vessel which is hard
16 to get to, so these --

17 MS. CONNOR: Right. This is all based on
18 accessibility, if they can get --

19 CHAIRMAN FORD: Pardon?

20 MS. CONNOR: This is all based --
21 everything is based on accessibility. They do have a
22 statement in the report that says that, you know, they
23 will not remove -- if they're easily accessible, then
24 they will do these inspections. If they need to --
25 they will not remove components to get to other

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1 components.

2 CHAIRMAN FORD: Now apart from -- there's
3 a full scope inspection Oscoshan several years ago
4 where they drained the vessel and did a complete
5 internal examination. As far as I remember, all the
6 bottom penetrations. Do you know if any other similar
7 inspection has occurred? That's only one population.
8 That's one of a very large population, with a negative
9 result. Any other?

10 MS. CONNOR: I'm not aware. You know, I
11 can definitely -- I've got contacts I can call. Okay.
12 Keep in mind that a few of these walls I just
13 previously discussed are pressure boundary walls, and
14 ASME Code requirements do apply. That was actually
15 one of the open items that we had asked them to
16 address in the BWRVIP report.

17 Okay. What we did was every year the
18 BWRVIP submits to us their inspection report
19 summaries, a commitment that they made to us, so in
20 reviewing them, you know, we kind of focused on the
21 lower plenum components to see what type of results
22 they've been getting, if they found indications, and
23 they were very minor. I'll just go through them
24 really quick.

25 For Dresden in 1994, there was one dry

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1 tube that was identified to be cracked. That was
2 replaced, and that was found in accordance with the
3 inspection requirements of GE SIL, or recommendations
4 of GE SIL-409. Oyster Creek, as I indicated before,
5 those step tubes that are sensitized, they found two
6 step tubes that were leaking at the bottom head. A UT
7 was performed of the CRD housings to the step tube
8 walls in the area of the housing to be rolled. No
9 reportable indications were found, and the roll
10 repaired both of the leaking housings. For Browns
11 Ferry Unit 2, same type of thing. The dry tubes were
12 inspected, cracking was found and the tubes were
13 replaced. So as you can see, you know, we haven't
14 found any major indications, any cracking indications
15 of the lower plenum components, so we feel pretty
16 assured that the inspections that they have
17 recommended through VIP-47 are, you know, pretty in
18 tact.

19 Okay. Then I just put a page together
20 regarding the safety consequence, inspection
21 experience, accessibility. BWRs, you know, they did
22 -- if cracking was to be found at the CRD in
23 core-housing welds, you really don't have a large
24 safety significance consequence because they don't
25 affect the CRD insertion. Even if cracking were to be

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1 found, the potential for CRD ejection is eliminated
2 because they have a shoot-out steel that comes out to
3 protect the coats from coming down. So, therefore,
4 CRD insertability is not challenged. In addition,
5 they've got the Boron injection. They've got the
6 additional redundancy of the Boron injection if
7 failure of CRD insertion were to occur.

8 MEMBER ROSEN: The shoot-out steel, is
9 this the grid underneath the housing that prevents the
10 housing from coming down?

11 MS. CONNOR: Exactly. Yeah. It's a kind
12 of strange name, but that's right.

13 MEMBER KRESS: When you say safety
14 significance, you're talking design-basis base.

15 MS. CONNOR: Right.

16 MEMBER KRESS: Have there been any risk
17 implications?

18 MS. CONNOR: Not that I know of. I don't
19 think there are. We're pretty assured that --

20 MEMBER KRESS: Probably not because the
21 small break LOCA wouldn't add much to the initiating
22 event frequency. And I don't think it would interfere
23 with the water source several accident, you know, they
24 rely -- in risk-base they credit for the water control
25 rod drives as part of the ECS, but it doesn't look

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1 like it would be a risk.

2 MS. CONNOR: I don't think so. Okay. If
3 cracking is significant and leads to leakage, then it
4 would be detected immediately, and appropriate
5 correction action is taken immediately with BWRs. And
6 as you all know, they're getting ready to implement --
7 these BWRs in the BWRVIP Program are getting ready to
8 implement hydrogen water chemistry, if they haven't
9 already. Also, there's noble metal chemical addition
10 that's going to be implemented, and we agree that the
11 actual susceptibility will be expected to drop quite
12 significantly.

13 So basically in conclusion, just in view
14 of the field history and the significant inspection
15 experience, we feel that what the BWRVIP has been
16 doing is, you know, definitely -- they're doing what's
17 required by code, and then they've implemented other
18 inspections as we discussed on those welds, so we
19 really feel assured that we're comfortable with what
20 they're doing. And we will continue to review their
21 inspection response. Okay.

22 CHAIRMAN FORD: Could I ask the members --
23 this is one of these situations that we asked about,
24 being sensitive to the reactive nature of this whole
25 problem, another problem coming up, another problem

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1 coming up. This is an obvious one to address. Do you
2 get the feeling right now that this is one that you
3 can relax on before going onto other topics?

4 MEMBER KRESS: I certainly do.

5 MEMBER SHACK: I had a question about the
6 leakage detected immediately. I mean, it's just water
7 in my 5 GPM. I mean, why would I detect it
8 immediately? There's no special leakage detection
9 system here, is there?

10 MS. CONNOR: No. I think they're just
11 really on any leaks they would visually see them from
12 the inspections. And before anything would occur, any
13 major thing would occur, they would detect them. They
14 would be taken, and corrective action would be taken
15 immediately.

16 MR. SHACK: Okay. I mean, it's our normal
17 kind of leak before break.

18 MS. CONNOR: Right. Exactly.

19 MEMBER ROSEN: And these dry wells have
20 leak detection in the sumps, and they monitor --

21 MS. CONNOR: They monitor them frequently.
22 Right.

23 MEMBER ROSEN: I'm just not familiar with
24 the BWR sump arrangement. Are the tech specs the same
25 as or similar to the PWR tech specs, where you have a

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1 level for unidentified leakage, and another level for
2 identified leakage?

3 MS. CONNOR: You know, we checked for
4 Oyster Creek and Nine Mile Point when we were looking
5 to approve the weld expansion criteria. They are
6 allowed leakage, because they have the old tech specs,
7 so for those two plants, I know that we have checked,
8 and they're in accordance with the old tech specs.
9 They're not with the new improved tech specs, so they
10 are allowed some leakage.

11 MEMBER ROSEN: And the new improved tech
12 specs say what?

13 MS. CONNOR: Say no allowable. Right. No
14 leakage.

15 MEMBER ROSEN: How is that detected during
16 normal operation?

17 MS. CONNOR: They've got monitor -- they
18 do detect them through the monitors. They've got the
19 -- as far as I know, they've got monitors that they
20 use to detect leakage.

21 MEMBER ROSEN: Monitors. Under the
22 vessel?

23 MS. CONNOR: You know, I really don't
24 know, to be honest. I can find out. I haven't gotten
25 -- I know about the tech specs, but I really haven't

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1 gotten into detail about how they detect the leak.

2 MEMBER SHACK: No unidentified leakage?

3 MS. CONNOR: Yeah, it would be -- they are
4 allowed -- with the old tech specs they are allowed to
5 have -- let me say this right. They are allowed
6 leakage. They are allowed to have leakage with the
7 old tech specs for those two plants because those are
8 old tech specs.

9 MEMBER ROSEN: Yeah. Well, I would be
10 interested in what the dry well leakage monitoring
11 systems are currently in service in the BWRs. I just
12 don't recall that. I used to know.

13 CHAIRMAN FORD: Mina, would you mind
14 following up on that and getting back to Ms. Weston?

15 MS. CONNOR: Sure. That would be no
16 problem. Right. Okay.

17 CHAIRMAN FORD: Thank you very much
18 indeed. You've put our minds somewhat at rest, at
19 least. Thank you.

20 MS. CONNOR: Thank you.

21 CHAIRMAN FORD: Al, thanks for
22 accommodating that.

23 MR. HISER: Appreciate Mina stepping up
24 with that. I guess pretty much of the presentation,
25 I want to go over some of the recent findings, some of

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1 the photos and things. And also then at the end, look
2 forward to the future with some outlook on where we
3 think this is going.

4 As indicated here, North Anna 2 had an
5 inspection this past fall. A little bit of history,
6 Fall, 2001, the same unit did a visual inspection,
7 identified some leaks. They were repaired. A year
8 later identified more leaks. One of the leaks was at
9 one of the nozzles that they had repaired in Fall,
10 2001. What they found was that the repair did not
11 cover the original Alloy 182 buttering, and actually
12 if you flip to page 21, Steve, there's a schematic
13 that shows what that looks like, which indicated in
14 the inner donut area, if you will, is the repair that
15 was made. What they've identified is then that some
16 of the original 182 weld material or the buttering was
17 left exposed to the environment, and indications were
18 identified in that buttering in this area.

19 I'm not sure that these have positively
20 been determined to be a leak source, but these were
21 new indications that they did not find when they did
22 the original repair. Intent of this repair was to
23 cover all of the 182. In this case, and as we'll see
24 -- well, in this case at North Anna Unit 2, that
25 didn't happen, so there were repair deficiencies

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1 identified.

2 MEMBER SHACK: Has anybody else tried this
3 J-weld weld butter repair?

4 MR. HISER: The overlay repair has been
5 accomplished, as well, at ANO 1. Is that the only
6 one, Terrance?

7 MR. CHAN: So far, I think.

8 MR. HISER: Okay. I think there's another
9 plant that has implemented this.

10 MEMBER SHACK: And everybody uses it as a
11 repair rather than a proactive thing to prevent --

12 MR. HISER: They've all been repairs,
13 repairs of leaking nozzles. In addition, at North
14 Anna, as was discussed yesterday, there were numerous
15 weld indications identified, and ultimately the
16 licensee decided to replace the head with a brand new
17 head with Alloy 690 nozzles.

18 CHAIRMAN FORD: And 52 weld?

19 MR. HISER: Yes. This is an EDF head
20 fabricated to the French code. In addition, ANO Unit
21 1 this past fall did an inspection of the head,
22 identified a leak on the RPV head at a repaired nozzle
23 indicated here. Unfortunately, it doesn't come across
24 real well. This is sort of the classic popcorn Boric
25 Acid that was coming out of this nozzle. And I guess,

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1 Steve, if you flip to page 24, this is an illustration
2 of the repair that they did.

3 MEMBER ROSEN: Look up above, Allen.

4 MR. HISER: Yeah. That's probably better.
5 This was the repair area from -- it was repaired I
6 guess a year and a half ago, Spring of 2001. In this
7 case, the original weld material was left exposed, and
8 just sort of a plug was applied to the weld.

9 Numerous indications are identified around
10 the circumference or the interface of the original
11 weld and the new weld. This was, I believe, one of
12 the first repairs that was performed on a CRDM, the
13 first that used an overlay approach, in particular.
14 And at the present time, this would not be the kind of
15 approach that this vendor would -- or kind of repair
16 that the vendor would use. They would want to
17 encapsulate the entire weld with 152 or 52.

18 CHAIRMAN FORD: So RI means what?

19 MR. HISER: Reportable Indication.

20 MEMBER ROSEN: Now what do they do when
21 they do a repair like that? Do they chase the crack
22 as far down as it goes by grinding first?

23 MR. HISER: I believe on this one that
24 they did not chase the flaws at all.

25 MR. SIMS: With that particular nozzle we

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1 ground all the way down to the butter. We ground all
2 of the weld material out where the indication was
3 found. And then we did a PT, and then found we'd PT
4 cleared at the bottom of it, to make sure there were
5 no indications.

6 MEMBER ROSEN: Then you built it back up.

7 MR. SIMS: Then we built it back up with
8 52 weld material.

9 MEMBER ROSEN: How did you leave the
10 surface when you were done?

11 MR. SIMS: Ground it smooth and PT.

12 MEMBER ROSEN: Okay. Thank you.

13 CHAIRMAN FORD: Just so we understand,
14 everything that is orange/green up the -- this region
15 here is the original weld.

16 MR. HISER: Right. This represents the
17 as-found condition.

18 CHAIRMAN FORD: And when you say "butter",
19 I always think of butter, as something you put on top.
20 That is, in fact, the actual weld.

21 MR. HISER: Well, the butter is placed on
22 the vessel head itself after machining the weld prep.
23 Then the head is -- once the butter is put down, then
24 the head is stress relieved.

25 CHAIRMAN FORD: I'm sorry. I see now that

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1 the arrow is going to this region.

2 MR. HISER: Right.

3 CHAIRMAN FORD: Okay.

4 MR. HISER: It's a concentric area.

5 MEMBER ROSEN: So go over it for me,
6 Allen, make sure I understand.

7 MR. HISER: The butter is --

8 CHAIRMAN FORD: You may have to look at
9 your -- and this may go off a minute.

10 MR. HISER: Well, maybe we can do it up
11 here. The weld prep is machined into the head. Then
12 the butter is applied. Head is stress relieved, and
13 then the weld -- the nozzle is inserted and the weld,
14 J-groove weld is applied.

15 CHAIRMAN FORD: And you put an 82 groove
16 weld, and a 182 top weld. Is that right?

17 MR. HISER: I'm not sure what the --

18 CHAIRMAN FORD: They put a weld and then
19 they put down the 182 on top of it. Is that the
20 normal way?

21 MR. SIMS: That's probably the way. I'm
22 not sure. I'd have to go back and look at the
23 records.

24 MR. HISER: It depends on early plant,
25 older plant, these kinds of things, as well.

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1 MR. SIMS: Yeah.

2 MEMBER ROSEN: How do you stress relieve
3 the -- I mean, you're talking about a huge head, and
4 you're working on one nozzle of the head.

5 MR. HISER: Yeah. Every nozzle is
6 machined, buttered, then the whole head is stress
7 relieved.

8 MEMBER ROSEN: Oh, I see. Take the whole
9 head out to a --

10 MR. HISER: Right. Then you insert the
11 nozzles, weld the nozzles, and it goes into -- well,
12 I mean, inspections and all. But there's no
13 additional stress relief after the J-groove weld is
14 applied.

15 MEMBER ROSEN: So this -- the ANO head was
16 removed from the container and taken out to a furnace
17 someplace?

18 MR. HISER: No, no, no, no. That was the
19 original fabrication.

20 MEMBER ROSEN: Oh, this was --

21 MR. HISER: I'm sorry. That was the
22 original, and I think --

23 MEMBER ROSEN: Okay. I got confused. I
24 thought you were saying you stress relieve the repair.

25 MR. HISER: No. The -- clarify one thing.

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1 The process that you talked about of grinding down to
2 the butter, was that the initial repair?

3 MR. SIMS: That was the initial repair.

4 MR. HISER: What about the repair last
5 fall?

6 MR. SIMS: The repair last fall was the
7 FDR repair where we basically removed the bottom
8 portion of the nozzle, put a new pressure boundary in.

9 MEMBER SHACK: But you ground down to the
10 butter, you didn't remove the butter so you didn't
11 have to do a stress relief --

12 MR. SIMS: That's correct. And when we
13 ground down to the butter, then we did a dye penetrant
14 exam and that was PT clean.

15 MR. HISER: And that was the main point,
16 just that this sort of patch repair did not hold up.

17 CHAIRMAN FORD: Patch repair was 52? When
18 you ground out these indications, and you did a -- I
19 know on some of them you did a 52 weld repair.

20 MR. SIMS: This was a stick weld.

21 MR. HISER: There's two parts, again.
22 There have been two repairs made to this nozzle.
23 Initially, when this patch was applied, that was 52/
24 152 repair. It had no indications left after they
25 ground out. The repair last fall was a different,

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1 totally different repair. It was not an overlay
2 repair. It was the repair where they machined the
3 nozzle up into the vessel head, much as Davis-Besse.
4 And then re-weld the head to the vessel or to the
5 nozzle up at that point, so the pressure boundary of
6 the J-groove weld is moved from the J-groove weld up
7 to this new weld. So all of the -- you know, none of
8 this is an integral part of the pressure boundary at
9 this point.

10 MEMBER SHACK: Do you have a problem that
11 you didn't have to stress relieve that weld?

12 MR. HISER: No.

13 MR. SIMS: It's temper made.

14 MR. ROSEN: It's temper made.

15 MR. HISER: This has created more
16 uncertainties than I wanted.

17 CHAIRMAN FORD: I guess what we're trying
18 to work our way through is the sequence of events.
19 And when did stress relieving take place, because that
20 would be relevant to the cracking? And when was 52
21 applied, and 52/152 weld or weld repair, and has that
22 degraded? I think that's where the line of
23 questioning is going.

24 MR. HISER: If you want to split it into
25 three parts, the original fabrication, repair one,

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1 repair two.

2 CHAIRMAN FORD: Right.

3 MR. HISER: The original fabrication is
4 when the butter was stress relieved along with the
5 head.

6 CHAIRMAN FORD: And never received stress
7 relief thereafter.

8 MR. HISER: It has not been stress
9 relieved thereafter. The 52/152 was applied to this
10 area.

11 CHAIRMAN FORD: Right.

12 MR. HISER: I don't recollect if the
13 licensee did a lot of investigation of these
14 indications. At least from the sketch, it looks like
15 all of them are not -- none of them are in the 52/152
16 repair material, but just like in the heat effected
17 zone adjacent to it. Maybe there's some sort of a
18 sensitization sort of an effect on the original weld.

19 CHAIRMAN FORD: Okay.

20 MEMBER SHACK: Now this is a CE
21 fabrication sequence. The discussion yesterday was in
22 B&W plants, you butter, you install the nozzle, and
23 then you stress relieve?

24 MR. HISER: No. I don't believe any of
25 the upper heads had a stress relieve of the J-groove

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1 weld with the nozzles inserted. The butter -- my
2 understanding is the butter, you know, the process is
3 very -- weld prep, butter, stress relieve the whole
4 head, insert nozzles, weld, as-welded condition is
5 what you have. That's on the upper heads.

6 What we've been told on the lower heads is
7 that they are stress relieved after nozzles are
8 inserted and welds are applied. That's what we've
9 been told on the lower heads. We need to confirm that
10 that's a universal process.

11 MEMBER ROSEN: When you say we've been
12 told, are you -- you're referring to on the lower
13 heads that they've been stress relieved. You're
14 referring to the B&W plants, or --

15 MR. HISER: There was a plant in Texas
16 that told us that a week ago.

17 MEMBER SHACK: I see.

18 MR. HISER: And that's our understanding
19 from some of the European experience, as well, where
20 some inspections have been done, that their welds are
21 stress relieved.

22 MEMBER SHACK: Would they still have a
23 sequence where they do a weld prep, a butter, then
24 install the weld, install the tube weld, and then
25 stress relieve? I mean, is there a butter or it's a

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1 direct weld to the vessel?

2 MR. HISER: I'm not sure.

3 MEMBER SHACK: It's butter.

4 CHAIRMAN SIEBER: You would have to stress
5 relieve the entire vessel.

6 MR. HISER: I'm sure that's when that
7 stress relief occurred.

8 CHAIRMAN SIEBER: Okay. So the stress
9 relief was really for the plate weld vessel.

10 MEMBER ROSEN: They get hot too.

11 MR. HISER: The one thing that was
12 surprising though is that that was -- you know, that
13 the nozzles were inserted before the stress relief.
14 My understanding is one of the reasons that the upper
15 head J-welds are not stress relieved is fear of
16 distortion. And one would have expected the same
17 issues on the bottom, but maybe the tolerances are not
18 as significant.

19 CHAIRMAN SIEBER: I guess they don't care
20 as much on the bottom as alignment.

21 MEMBER ROSEN: Then goes through those --

22 MR. HISER: Yeah.

23 CHAIRMAN SIEBER: There's a lot of --

24 MR. HISER: So you just bend those.

25 CHAIRMAN SIEBER: Well, the sequence of

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1 fabrication then was fortuitous as far as --

2 MR. HISER: Right.

3 MR. MATTHEWS: Al, at this point it's not
4 clear to me that all the bottom mounted instruments,
5 nozzles were stress relieved with the vessel. That
6 may be a vessel by vessel thing. We're going to have
7 to -- you know, everybody is going to have to look
8 into. I think some were and some weren't.

9 MR. HISER: Okay Like everything else,
10 every plant is different.

11 CHAIRMAN FORD: Go forward.

12 MR. HISER: Okay. So we'll go passed ANO
13 1 to Sequoyah Unit 2. What was identified at Sequoyah
14 was a leak from a RVLIS valve, and this is like the
15 RVLMS at Turkey Point we talked about earlier with the
16 relief request, that this is a little bit different.
17 In particular, Boron from this leak impacted the
18 insulation and fell through a seam and onto the RPV
19 head. This is the RVLIS valve itself, leak occurred.
20 You can see the flow pattern, the spray pattern from
21 that. The pile of Boron that was left on the
22 insulation, I think it was on the order of 20 pounds
23 of Boron. I'm not sure how long this leak occurred.

24 If you flip to the next page, Steve, the
25 upper figure shows the head itself, and clearly down

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1 at the flange area, the Boron piled up. It's sort of
2 hard to see because of focus issues, but this is the
3 area that remained after the head was cleaned up.
4 It's sort of hard to get a lot of perspective on that,
5 I guess.

6 MEMBER WALLIS: Well, the discoloration,
7 the red stuff up there, the proper color there is rust
8 or something, corrosion of some sort.

9 MR. HISER: Minor surface corrosion.

10 MEMBER WALLIS: Minor surface.

11 MR. HISER: Yeah.

12 MEMBER WALLIS: But the other place is
13 deeper corrosion there.

14 MR. HISER: Yeah. This area is the main
15 corroded area where the leakage impacted the head.

16 MEMBER WALLIS: And how deep was that,
17 Allen?

18 MR. HISER: The licensee said it was a
19 maximum of an eighth of an inch deep, about five
20 inches long in this direction, and really hard to
21 tell, but apparently five-sixteenths of an inch wide,
22 so it was more of a groove than really is indicated
23 here. It's hard to tell.

24 CHAIRMAN SIEBER: Did they do some kind of
25 repair?

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1 MR. HISER: No, this was found to be
2 acceptable.

3 MR. HISER: Okay. And this finding,
4 frankly, is what prompted the one provision of the
5 order that licensees have to look for leakage above
6 the head that could impact the vessel head. This is
7 one of those areas that if, for example, the bare
8 metal visual focused only on the area around the
9 nozzles, this could have been missed, because this is
10 far away from where the nozzle area of the head is.

11 MEMBER ROSEN: Now this is a little off
12 the topic, but the leak from the valve, where did the
13 valve leak? Is that a body leak or a bonnet leak, or
14 was it a bellows leak? Is that bellow seal valve?

15 MR. HISER: I don't know the details on
16 that.

17 MEMBER WALLIS: It looks like a leak from
18 where the pipe is attached to the valve.

19 MR. CHAN: This is Terrance Chan. I'm
20 with the Materials and Chemical Engineering Branch.
21 The leak came from a compression fitting that was not
22 installed -- evidently, it was not installed properly.

23 MEMBER ROSEN: It's the compression
24 fitting right where the line attaches to the valve?

25 MR. CHAN: Yes. That's our understanding.

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1 MEMBER ROSEN: Okay. Yeah, it looks like
2 that's where it would be.

3 CHAIRMAN SIEBER: Actually, it's covered
4 up.

5 MEMBER ROSEN: Yeah. Well, there's lot of
6 Boron on it.

7 CHAIRMAN SIEBER: Well, there's this pipe
8 support there too.

9 MR. HISER: Okay. We move on to North
10 Anna Unit 1. This past spring, history on North Anna
11 Unit 1, this was the first plant to be inspected after
12 issuance of Bulletin 2001-01. You need to zoom out a
13 little bit, Steve. At that time, there were I guess,
14 if you will, suspicions of leakage on this nozzle. If
15 you go ahead and turn to the photographs, this is
16 nozzle number 50, indications of something going on on
17 the head.

18 North Anna, I believe this was the first
19 time that they'd looked under the insulation of their
20 upper head. They had had significant problems with
21 canoseal leaks. Frankly, they had a lot of Boron on
22 the head. What we found out, as well, is they had
23 very high velocity air moving through the upper head,
24 so there was, you know, spray pretty much going
25 everywhere.

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1 At this point in time, we were expecting
2 to see popcorn. That was the Oconee classic evidence
3 of nozzle leakage. We saw this, and it really wasn't
4 clear to us what was going on there.

5 MEMBER WALLIS: It looks to be smeared up
6 the tube, the flow is flowing it up the tubes.

7 MEMBER ROSEN: There's some capillary
8 action of some kind drawing it.

9 MR. HISER: Yeah. The only photo that
10 seemed to have any sort of volume to it was this one,
11 where maybe you can see something there. Whether
12 that's directly associated with the annulus of the
13 nozzle or, you know, it's wind-blown from one of the
14 canoseal leaks isn't obvious.

15 The licensee in this case did a UT
16 inspection of the nozzle, came back clean. Did a PT
17 of the J-groove weld, had some indications in the PT
18 that the licensee dispositioned as being out at the
19 clad to the J-groove weld interface, artifacts of the
20 geometry. Region 2 staff and NRR staff agreed with
21 the licensee that it was not necessarily relevant to
22 the nozzle, based on where the indications were, and
23 based on the lack of a clear leak indication on the
24 head.

25 MEMBER ROSEN: And in the lower left

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1 picture, there's much debris in the back there.

2 MR. HISER: Yeah.

3 MEMBER ROSEN: That was considered to be
4 unrelated to it?

5 MR. HISER: Yes. Yeah, there is a lot of
6 Boron on the head, and I believe this area was more
7 powdery, which is like what you normally see from a
8 high temperature leak, you know, the water flashes,
9 and the Boron just falls out.

10 MEMBER SHACK: What was the insulation
11 like on this head?

12 MR. HISER: A horizontal step, so this is
13 part of the insulation here. In this case, the
14 insulation starts off at the top of the head, and then
15 comes down in a step-wise progression like that.
16 Access is not real good. Yeah, you can manipulate it
17 and get there, which clearly they did. So that's what
18 was seen in 2001. If you flip to the next page, zoom
19 out, this is that same nozzle a year and a half later.
20 At this point, the classic popcorn Boron.

21 MEMBER WALLIS: It also has the streaks,
22 there's a red streak running down from this nozzle.

23 MR. HISER: From here.

24 MEMBER WALLIS: That clear one up at the
25 sky there on the projector up on that wall there.

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1 MR. HISER: Yeah, right there.

2 MEMBER WALLIS: It's much more obvious,
3 red streak.

4 MR. HISER: Yeah. So if you look back at
5 the 2001 photos, what may have happened is a leak may
6 have occurred fairly late in the cycle, and the Boron
7 concentration is relatively low. It just was not able
8 to provide a full deposit, so I think the capillary
9 action sort of an explanation may be consistent with
10 what this is.

11 And as with North Anna Unit 2, this head
12 was replaced, not necessarily related to nozzle 50,
13 but just as a preventative measure by the licensee. I
14 guess the only other point to make about that was the
15 visual inspection really only encompassed that one
16 nozzle, because there were some uncertainties, and I
17 guess some allegations regarding the condition of that
18 nozzle. And the licensee did only inspect that one.
19 They did not do a general head inspection, which was
20 unfortunate.

21 Okay. Last couple of inspections.
22 Sequoyah Unit 1 this past spring, a Boron deposit was
23 identified on the head at nozzle 3. And I think if
24 you go ahead, Steve, and put the photographs up, just
25 really a small area.

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1 MEMBER WALLIS: And it did seem to wick up
2 the wall or something. It's higher on there than the
3 surroundings.

4 MR. HISER: Really hard to tell. I think
5 this had a 3-D character to it according to the
6 licensee, so it's not like a film, like what was
7 observed at North Anna Unit 1. The licensee had, in
8 the past, some issues with I believe canoseal leaks
9 from above, had not inspected the top of the head
10 previously, so this was the first --

11 MEMBER WALLIS: What's this rim of the hat
12 that's at the top there?

13 MR. HISER: Okay. I think that's related
14 to the insulation, I believe.

15 MEMBER WALLIS: So how does it get around
16 that and go way back to the nozzle? Presumably, it
17 drips off that cap.

18 MR. HISER: It may drip between this and
19 the nozzle. Anyway, the significance of this deposit
20 was that this plant has the lowest head temperature
21 upper head temperature at 557 degrees. The EDY is
22 1.5, so it's very low. It's 67 out of 69 PWRs. The
23 licensee did a UT of the nozzle base material. This
24 was clean. There was no evidence of a leak path,
25 indicating that it was unlikely that the deposit came

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1 from the J-groove weld or somewhere in the nozzle.

2 The J-groove weld itself was PTd by the
3 licensee. The licensee identified it as clean. This
4 was concurred in by NRC Region 3 staff, and our
5 understanding is more recently a third- party
6 independent assessment indicated that the PT was
7 clean.

8 CHAIRMAN FORD: What does that mean
9 specifically? Somebody else with no --

10 MR. HISER: Not --

11 CHAIRMAN FORD: -- conflict of interest?

12 MR. HISER: Not a licensee member, not an
13 NRC member.

14 CHAIRMAN FORD: And you don't know who
15 this is.

16 MR. HISER: Wesdyne, Westinghouse
17 Inspection folks.

18 CHAIRMAN FORD: Now yesterday -- I mean,
19 the fact is you found some Boron on the head. Do you
20 know unequivocally where it came from?

21 MR. HISER: My guess is that the licensee
22 may have some explanations of where it came from.
23 Whether they are 100 percent certain is not clear at
24 this point.

25 CHAIRMAN FORD: The reason I'm being

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1 suspicious, just to be a devil's advocate. We heard
2 yesterday about the inspection techniques. There was
3 all sorts of questions about the sensitivity, the
4 resolution capabilities, and the qualification of the
5 inspector, so to base conclusion exclusively on the UT
6 /PT examination, you automatically feel a little bit
7 uncomfortable about the reliability of that data. It
8 would make a much cleaner story if we knew
9 unequivocally where the Boron came from, that it came
10 from somewhere else.

11 MEMBER ROSEN: The difficulty, Peter, of
12 course, is that the Cesium Analysis shows it was 5, 10
13 years ago, when it came from wherever it came from.
14 That was 5 or 10 years ago, so a little bit -- you do
15 a forensic Boric Acid archeology.

16 CHAIRMAN FORD: Well, again, and recognize
17 I'm being a devil's advocate. I'm being deliberately
18 difficult. How about an original fabrication defect,
19 which then just went through that extra bit, not by
20 this PT/UT, deposited, dropped, and didn't operate
21 very long. There's your 5 to 10 year Boron deposit,
22 but it did crack initially and blocked up. Now I'm
23 giving a hypothesis. Well, I'm asking to be shot
24 down.

25 MEMBER ROSEN: No one's shooting.

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1 CHAIRMAN FORD: That's what I'm worried
2 about.

3 MEMBER SHACK: Well, it's hard to be
4 unequivocal, Peter.

5 MR. HISER: Yeah. I think the kinds of
6 measures we used are --

7 CHAIRMAN FORD: Where are the sources that
8 the Boron could come from? It could come from inside,
9 and I'm just making a devil's advocate approach, that
10 you haven't shot that one down. Where else would it
11 come from? You're saying seals from above. Is there
12 any evidence that it did come from the seals above?

13 MR. MATTHEWS: Peter, this is Larry. It's
14 my understanding that 10 years ago they had a major
15 canopy seal weld leak near the center of the vessel at
16 this plant.

17 CHAIRMAN FORD: And it could have gotten
18 from that position to that --

19 MR. MATTHEWS: Oh, no doubt about it. The
20 whole head was covered with Boric Acid.

21 MEMBER ROSEN: And so what that, Larry,
22 says, that they cleaned the whole head, but they left
23 a little bit right here.

24 MR. MATTHEWS: Or it's easy -- I thought
25 they had Boric Acid everywhere. Now we might need to

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1 clarify that, but it's easy also to --

2 MR. HISER: I think they had a film. They
3 had several discreet locations where they had piles of
4 Boron. This was the only one that was at a nozzle.
5 The others were in-between nozzles. I'm not sure if
6 it was associated with seams in the insulation.

7 MR. MATTHEWS: It very likely could be,
8 that it could drip through there.

9 CHAIRMAN FORD: Was that -- when you said
10 it had that drip, was that 5 to 10 years ago?

11 MR. MATTHEWS: Yes. It was 10 years ago
12 that they had, as I understand it about 10 years ago
13 that they had a canopy seal weld leak, a fairly
14 significant canopy seal weld leak. It's also easy to
15 imagine that the mirror insulation which is just
16 layers of metal, stuff can get in there, and you think
17 you got it all. And then when you start up, it gets
18 blown around.

19 MEMBER ROSEN: Well, you know, Peter,
20 before we got this information from the Southwest of
21 the United States, I would have said this was a pretty
22 good story. It's a low susceptibility plant. And the
23 arguments about where this came from, and the 10 year
24 old Cesium and that don't hold together very well, in
25 my view. But the fact that it's a low susceptibility

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1 plant because the EDY are so low, then I go and say
2 well, probably true. But now that we have this
3 additional information, I'm less certain of that. It
4 shakes the Sequoyah story.

5 MEMBER KRESS: The Cesium ratio is a
6 pretty good -- that's pretty good evidence.

7 MEMBER ROSEN: Yeah, it says -- no, that's
8 very good evidence. That says whatever -- whenever
9 the leak happened -- if there's a crack in there, it
10 happened that long ago. And Peter's scenario, you
11 know, there's still a crack there but it's plugged up,
12 it's not now active. But I think this new evidence
13 we're getting shakes the Sequoyah story somewhat, that
14 below EDY plants can, in fact, have cracks based on
15 some other mechanism. The EDY is not the whole story
16 is what this is saying. I mean, we'll see. This is
17 a -- we're in a work-in-progress here.

18 CHAIRMAN FORD: Is it work-in-progress as
19 far as the NRC is concerned, or is this resolved? Has
20 there been disposition?

21 MR. HISER: As far as Sequoyah is
22 concerned, I think our understanding is it's resolved.

23 MEMBER ROSEN: Right. Until they do the
24 next inspection.

25 MR. HISER: Until they do the next

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1 inspection, which --

2 CHAIRMAN FORD: They probably won't see
3 anything --

4 MEMBER ROSEN: Well, but then they'll go
5 back and look at this nozzle, won't they?

6 MR. HISER: Well, by the orders, by the
7 fact that this has a clean UT, a clean PT, there are
8 no indications it would require any additional
9 inspection. The way that the order is written, this
10 licensee would not have to do even a visual inspection
11 for three refueling outages.

12 MEMBER ROSEN: Right. But at some point
13 they go back onto the head and look at this nozzle.

14 MR. HISER: 2007.

15 MEMBER ROSEN: Okay. That's all I'm
16 saying, is that they --

17 CHAIRMAN FORD: In all likelihood -- the
18 point is, in all likelihood you won't see anything
19 because if the scenario is right, and according to
20 your Cesium argument, that hey, this is not new Boron,
21 you won't see it any more. It's plugged up. And if
22 there's a question on the UT and the PT.

23 MEMBER ROSEN: As long as it stays plugged
24 up, that's correct.

25 MR. HISER: That's true. By 2007, as

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1 well, they would have to do a non-visual.

2 MEMBER ROSEN: My experience with cracks
3 and plugging thereof is that they don't heal by
4 themselves. They may plug for a while, but the crack
5 is still there. And with enough working and thermal
6 cycles or whatever, vibration, it's not healed. So if
7 the crack is there, it has a tendency to wake up one
8 day and remind you that it's there.

9 MEMBER WALLIS: If this Boron came from a
10 crack, and apparently it came from somewhere else all
11 together.

12 MEMBER ROSEN: Yeah.

13 CHAIRMAN FORD: You've got to prove
14 unequivocally that it came from somewhere else.
15 Larry's got a good point. You know, is it sufficient?

16 MEMBER KRESS: I don't think you can plug
17 the crack with Boron.

18 CHAIRMAN SIEBER: I think establishing
19 where -- that it came from someplace else is
20 corroborative of the actual physical examination of
21 the area where flaws might be is the key.

22 MR. HISER: The one point that was latched
23 onto early- on with this finding was that this head
24 was fabricated at Rotterdam Dock Yards, which I heard
25 a little bit about yesterday. But the PT didn't prove

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1 to have any clear indications of the required
2 follow-up. And that's where a lot of the problems
3 were at the North Anna and Surry Units were in the
4 welds.

5 MEMBER KRESS: Well, if South Texas is
6 determined -- will determine what the source of their
7 leak is, and the root cause, I don't think you have to
8 go back to Sequoyah. I think that will be sufficient
9 to give you enough information to decide whether --
10 what kind of problem you have.

11 CHAIRMAN FORD: You mean if South Texas
12 turned out to be a justifiable red herring, then we
13 can resolve this one. If it turns out to be --

14 MEMBER KRESS: Yeah, that's my feeling.

15 CHAIRMAN FORD: -- a real crack, then
16 you've got to go back and re-examine it. Is that
17 right? Is that the decision tree?

18 MEMBER KRESS: No, no. I am thinking --
19 and base my -- I don't think you're going to find
20 anything about Sequoyah. I think I base my subsequent
21 decisions and processes on what I find out at South
22 Texas.

23 CHAIRMAN FORD: We're giving you a hard
24 time, Allen. I bet you thought you could get through
25 this in half an hour.

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1 MR. HISER: I thought this was easy.

2 Before launching into South Texas, which
3 is really focused on the lower head, just to review a
4 little bit. When we issued Bulletin 2002-02 last
5 August, plants in the fall did some inspections of
6 their upper head. We also began to inquire of
7 licensees, of whether they had looked at the lower
8 head at all to see if there were any indications of
9 leakage.

10 In some cases, licensees found on the
11 outside of the insulation indications of Boron, in
12 some cases rust, things like that. In some cases,
13 what the licensees then did is that they put
14 boroscopes up so that they could get a view of the
15 lower head. No definite signs of leakage were
16 identified. In some cases, the maybe limited
17 follow-up to those indications were attributed to the
18 fact that there's no known history of leakage in this
19 area, so there's -- you know, the licensees didn't
20 feel there was a credible mechanism for leakage for
21 cracks in that area.

22 With that sort of as a back-drop, there
23 hasn't been a lot of lower head examinations
24 performed. South Texas this spring did what appears
25 to be a very effective lower head inspection. Access

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1 at South Texas appears to be very good. Whether
2 that's by design or just a consequence of the design
3 is not clear, but I think South Texas is in probably
4 prime position to do these kinds of inspections.

5 More recently, I think the Farley plant,
6 if I remember, Larry, was also able to do a very good
7 lower head inspection. That's not the universal case.
8 Access through the insulation tends to be very poor in
9 all honesty, and requires some fairly major
10 disassembly to really get significant access.

11 Anyway, South Texas identified deposits
12 associated with two nozzles, number 1 and number 46.
13 My understanding is that the upper head was clean at
14 South Texas, so the upper head is good, the lower head
15 is potentially not clean. The EDY of the upper head
16 is somewhere between 4.5 and 6.3. This relates to
17 what temperature assumptions the licensee uses for
18 their operation. I believe in 1999, four years ago,
19 they did a bypass flow conversion.

20 MEMBER ROSEN: During the steam generator
21 replacement outage.

22 MR. HISER: Okay. And that was in '99.
23 Okay. And that dropped the upper head temperature
24 from possibly a little over 600 degrees down to about
25 560, 561. Using a lower head operating temperature of

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1 561, the EDY is approximately 2.1 for the lower head.

2 Before launching into photos --

3 CHAIRMAN FORD: Now.

4 MEMBER ROSEN: No, the lower head has
5 always been at 561.

6 MR. HISER: Right. Yeah, right now in
7 effect the lower head and upper head are at the same
8 temperature.

9 MEMBER ROSEN: Since '99.

10 MR. HISER: Right. The licensee from
11 discussions we've had is planning what appears to be
12 a good characterization activity to determine where
13 the flaws are, are they in the base material, the
14 J-groove weld, trying to determine the root cause,
15 whether they're fabrication-related, potentially some
16 sort of flow induced vibration, fatigue. Or is it a
17 PWSEC sort of mechanism, a cranking mechanism. The
18 significance of each of these is different, and what
19 generic responses might be would be different
20 depending on which of these it is.

21 CHAIRMAN SIEBER: Are you going to tell us
22 how they performed the examination?

23 MR. HISER: Well, they haven't yet.

24 CHAIRMAN SIEBER: Tell us how they will
25 perform the examination.

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1 MR. HISER: They don't know yet. We can
2 speculate.

3
4 [THE DISCUSSION HAS BEEN REMOVED DUE TO PROPRIETARY
5 INFORMATION]

6
7
8
9
10
11
12 MR. HISER: Yeah. If we flip to the next
13 page, this is a schematic of what things look like on
14 the lower head. Similar to the upper head, in that
15 there's an inconel buttering, an inconel weld,
16 stainless steel cladding. This is the Alloy 600
17 penetration itself. As opposed to a four inch outside
18 diameter, this is on the order of one and a half
19 inches. Is that shown there? Yeah, about 1.499 is
20 what's listed there. The wall thickness is on the
21 order of .44 inches, so it's thinner than the upper
22 head nozzles which are about five-eighths.

23 Penetration number 1 is located here on
24 the lower head, just off of dead center on the bottom

25

1 head. Nozzle 46 is off on the periphery, so I guess
2 here. The deposits that the licensee identified at
3 Penetration 1, they identified as being gummy in
4 appearance. And we can flip through these every
5 couple of seconds, and I mean they're all the same
6 penetration, just different perspectives. Clearly,
7 you can see the deposit -- the overall head appearance
8 doesn't look too bad. There are areas around nozzle
9 1 and nozzle 46, in particular. You know, here that
10 have more of a rusty appearance to them. Some of the
11 speculation is that these areas were taped off, and
12 then the rest of the head may have had like an
13 aluminum paint applied to it, but that was not -- they
14 didn't want that up against the nozzles themselves for
15 whatever reason. You can see here the insulation
16 package offset.

17 MEMBER ROSEN: How big is that dimension
18 between the bottom of the head and the -- it looks
19 huge.

20 MR. HISER: We're told it's somewhere
21 between a foot and three feet, where the nozzles are
22 located, so this probably is about a foot.

23 CHAIRMAN SIEBER: That's an inch and a
24 half.

25 MEMBER ROSEN: Yeah.

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1 CHAIRMAN SIEBER: I expect it's not three
2 feet.

3 MR. HISER: Yeah. No, it's not three
4 feet, but it --

5 CHAIRMAN SIEBER: It could be on the side.

6 MEMBER WALLIS: So what are we seeing
7 here, the bright orange area? What is that, bright
8 red area?

9 MR. HISER: There is where they tried to
10 highlight for the --

11 MEMBER WALLIS: Shine the light on there.
12 What's all the white stuff on the ceiling?

13 MR. HISER: This area?

14 MEMBER WALLIS: This looks like a parking
15 garage to me. What's on the --

16 MR. HISER: Yeah, this is probably paint
17 and again, just some reflections from the light.

18 MEMBER WALLIS: Why is it so spotty?

19 MR. HISER: Minor surface corrosion.

20 MEMBER WALLIS: Were these penetrations
21 stress relieved?

22 MR. HISER: We were told that they were.

23 MEMBER WALLIS: They were.

24 MR. HISER: Yes. We were also told that
25 at some point fairly early in life, that there were

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1 modifications made away from the head up inside the
2 vessel to this, because of, I believe, vibration
3 problems. They thickened up the --

4 MEMBER ROSEN: The tubes themselves that
5 go inside were, in fact, thinning in various places
6 because of vibration. And they were removed and
7 replaced with new tubes of a thicker wall thickness so
8 that that stopped the vibration.

9 CHAIRMAN SIEBER: That was a fairly
10 complex problem.

11 MR. MATTHEWS: Is that not the dry tubes
12 that go inside of these tubes? Because all of the dry
13 tubes, or a lot of the dry tubes on the Westinghouse
14 plants have had thinning areas, and we've had to
15 monitor that thinning from the idea the dry tube, and
16 reposition those and/or replace those dry tubes. But
17 that's not this Alloy 600 nozzle. It's a stainless
18 steel dry tube that's inside this nozzle.

19 MEMBER ROSEN: Yeah, that's what I'm
20 talking about.

21 MR. MATTHEWS: Okay. So it's not this
22 nozzle, it's the dry tube that goes inside this
23 nozzle.

24 MEMBER ROSEN: Right.

25 CHAIRMAN FORD: Is there a lot of crud on

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1 the bottom of these? Is there crud on the bottom of
2 the pressure vessel?

3 MR. HISER: I don't think anybody has
4 looked. Presumably, not a lot.

5 CHAIRMAN FORD: What was the mechanism of
6 thinning of the tube?

7 MEMBER ROSEN: The mechanism of thinning
8 of the internal tubes, vibration and I think against
9 the -- you know, the inside of the fuel assemblies.

10 CHAIRMAN FORD: Oh, I see.

11 MEMBER WALLIS: Now this bright white
12 stuff here is Boron, that bright white stuff. What's
13 the region of corrosion of the low end? It seems --

14 MR. HISER: There?

15 MEMBER WALLIS: Right.

16 MR. HISER: It's not obvious.

17 MEMBER WALLIS: And there's something --
18 what's the scar on the tube that runs all the way down
19 it, the top of it there. What's all that stuff?

20 MR. HISER: It's not clear what that is,
21 whether it's related to fabrication.

22 MEMBER WALLIS: All that stuff, is that
23 due to -- what is that, scratches, or is it --

24 MR. HISER: It looks like scratches. The
25 area up here is -- here looks like it has some 3-D

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1 character to it. I'm not sure which page you're on,
2 Steve.

3 MEMBER WALLIS: It looks as if it's been
4 corroded, bigger area than the Boron deposit.

5 MR. HISER: Maybe if you go to the next
6 page. To me it just looks like there's maybe some
7 surface staining, something like that. Some of the
8 photos it looks like there's a 3-D character to
9 something at the top of the nozzle. But the other
10 one, it looks like it's more just a surface stain or
11 something like that.

12 MEMBER ROSEN: And here is a very good
13 picture where you see that rectangular pattern on the
14 bottom of the head, that is what you described earlier
15 as they put masking tape around the nozzle and painted
16 the rest of the bottom surface of the vessel with some
17 kind of aluminum paint for some reason. But they
18 didn't do it right up against the nozzle.

19 MR. HISER: Right.

20 MEMBER ROSEN: So that's why you see this
21 unpainted area.

22 MR. HISER: And in all honesty, this one
23 it looks like there's some degree of corrosion going
24 on.

25 MEMBER WALLIS: Now if these Boron

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1 popcorns grew too big, they'd fall off. Where would
2 they go to?

3 MR. HISER: The experience on the upper
4 head is that they're very adherent.

5 MEMBER WALLIS: But here they're on the
6 bottom, so if they broke off, they would fall. On the
7 top they might have less --

8 MR. HISER: I'm not sure if they would
9 break off. That's --

10 MR. MATTHEWS: And even if they did break
11 off, they would fall right on the top of these
12 insulation panels here. And I don't believe there is
13 anything there.

14 MEMBER WALLIS: On this one down there?

15 MR. HISER: I would expect that that is
16 the first area that they looked was the top of the
17 insulation, because of things like that, that gravity
18 is sort of working against you, keeping things on the
19 head.

20 MEMBER ROSEN: But this picture, if you
21 look up above it's not so good on the screen directly
22 in front, but up above, it looks very clean, kind of
23 what's been called the dance floor. Is it -- was that
24 a picture that was taken after it was cleaned, or when
25 they first went in? Do you know that?

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1 MR. HISER: I'm not sure which.

2 MR. MATTHEWS: I don't believe they
3 cleaned anything, except when they were scraping right
4 around to get the samples of the Boric Acid.

5 MEMBER ROSEN: So that's as-found when
6 they went in.

7 MR. HISER: Yeah. I think what they said
8 was that the insulation was clean. I mean, there was
9 nothing there, unlike a lot of the upper heads.

10 CHAIRMAN FORD: A working hypothesis right
11 now is that you've got cracking at this weld here. Is
12 that right? Which might be covered with crud. And
13 that weld is stress relieved. Yes?

14 MR. HISER: That weld is stress relieved.
15 We're told it was stress relieved.

16 CHAIRMAN FORD: So the only reason why it
17 would crack unusually would be presumably if a stress
18 relief, but the initial residual stress was much
19 higher than we normally would expect. I mean, that's
20 one hypothesis.

21 MR. HISER: Right.

22 CHAIRMAN FORD: Is it not true that small
23 tubes welded into large components generally have a
24 very high residual stress?

25 MR. MATTHEWS: They will have a high

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1 stress. These are not thin walled tubes. This is a
2 hefty wall on the tube. T-to-D is thicker than the
3 one on top, and so it's --

4 CHAIRMAN FORD: Thin walled tube. I'm
5 looking for hypotheses, this is cracking. Would it be
6 a --

7 MR. MATTHEWS: There's all kinds of -- you
8 could have lack of fusion, you could have PWSCC that
9 we don't know why that's going on, you could have a
10 high stress on the ID of the tube that has resulted in
11 a through-wall crack in the tube.

12 CHAIRMAN FORD: Steve mentioned something
13 about a repair weld. Is that right?

14 MR. MATTHEWS: No, it was not a weld.

15 CHAIRMAN FORD: Could you go down on that?

16 MR. HISER: Yeah. I think it's way up.

17 CHAIRMAN FORD: Oh, I'm sorry. This way
18 up.

19 MR. HISER: Well, the --

20 CHAIRMAN FORD: Okay.

21 MR. HISER: The head would be somewhere in
22 this area.

23 MEMBER ROSEN: It's down below that.

24 MR. HISER: It's down below, yeah.

25 CHAIRMAN SIEBER: Ahh, there it is.

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1 CHAIRMAN FORD: I thought I heard you say
2 something about some repair, fatigue and repair --

3 MEMBER ROSEN: No, no. I said something
4 like that.

5 CHAIRMAN FORD: Well, I'm looking for
6 explanations. Okay. But I'm assuming that the
7 industry is going through that sort of thought
8 process.

9 MR. MATTHEWS: Absolutely. What possibly
10 could it be, and what are the consequences to the rest
11 of the fleet and programs, and everything else. But
12 we've got to wait until -- we really don't know. All
13 we know now is there's a little Boric Acid residue on
14 the outside of two nozzles. That is the extent of the
15 knowledge until they get in there and do some NDE.

16 CHAIRMAN FORD: How often is the bottom
17 head inspected?

18 MR. MATTHEWS: South Texas did a bare
19 metal visual every time as part of their Boric Acid
20 walk-down. Most plants don't.

21 MR. HISER: They did one apparently six
22 months ago.

23 MR. MATTHEWS: Yeah, in November they did.

24 MR. HISER: And did not find anything in
25 this area.

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1 MEMBER ROSEN: In November of 2002?

2 MR. HISER: Yes.

3 MR. MATTHEWS: Yes.

4 MEMBER ROSEN: What was going -- why were
5 they in there in November of 2002?

6 MR. MATTHEWS: As part of their Leakage
7 Assessment Program, as I recall, any time they have a
8 cold shutdown of a sufficient duration, they go look
9 for Boric Acid. And this is one of the locations that
10 this plant, because of their relatively easy access,
11 includes in their Boric Acid look. That's my
12 understanding.

13 MEMBER ROSEN: Yeah. That was not a
14 refueling outage.

15 MR. MATTHEWS: No, no, no. It was just
16 some other cold shutdown.

17 MEMBER ROSEN: Some other reason.

18 MR. MATTHEWS: Yeah.

19 MR. HISER: And my recollection from notes
20 from the licensee was that the other unit they've
21 looked at several times over the last year, and found
22 nothing on the lower head.

23 MEMBER ROSEN: Unit 2.

24 MR. HISER: Yes.

25 MEMBER ROSEN: So six months between

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1 November of 2002 and the spring of 2003, this stuff
2 showed up.

3 MR. HISER: Right. Cesium dating of this
4 is what I think four years old. But the amount of
5 deposit is very small. I think what I recollect that
6 they said they collected at 46 was on the order of
7 half of an aspirin was the quantity.

8 MEMBER. ROSEN: But it's four years old,
9 so it's been in -- and they looked six months ago and
10 didn't see it, so the --

11 MR. HISER: What's here is four years old.

12 MEMBER ROSEN: Yeah, but they didn't see it
13 six months ago --

14 MR. HISER: What's up here --

15 MEMBER ROSEN: -- so it was coming down
16 for four years.

17 MR. HISER: That's a hypothesis. Yeah, it
18 may be that, you know, like an extruding process, that
19 eventually, you know, gets pushed out. And the Boron
20 that they found started up here four years ago, and
21 just took four years to make the trip to where it was
22 detectible. And what we were told, as well, is that
23 from six months ago, that they specifically know that
24 they saw the area around nozzle 46 because of it's
25 peripheral location. I guess it was easier to get to,

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1 so there is some -- they have very high confidence in
2 that time frame, that there was nothing in November,
3 at least on nozzle 46. Nozzle 1 they said -- describe
4 it as a gummy appearance. I think they had some
5 recent history with tape in that area for, I don't
6 remember what the -- some sort of instrumentation or
7 something, and it may have been related to that. But
8 it also had Boron on it, so that was --

9 MEMBER WALLIS: Now this Cesium dating
10 assumes that the Cesium and the Boron area
11 homogeneously mixed at all times. There isn't sort of
12 a preferential seeping of the Cesium through the Boron
13 in some way?

14 MR. HISER: It's 134 to 137 --

15 MEMBER WALLIS: Yeah, but you assume that
16 they move together, and we know that when we look at
17 radioactive stuff moving through the ground, there's
18 all kinds of weird things that happen. Certain
19 isotopes go faster than others because they can attach
20 to the ground in different ways, a very complicated
21 process of tracking radioactive isotopes through
22 porous media. They don't all travel at the same
23 speed.

24 CHAIRMAN FORD: Okay. Do you think we can
25 add anything more constructive to this debate at this

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1 point? Obviously, there's a whole lot of work going
2 on. They're asking all the right questions. Just
3 wait to get the answers?

4 MR. HISER: And we're trying to get more
5 information. We know that the French have been more
6 -- have done a significant number of non-visual NDEs
7 of the lower head, and we're trying to gather that
8 information. Somebody mentioned about what sort of
9 inspection would you do. Maybe, Steve, if you go back
10 up to that one schematic, the one of the nozzle and
11 the head.

12 Well, actually, you know, similar NDE to
13 the upper head. What is applied in France is
14 ultrasonic and eddy current into the nozzle ID.
15 Again, it's really restricted to the nozzle base
16 material itself. That would not necessarily cover or
17 find indications in the weld.

18 MEMBER ROSEN: Why do you show that as
19 coming down from above, rather than up from below? I
20 mean, obviously it would be much easier to come in up
21 from below.

22 MR. MATTHEWS: No. In fact, it would be
23 almost impossible to come in from below. There's
24 about a 30 or 40 foot tube that's socket welded in
25 right here that goes out to a seal table, and it

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1 contains a dry tube. And you have to pull all of that
2 out, and come in -- to even come in from above.

3 MEMBER ROSEN: But obviously, the
4 importance of this, you could retract that tube --

5 MR. MATTHEWS: If you retract the tube,
6 you've got water flowing out the bottom of the vessel,
7 unless you freeze plug something somewhere, or plug it
8 from inside the vessel.

9 MEMBER ROSEN: Yeah, you can retract the
10 tube and freeze plug above --

11 MR. MATTHEWS: You'd have to freeze plug
12 inside the vessel.

13 MEMBER ROSEN: Yeah.

14 MR. MATTHEWS: Or put some kind of plug
15 inside the vessel. Or you could drain the vessel. I
16 mean, there's lots of things to do.

17 MR. HISER: And that's partly why they
18 don't know what they're going to do yet, because
19 there's a lot of --

20 MEMBER ROSEN: Trying to think through all
21 that.

22 CHAIRMAN FORD: Now you say the French
23 have done I was about to say routinely, but they have
24 done far more inspections on this particular
25 sub-assembly than we have.

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1 MR. HISER: Right. Non-visual NDE.

2 CHAIRMAN FORD: And have you had any
3 indication of -- would they be shocked hearing this?

4 MR. HISER: I think they are surprised,
5 but clearly not shocked because they're doing
6 inspections. My understanding is their only findings
7 have been one or two fabrication-related flaws.

8 CHAIRMAN FORD: They haven't found any
9 found any --

10 MR. HISER: No.

11 CHAIRMAN FORD: Degradation issues.

12 MR. HISER: No service-related
13 degradation.

14 CHAIRMAN FORD: Okay.

15 CHAIRMAN SIEBER: And you would not expect
16 that here either, would you?

17 MR. HISER: We would not expect, given our
18 experience with PWSCC of these alloys, we would not
19 expect to see this.

20 CHAIRMAN FORD: Based solely on
21 temperature.

22 MR. HISER: Based solely on temperature,
23 whether they're plant-specific. There are fabrication
24 flaws, much as North Anna had.

25 CHAIRMAN SIEBER: That could be the

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1 answer.

2 MR. HISER: Yeah. There's a lot of -- the
3 implications are different for every one. Maybe the
4 heat of material is much higher yield strength, I
5 mean, there's a lot of things. How do we know this is
6 necessarily different from every other PWR? I don't
7 know that we know that either. We know that it
8 operates -- actually, the operating temperature of the
9 lower head is actually higher than the upper head at
10 plants like Sequoyah. So this actually -- there's I
11 believe 16 plants whose upper heads are colder than
12 South Texas' lower head, so maybe that does fit within
13 the --

14 MEMBER SHACK: That doesn't seem to jive
15 with your 2.1 years though.

16 MR. HISER: Well, the operating time here
17 is pretty low. And if you look at Bill Cullen's plot
18 from yesterday, there's about 15 or so plants that are
19 down in a very low EDY area. This would fit in at the
20 upper bound of those, if it operated for a long enough
21 time period to accumulate the EDY.

22 CHAIRMAN FORD: Okay.

23 MR. HISER: So if this were the upper head
24 and you had full access like Sequoyah did, you would
25 want to do NDE of the ID of the nozzle. If you found

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1 nothing, you'd want to look at the weld to see if
2 that's where the leakage path is. You know, we know
3 that there are people in the world who have done NDE
4 of the ID of the nozzle. Nobody that we're aware of
5 has done anything on the J-groove welds. Again, it's
6 a smaller diameter. The geometric sorts of concerns
7 with the relatively high hillside, I mean, all of
8 those become more pertinent here, more restrictive.

9 MEMBER ROSEN: This is an exaggeration,
10 isn't it? I mean, the vessel head is not -- according
11 to these pictures, it's not that steep at that point.

12 MR. HISER: Yeah, it's pretty steep on the
13 outer row.

14 MEMBER ROSEN: Well, open for 46 which is
15 one of the outer ones, it probably is.

16 MR. HISER: Yeah.

17 MEMBER ROSEN: Number 1 is right in the
18 middle. It's flat.

19 MR. HISER: It's just off a little bit,
20 but yeah.

21 MEMBER ROSEN: It's nearly flat.

22 MR. HISER: Absolutely. I think on some
23 of the -- on the upper heads some of the angles we've
24 seen are on the order of almost 45 degrees on some of
25 these.

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1 MEMBER ROSEN: And it might go to 46.

2 MR. HISER: Yeah.

3 MEMBER ROSEN: For one, the one that's of
4 principal interest right now.

5 MR. HISER: Well, one is the one that had
6 what they called a gummy appearance to it.

7 MEMBER ROSEN: Oh, okay. I got it
8 backwards.

9 MR. HISER: Yeah.

10 MEMBER ROSEN: 46.

11 MR. HISER: Yeah.

12 CHAIRMAN FORD: Okay.

13 MR. HISER: Okay. Where are we going
14 overall? That's just to summarize on this page, and
15 then the next page with some ideas on interactions
16 with the industry. Clearly, what we want to do is get
17 to a point of permanent requirements. We want to get
18 out of order space, bulletin space. Let's get
19 something in the ASME Code, get something in 54.55a.
20 The ASME Code is working on this. For anybody that's
21 familiar with the code, it's glacial is about the pace
22 that it works at.

23 Right now the ASME Code work has been
24 based on the industry report, MRP-75. We have
25 provided some comments to the MRP. To be real blunt,

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1 we did not think that the report was acceptable last
2 summer, last August when we first got it. And as the
3 industry works to revise it, clearly acceptability of
4 the final product is not certain. I think there may
5 be some philosophical differences that we have had
6 with the industry. Hopefully, you know, we'll both be
7 able to get on the same page overall with what is
8 acceptable.

9 As we talked about, we did suspend review
10 of the report pending revisions by the industry, which
11 I guess we're expecting by the end of the summer. At
12 this point, it's not clear that ASME Code adoption
13 would be complete until 2004 or later. Things like
14 South Texas helped to delay that, you know, just
15 creates more doubts in our understanding of what's
16 going on.

17 One thing we do know is requirements will
18 be implemented in 50.55a. Hopefully, we'll be able to
19 endorse what the ASME Code develops under some sort of
20 an expedited implementation process that relates to
21 getting 50.55a updated, and then having licensees pick
22 up that code addition, so we would probably want to
23 expedite implementation so that the requirements
24 become effective pretty much immediately.

25 If that does not work out, if the ASME

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1 Code does not develop acceptable requirements, then we
2 will codify some alternative inspection requirements.
3 Know clearly at this point what that would look like,
4 and we have the order on the books right now.
5 Presumably, that's our best thinking at this point in
6 time. However this works out, once we start to revise
7 50.55a, it still will take a time period for these
8 requirements to be implemented, so that's --

9 CHAIRMAN FORD: From a control aspect,
10 regulatory control aspect, do we take it in the
11 remarks of Rich Barrett to be the first date, that the
12 order that you have out right now will be sufficient
13 to maintain safety aspects for that sort of time
14 period, out until one to two years? They are all-
15 encompassing enough to take into account potential
16 cracking, such as maybe at South Texas? Sufficient to
17 take into any potential Boric Acid corrosion effects?

18 MR. HISER: Yeah.

19 CHAIRMAN FORD: And then as we get out to
20 one to two years, and we've sorted out this MRP, the
21 industry life management approach that they're putting
22 forward, supplemented by the one that was described
23 yesterday by Bill Cullen, then you can come in two
24 years time, come into a modified version of the
25 regulations? I'm trying to get an idea of -- you're

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1 talking several times here before we going to get any
2 changes to the current situation.

3 MR. HISER: I would expect that once we
4 fix on what inspection requirements are necessary,
5 that we would probably, if that's different from
6 what's in the order, we would probably revise the
7 order while the ASME Code and while 50.55a are being
8 revised, so that we would have some continuity at that
9 point.

10 CHAIRMAN FORD: So the order would become
11 more stringent.

12 MR. HISER: Well, I wouldn't say that. I
13 would say the order may be different. It may be less
14 stringent in some areas. It may be more stringent in
15 other areas, given what we've seen at Sequoyah and
16 South Texas. If those were to pan out to indicate
17 that there may be more susceptibility with what we
18 thought were low susceptibility plants, that part of
19 the requirements would probably get beefed up. They'd
20 become more stringent.

21 There are some folks that think that the
22 high susceptibility plant requiring non-visual NDE
23 every outage is too stringent. I mean, so there may
24 be -- it may be that right now we have too steep of a
25 curve between high susceptibility and low

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1 susceptibility, and that needs to flatten out
2 somewhat. But, you know, that's just -- that's trying
3 to pre-judge what we're going to have happen. We may
4 be here in six months, and Plant XYZ had some other
5 unique findings. Or maybe the industry will look at
6 the North Anna head and find something totally
7 unanticipated. But I think right now, I think we're
8 fairly well-positioned for the interim.

9 In terms of interactions that we have
10 ongoing with the industry and I think this has been
11 provided to NEI separately, clearly revising and
12 updating MRP-75 is a high priority. We have had good
13 interactions with the industry, and that sort of is
14 diminished with Davis-Besse and, you know, sort of
15 fighting fire after fire in order for MRP-75 to be in
16 a real -- in a position that we're real comfortable
17 with, and I think we need to renew the staff level
18 interactions.

19 Tom Alley talked yesterday about the
20 inspection tools. Clearly, there's room to improve
21 those, and I think the industry is looking a lot in
22 terms of delivery and efficiency of the inspections.
23 Effectiveness is also an area that needs to improve.
24 The industry has activities to characterize heads
25 removed from service. We've heard about North Anna

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1 Unit 2. Hopefully, some of that can be extended to
2 other heads. Boric Acid corrosion research that they
3 talked about is -- it looks like it's addressing the
4 correct issues.

5 The one area that we -- that really before
6 vessel heads, we had VC Summer with the butt weld
7 cracking issue. That sort of -- you know, we dealt
8 with that for a little bit two years ago, and that
9 really has been put on the back burner. And I know
10 that the ACRS members expressed a lot of interest in
11 that yesterday. And I think that's an interaction
12 that we're going to renew with the industry, is to
13 have them finalize their report that they provided to
14 us two years ago, so that we can start to move forward
15 in some of these other areas, instead of being bogged
16 down.

17 MEMBER WALLIS: I remember at that
18 incident there was a huge Boron stalactite. It was
19 a huge amount of Boron that came out before anything
20 was detected. It was quite surprising, not only that
21 this happened at all, but there was so much Boron
22 deposited from that leak in VC Summer.

23 MR. HISER: But see, that may have
24 provided some false reassurance that you're going to
25 get tons of Boron. I think that was the expectation

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1 six years ago. You know, now clearly we know
2 differently. You know, a gallon per year from Ocone
3 Unit 3, 180 degree cir crack. That's the benchmark.
4 Ten to the minus six GPM. That's not much water
5 coming out. That's all I have, Mr. Chairman.

6 CHAIRMAN FORD: Are there any other
7 questions from the members?

8 MEMBER WALLIS: Well, I guess that one of
9 the weak points here is Bullet 2, how good are these
10 underlying analyses? Apparently, they're not
11 satisfactory yet, and I don't know this Committee has
12 any measure of how likely they are to be satisfactory
13 at some future date. Isn't that one of the key things
14 that's holding up progress, is getting some very solid
15 underlying analyses to support MRP-75?

16 MR. HISER: I think understanding what's
17 going on is really one of the keys, as well.

18 MEMBER WALLIS: Well, what's the prospect
19 of getting that in a reasonably short time?

20 MR. HISER: Well, we were told yesterday
21 August.

22 MEMBER WALLIS: Yeah, but that seemed to
23 be unreasonable.

24 MR. HISER: Well, I guess -- I think from
25 the NRC perspective, we're comfortable for the interim

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1 where the order puts us, unless South Texas, Sequoyah
2 sorts of findings indicate that we need to modify our
3 position. We're comfortable with where the order puts
4 us. The industry probably wants some relaxation,
5 generic relaxation of the -- again, much as with the
6 Alloy 690 heads, the burden is on the industry to
7 provide the basis that would enable us to change our
8 position.

9 CHAIRMAN SIEBER: It seems to me if you
10 look into the future and speculate as to where you're
11 going to go, South Texas has two impacts, in my view.
12 One of them is, it opens for inspection a whole new
13 area which has doubled now the work of this inspecting
14 the upper head. The second thing is, it seems to me
15 that you can take your susceptibility curve and throw
16 it away.

17 MR. HISER: The difference in geometry, in
18 fabrication and all, it may be that there's different
19 susceptibilities.

20 CHAIRMAN SIEBER: It could be.

21 MR. HISER: I think there was some mention
22 of small diameter nozzles on the upper head. Two B&W
23 plants had I think about one inch diameter therma
24 couple nozzles, eight at each plant. One plant, all
25 eight were cracked. The other plant, they had five

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1 out of eight that were cracked. You know, the
2 prevalence of cracking there was much higher than the
3 CRDM nozzles at those same plants. It may be that
4 there's just -- you know, that the conditions are
5 different. It may be the EDY is okay, but we just
6 need to shift the cut-offs to lower values for the
7 lower head, as an example.

8 CHAIRMAN SIEBER: That's true, but it's
9 obviously an area where continued thought needs --

10 MR. HISER: Absolutely. You know, we have
11 no preconceived notions at this point.

12 MEMBER ROSEN: At some point when you
13 shift the EDY to lower numbers, you're basically
14 saying everybody is old enough to be --

15 MR. HISER: Well, but it may be that what
16 you see on the lower head may not necessarily relate
17 to what you're going to see on the upper head. And
18 that's the only -- one thing -- I focused on all the
19 negative things from the last couple of outages.
20 There are some plants that are very high
21 susceptibility, that I think Larry may have mentioned,
22 Bill Cullen mentioned. They did full-blown
23 inspections, visual, UT and in some cases EDY current.
24 They found no cracks anywhere. These are top five
25 plants. There's something going on. There are good

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1 news stories out there.

2 CHAIRMAN FORD: Okay. I'd like to recess
3 for one hour for lunch, and then we'll return at 1:00
4 for the final presentation, so we're in recess.

5 (Whereupon, the proceeding in the
6 above-entitled matter went off the record at 11:54:09
7 a.m. and went back on the record at 1:01:18 p.m.)

8 CHAIRMAN FORD: Okay. I'd like to get
9 back into session. The last presentation we have for
10 this Subcommittee Meeting is addressing the Plans for
11 Addressing the Davis-Besse Lessons Learned Task Force
12 Recommendation, Brendan Moroney, and Cayetano Santos.
13 And apparently, they're going to do a tag-team act on
14 this subject.

15 MEMBER WALLIS: Is this something I have?

16 MR. MORONEY: You should. It's got big
17 black letters.

18 CHAIRMAN SIEBER: It should be wet.

19 MEMBER WALLIS: Okay. It's underneath.
20 It's the last one.

21 MR. MORONEY: Good afternoon, gentlemen.
22 We're here to give you a briefing on the action plan
23 for addressing the Davis- Besse Lessons Learned Task
24 Force.

25 COURT REPORTER: Excuse me. Would you

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1 pull the microphone closer.

2 MR. MORONEY: Good afternoon, again. My
3 name is Brendan Moroney. I'm with NRR, Division of
4 Licensing Project Management, and I have Cayetano
5 Santos who's in Research, Division of Engineering.
6 And we're here to give you a briefing and overview of
7 the action plans for accomplishing the Davis- Besse
8 Lessons Learned Task Force recommendations.

9 As a brief overview of what we're doing
10 today, the plan involves an overall implementing plan
11 for addressing the actions and the recommendations.
12 We'll describe what the overall plan is. And then the
13 overall plan does include specific action plans in
14 specific areas, and we'll briefly tell you what all of
15 them are, but our intent today is just to discuss two
16 of them, one in the stress corrosion cracking area,
17 and the other one in the barrier integrity
18 requirements area.

19 By way of introduction, I'm sure you're
20 all familiar with the LLTF report, which came out in
21 September. The EDO referred it to a Senior Management
22 Review Team, which reviewed the recommendations and
23 then made its own assessment and recommendation to the
24 EDO at the end of November. There were originally 51
25 recommendations. The Senior Management Review Team

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1 deleted two of them that they thought were not
2 necessary to be accomplished or appropriate to be
3 accomplished, leaving 49 recommendations. They took
4 those 49 recommendations and divided them up into four
5 general categories, and then assigned priorities to
6 each of them, either high, medium or low.

7 MEMBER ROSEN: Do you have them by
8 category or by individual item?

9 MR. MORONEY: Each individual item was
10 given a -- within a category was given a
11 prioritization. The EDO then issued a tasking
12 memorandum on January 3rd of this year to the
13 Directors of NRR and the Director of Research to
14 jointly develop a plan for implementing the
15 recommendations. Together we developed an overall
16 implementing plan which was delivered to the EDO on
17 the 28th of February, as required. This plan was
18 subsequently forwarded by the EDO to the Commission
19 for their information on March 10th, and we're
20 operating now under the provisions of those plans to
21 accomplish the recommendations.

22 The overall plan consists of three parts,
23 actually. Part is to address the high priority items
24 of the 49 recommendations, and there were 21 of those
25 that were listed or given a high priority by the

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1 review team. And there were four action plans
2 developed, and they were structured along the lines of
3 the categories that the review team had put them in.
4 And what they are is addressing stress corrosion
5 cracking issues which NRR/DLPM has the lead on for
6 plan management, but the technical part of that,
7 you've heard from the people that are really doing the
8 in the trenches work on that, which was Allen Hiser,
9 Bill Cullen, people like that over the last couple of
10 days.

11 There's a plan for operating experience
12 assessment. The lead on that is the operating
13 experience branch, NRR/Division of Regulatory
14 Improvement Programs. And I was told also that there
15 will be a specific presentation on that particular
16 evolution at your May 8th Full Committee Meeting.

17 The third area had to do with inspection
18 program, assessment, project management, and that has
19 been assigned to our Division of Inspection Program
20 Management. And finally, there was one on barrier
21 integrity requirements, which the lead on that is
22 Research.

23 The remaining items in the low and medium
24 priority categorization were to be addressed through
25 the agency planning, budgeting and project management

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1 process, the PBPM process, which is a process by which
2 the leadership team, the executives of each office sit
3 down and prioritize, schedule, assign responsibility
4 for various work that has to be done within their
5 groups. And those items in the overall plan we
6 committed to having the initial screening completed by
7 August of this year, so the other 28 items that are
8 low and medium priority will be addressed through the
9 PBPM process by August of this year.

10 In fact, we have an initial presentation
11 scheduled for our leadership team on May 20th, to
12 start presenting to them what has to be done, and our
13 estimates of the potential schedule, resource
14 requirements, and so on.

15 The third aspect of the plan was to
16 provide for tracking and reporting of the items. And
17 action plan items, the actions plans were developed in
18 accordance with our office instruction on action plan
19 management. And we have quarterly updates to the
20 Division Director level of the status of all action
21 plan items, so each of the high priority items will be
22 statused and updated at least on a quarterly basis to
23 our Director, our Division level.

24 The EDO's tasking memo and the
25 recommendations from the review team was that all the

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1 items should be updated and statused at least on a
2 semi-annual basis, so we also have in the plan put a
3 provision for making a semi-annual report on all items
4 and their current status. And the first report is due
5 six months after the date that we implemented the
6 plan, which was February 28th, so at the end of
7 August, we will have our first semi-annual report. So
8 that's basically the overall plan as to how we are
9 structuring this for accomplishing the
10 recommendations. Are there any questions so far,
11 before we go into some of the specifics of the plans?

12 Okay. We're going to talk in more detail
13 today about two of the action plans. The first one is
14 the stress corrosion cracking concerns, and the other
15 one is the barrier integrity concerns. The SCC Action
16 Plan has three major parts. The first has to do with
17 development of the reactor pressure vessel head
18 inspection requirements. The second part has to --

19 CHAIRMAN FORD: Is this related just to
20 the reactor pressure vessel head? How about
21 pressurizers penetrations, how about bottom head
22 penetrations?

23 MR. MORONEY: Right now it's focused on
24 the pressure vessel head. It presents the -- that was
25 the area of focus in the recommendations, and the

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1 concern that came out of the Davis- Besse. However,
2 it has provision for expanding into other areas, as
3 necessary. In particular, I think when we look at the
4 Boric Acid corrosion program and inspection
5 requirements, looking at that, that will branch out
6 into a lot of different areas, all nozzles and
7 penetrations, lower head and things like that.

8 CHAIRMAN FORD: What will trigger such an
9 extension of the scope?

10 MR. MORONEY: Well, a review of the
11 experience and the information that comes in, plus the
12 inspection requirements that are proposed, you know,
13 by the industry and our review of those.

14 CHAIRMAN FORD: So essentially, it is
15 reactive. You will wait until something goes off in
16 the middle of the night, and then you will react to
17 that, alter you program accordingly?

18 MR. MORONEY: Well, we'll certainly be
19 responsive to any issues that arise. I mean, you
20 know, the program has an active and a reactive phase
21 to it. I mean, we are certainly looking at for
22 inspection requirements, we're monitoring and in some
23 ways, you know, following along with the industry by
24 our review of the MRP documents, and ASME Code
25 developments, things like that. And, you know, one of

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1 the action items in the recommendations of the task
2 force was to participate in that, and to encourage
3 those things to be moved along to the way we want to
4 do things. But in addition to that, we have a lot of
5 research effort going on, and a lot of our own
6 internal reviews to decide, you know, how we want to
7 go, and where we think the inspection programs ought
8 to be, and what the scope ought to be. And those are
9 kind of moving in parallel.

10 I think the staff is deferring somewhat to
11 the industry to see -- to allow them to try and
12 develop something that they can present, can be put
13 into the ASME Code, and then we could endorse that, if
14 it's acceptable. But in the meantime, we are
15 proceeding along doing our own reviews and our own
16 evaluations. And at some point in time, it's possible
17 that if the industry efforts are bogged down or not
18 proceeding at a satisfactory pace, we will go ahead
19 and take the lead on establishing --

20 CHAIRMAN FORD: I'm just curious because
21 Alex Marion indicated yesterday that it was trying to
22 take more of a holistic view of the degradation of the
23 whole -- in this case of the primary waterside PWRs,
24 which would include not only pressure vessel top head,
25 bottom head, and also pressurizers, where we know

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1 we've had problems. I'm just curious as to why we at
2 NRC are holding back on doing such more proactive
3 work, and letting the industry dictate - that's the
4 wrong word - show the way of how it should be done.

5 MR. MORONEY: Well, once again, I guess
6 I'm not sure that it would be categorized that we're
7 sitting back and letting them take the lead. I think
8 it's a parallel effort right now. We're certainly
9 working with them and, you know, following what
10 they're doing, and willing to accept their input and
11 knowing that there is a process where it will develop
12 recommendations and the code committees will, you
13 know, try and factor those into updates for the code.
14 And then we will ultimately make those, you know, part
15 of our own regulations. But we certainly have the
16 ability to proceed ahead on our own rule making if we
17 figure that's the appropriate way to go.

18 The second part has to do with -- it's a
19 similar type of an effort, but having to do with Boric
20 Acid corrosion control activities, inspection
21 requirements and the scope of inspections, and
22 potential changes in regulatory structure there. And
23 third would have to do with inspection program
24 improvements, which would be a fall-out from any
25 changes that do arise from the changes in our

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1 inspection requirements or regulations.

2 Going into a little more detail, in the
3 Part One as far as the SCC inspection requirements, or
4 the reactor pressure vessel inspection requirements,
5 there's an effort underway, a project underway now to
6 collect worldwide information and establish a data
7 base on experience in corrosion and cracking. I think
8 Bill Cullen gave you some information on that
9 yesterday. He sort of has the lead on that from
10 Research, and that is ongoing, and expected to be
11 complete a year from now.

12 CHAIRMAN FORD: Now is that worldwide
13 information on data or is it on experience, operating
14 experience? I'm assuming the former. Is that
15 correct?

16 MR. MORONEY: Well, I think it's both. I
17 mean, operating experience information that comes out
18 of the reports from around the world, whatever format
19 it's in, it's still --

20 MEMBER ROSEN: Now the distinction in
21 Peter's question that I'm interested in is, is it data
22 on research on stress corrosion cracking, or is it
23 data on operating experience with plants that operate
24 material susceptible to stress corrosion?

25 MR. MORONEY: Oh, I see. My understand is

1 it's the latter.

2 CHAIRMAN FORD: Operating experience.

3 MEMBER ROSEN: Operating experience of
4 plants that use materials susceptible to stress
5 corrosion cracking.

6 MR. MORONEY: Right.

7 CHAIRMAN FORD: Because, Bill, in his
8 presentation yesterday talked primarily about data,
9 not operating experience.

10 MEMBER ROSEN: You mean data, research
11 data.

12 MR. MORONEY: Well, I'm sure there's a lot
13 of that involved but, you know, I think that the
14 latter part is important.

15 MR. HISER: Yeah. I think actually it is
16 both. As you're aware, MRP has collected data from
17 around the world, and I think the interest is to
18 continue to collect the experimental and crack growth
19 data, and similar kinds of information, along with the
20 operational experience.

21 CHAIRMAN FORD: That's important. It's
22 very easy to crack 182 in the lab, not so easy to
23 crack it in the --

24 MR. HISER: Yeah.

25 CHAIRMAN FORD: These are PWRs.

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1 MR. MORONEY: Yeah, I think the focus of
2 the LLTF recommendation was to actually get operating
3 experience.

4 MEMBER ROSEN: But you're doing both.
5 You're going beyond the original intended focus.

6 MR. MORONEY: That's true.

7 MEMBER ROSEN: Okay. That's a good thing.

8 MR. MORONEY: Good.

9 MEMBER ROSEN: Used your brain.

10 MR. MORONEY: There's another step which
11 would be to evaluate the SCC models for use in the
12 susceptibility index to determine, you know, their
13 continued applicability and effectiveness. I think
14 Bill also talked a lot about that yesterday.

15 MEMBER ROSEN: You're talking here about,
16 for instance, the time and temperature.

17 MR. MORONEY: Uh-huh.

18 CHAIRMAN FORD: And when you say models,
19 you mean the empirical models.

20 MR. MORONEY: I think so.

21 CHAIRMAN FORD: Not anything deeper than
22 that.

23 MR. MORONEY: I think so. Then we're
24 doing an evaluation of the results of all the
25 inspections as they're completed. We get the reports

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1 from each of the plants of the inspections that are
2 done in response to the bulletins and the order, and
3 that's an ongoing process right now. The way the
4 schedule is laid out for the various refueling outages
5 and inspections, it would be in the spring outage
6 season of next year before all of the plants will have
7 been through at least one of the cycles where they've
8 had all of these inspections, so we anticipate that at
9 least the first go-around of the complete results of
10 inspections would be completed by around May of next
11 year.

12 The other part we talked about before is,
13 we're also evaluating the MRP and ASME efforts and,
14 you know, following them very closely in our review of
15 those items.

16 CHAIRMAN FORD: We know what the MRP --
17 we've had several presentations on the MRP efforts.
18 Can you tell me something more about the ASME effort?

19 MR. MORONEY: Well, the ASME Code
20 Committee will be revising their, you know, Section 11
21 inspection requirements primarily based on the input
22 that they get from the MRP, as I understand it. That
23 is probably not going to take place for quite a while.
24 The MRP has, you know, they had originally submitted
25 their first edition of the MRP-75, and then that was

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1 withdrawn, and I believe I heard yesterday that
2 they're gearing towards having it revised, or a new
3 edition of that in this summer sometime, so it will
4 be, you know, over the next or so that we'll be
5 following that. And I'm sure there'll be a lot of
6 discussions, meetings, and activities as part of that
7 review.

8 I think the ASME Code updates probably
9 will not take place, or not occur until the latter
10 part of next year at the earliest. And then it would
11 be our position at that point to either accept or, you
12 know, propose even alternate ones. If we accept it,
13 you know, it would be incorporated into our 10 CFR
14 50.55a, and if we have to go ahead with additional or
15 different recommendations on our volition, then it
16 would be part of additional rule making activity which
17 could go on for an extensive period of time, so it
18 might be a couple of years before that would be
19 accomplished.

20 CHAIRMAN FORD: I realize that this is a
21 high priority item.

22 MR. MORONEY: Uh-huh.

23 CHAIRMAN FORD: And therefore, we'll have
24 the resources to make it a high priority.

25 MR. MORONEY: Yes. All of the items that

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1 -- our leadership teams have already been briefed or
2 presented all of these items. They agreed to them,
3 and part of the action plans were estimates of
4 resource requirements and costs, and those have all
5 been approved.

6 CHAIRMAN FORD: But the time limits of
7 this, you mentioned that you would probably get to the
8 end of this page by the end of 2004.

9 MR. MORONEY: Right.

10 CHAIRMAN FORD: But many of the inputs are
11 out of your control.

12 MR. MORONEY: That's true.

13 CHAIRMAN FORD: Worldwide information, the
14 ASME efforts, the MRP efforts, so is this a realistic
15 figure?

16 MR. MORONEY: I think it's as realistic as
17 we can give it right now. I think the collection of
18 information, you know, will be complete. It will be
19 as up-to-date as it can be in a year from now.
20 Obviously, that's just the start of the database and
21 then it will continue after that, you know. It will
22 be kept as an active thing.

23 CHAIRMAN FORD: The reason why I'm asking
24 the question is not to be argumentative, but to give
25 us a feeling as to how long we're going to be in

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1 limbo.

2 MR. MORONEY: I understand. Yeah. And we
3 are, to a certain extent right now because of the
4 delays in some of the MRP submittals. That looks like
5 it's finally starting to move ahead again, and I think
6 the best that anybody can judge right now is that, you
7 know, it won't be until late next year that we have
8 any real firm path established. And really the fifth
9 bullet there is really the final culmination of that.
10 You know, once we have that, we'll codify it in our
11 regulations.

12 Part two of our action plan has to do with
13 the Boric Acid corrosion control programs. And once
14 again, it starts out with a collection of worldwide
15 information, operating experience on Boric Acid
16 corrosion. This is an effort similar to the other
17 one, but it's a little bit behind. It probably won't
18 be completing this until the latter part of next year,
19 probably around October of next year is our target for
20 right now.

21 Ongoing at the present time and continuing
22 will be the evaluation of the responses we get to the
23 Bulletin 02-01, which the licensees will all have
24 provided the information on their Boric Acid corrosion
25 control programs.

1 The initial review, all of those initial
2 responses are now in. They have been under review.
3 The initial review and a summary report of the
4 findings and the evaluation of those is due by the end
5 of this month. That is in draft format right now,
6 being prepared for, you know, sending to management
7 concurrence. So by the end --

8 CHAIRMAN FORD: I'm sorry to interrupt.
9 This information here you're evaluating right now,
10 what sort of format is it, corrosion rates and alloy
11 steel and Boric Acid at various temperatures?

12 MR. MORONEY: No, it's inspection program
13 requirements, what they're looking for, how they
14 address where they find evidence of Boric Acid
15 corrosion or leakage, what the scope of components or
16 parts of the primary system that they look at.

17 CHAIRMAN FORD: So it's more of an
18 engineering observation rather than scientific data.

19 MR. MORONEY: Yes. Right. As far as the
20 evaluation of the licensee programs, yes. Based on
21 our review of those responses that we receive, and our
22 evaluation of the programs, there will be a decision
23 whether or not currently established programs are
24 adequate to achieve, you know, a real good program for
25 finding and dealing with Boric Acid leaks. So once

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1 that report is compiled and put together for
2 management review, there will be a decision as to
3 whether additional regulatory requirements, for
4 example, an extension of the bulletins or orders in
5 the near term might have to go out asking for
6 additional inspection requirements.

7 CHAIRMAN FORD: Surely there's a big jump
8 between items 2 and 3. Items 2, as you said, just
9 collecting a whole lot of engineering observations and
10 data from operating plants. It doesn't tell you why
11 you have got that degree of degradation in specific
12 plants. Fortunately, very few instances of
13 degradation, so you've got --

14 MR. MORONEY: Well, I'm not sure --

15 CHAIRMAN FORD: -- a very simple database
16 to make any evaluation of the need for additional
17 regulatory actions.

18 MR. MORONEY: Well, I think the additional
19 regulatory actions would be whether or not we think
20 that the programmatic approaches to inspecting and
21 dealing with leakage of Boric Acid containing systems
22 is adequate.

23 MEMBER ROSEN: Well, let me take a
24 for-instance here. I think it says April, 2003 is the
25 target completion date for that activity in your

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1 summary.

2 MR. MORONEY: Uh-huh.

3 MEMBER ROSEN: That's now. Okay?

4 MR. MORONEY: Yes.

5 MEMBER ROSEN: And what I would presume
6 you're doing under that plan is looking at all these
7 licensee programs and saying well, gee, here's a
8 program or two, or five, or however many that doesn't
9 ever inspect the lower head.

10 MR. MORONEY: Uh-huh.

11 MEMBER ROSEN: And now we know that that's
12 probably a good thing to do. And that's what you'd be
13 going back with probably, I'm presuming, and saying to
14 those licensees, you know, there are some things you
15 really ought to do in addition to what you propose.

16 MR. MORONEY: Right. There's probably a
17 couple of aspects we might do. We might put out
18 something that would say, like an RIS, Regulatory
19 Information Summary, that would say here are some of
20 the best practices that we have found. But, you know,
21 that's just informational. All right. And in order
22 to give it some teeth, we really think that there's
23 not enough being done in some of the areas, and we
24 want more done right now and on a continuing basis,
25 that we'll have to follow it up with something that

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1 has more teeth to it, like an order, additional
2 bulletin or something like that.

3 And then ultimately, the long-term
4 approach would be similar to with the ISI program,
5 would be to incorporate it into the 50.55a
6 requirements and the regulations as to what the final
7 inspection requirements should be, which is the next
8 step there basically. And that, once again, is not
9 anticipated until late '04 or early '05, that the
10 current work by the ASME Committee would complete
11 their current plans or recommendations.

12 MEMBER ROSEN: Well, I'm making a
13 presumption here that if you decide that certain
14 plants need to do more, you don't have to wait until
15 the code is revised.

16 MR. MORONEY: No, that's correct. That's
17 the reason for determining if any immediate or
18 near-term additional regulatory action is required.
19 The ultimate goal, instead of having bulletins and
20 orders, would be to have it all codified.

21 CHAIRMAN SIEBER: I guess if I step back
22 and look at what you folks are doing, you're basically
23 responding and coming up with a potential for the need
24 of additional regulatory action based on the
25 information you're getting from the plants.

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1 MR. MORONEY: Yeah, we'll have --

2 CHAIRMAN SIEBER: On the other hand, that
3 won't take care of the surprises. For example, some
4 of the surprises have been the fact that Boric Acid
5 can dissolve into the base metal of the head.

6 MR. MORONEY: Uh-huh.

7 CHAIRMAN SIEBER: Another surprise is that
8 potential leak, because I don't know that there's a
9 leak yet, in an area that's relatively cold. And,
10 therefore, low degradation years which now in my mind
11 calls into question the value of the ranking system
12 that you have. And there's -- what kind of effort are
13 you making to try and brainstorm where all the
14 surprises might be, and how to roll those into a
15 monitoring program, or an inspection program that will
16 give you a clue before it turns into a big deal?

17 MR. MORONEY: Well, I think some of that
18 is coming right now. The people that were reviewing
19 all these responses, you know, the technical staff had
20 set down some parameters, you know, a model template
21 for what they expected to find in a program, and are
22 reviewing the responses according to that.

23 Some of the things that, you know, we're
24 looking at potentially to try and maybe get away from
25 some of the surprises is the fact that people hadn't

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1 been looking at the lower head, or people had not been
2 removing insulation in order to inspect various parts
3 of the piping, or the components, or nozzles, or
4 things like that.

5 CHAIRMAN SIEBER: And they're not required
6 to.

7 MR. MORONEY: They're not required to
8 right now. And potentially, one of the actions coming
9 out of this review and the analysis of what is being
10 done, versus what we think is probably more
11 appropriately done, would be to provide new
12 requirements, and that's where we're heading. So
13 that's where, I think, the only way right now we can
14 potentially look at, if you have better coverage,
15 better inspection access requirements, you're more
16 likely to find something in an incipient, you know,
17 nature than you would have waiting for it to come and
18 bite you.

19 CHAIRMAN SIEBER: Well, my concern is one
20 as to whether the agency is reactive or proactive.
21 Right now the way it would appear is that when
22 surprises occur, the agency becomes reactive, which
23 means the effective condition has an opportunity to
24 develop where it might become an initiator, before
25 there's a regulation to control what is going on. And

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1 so it would seem to me that you ought to be looking at
2 these anomalies with a fair amount of scrupulosity to
3 see whether you're covering all the bases or not, as
4 opposed to perfecting the inspection of upper head
5 nozzles or, you know, making sure that all the Is and
6 all the Ts are dotted, and developing to the great
7 extent the framework of plans, inspection procedures
8 and data collection we have right now. And I think
9 that helps the agency move to a point where its sort
10 of a step ahead of the game, instead of a step behind.

11 MR. MORONEY: Right. I agree and, you
12 know, obviously some things are reactive because of
13 events that have happened.

14 CHAIRMAN SIEBER: They're surprises.

15 MR. MORONEY: And, you know, we're trying
16 to now step back or, you know, move ahead and say
17 okay, you know, we got surprised. Let's react to that
18 and see what we can do to be better in the future.
19 And I think there's -- you know, the inspection
20 requirements like for looking for leaks of Boric Acid
21 and how you handle them, I think there's some synergy
22 between that and the research efforts that are going
23 on on, you know, what are the susceptible areas for
24 leakage and so on. And they'll be -- those people
25 will be working together. And anything that comes out

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1 of one, that effort will certainly be fed into the
2 other part of the program so that, you know, if our
3 research on susceptibility and potential areas of
4 leakage show that there ought to be better inspections
5 on that area, that will be factored into the
6 inspection requirements.

7 CHAIRMAN SIEBER: Well, please tell me if
8 I'm incorrect in my perception of what's going on,
9 because you may -- you, obviously, know your own
10 programs better than I do.

11 MR. MORONEY: Uh-huh.

12 CHAIRMAN SIEBER: But that's the
13 impression I have right now, and I'm encouraging you
14 to be --

15 MR. MORONEY: More proactive.

16 CHAIRMAN SIEBER: Move so that you have a
17 larger view of what's going on. But if I'm wrong,
18 tell me.

19 MR. MORONEY: No. I don't think you're
20 wrong. I'm not challenging that. I just --

21 CHAIRMAN SIEBER: Well, I want to make
22 sure that I'm right by giving you the opportunity to
23 --

24 MEMBER ROSEN: Well, let me encourage you
25 along Jack's lines also in another area, which I

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1 served up a slow high curve ball this morning
2 expecting it to be hit out of the park, and actually
3 it fouled off, so I'll throw up another one.

4 What we find -- what's happened at least
5 twice that I know of, is licensees having unexpected
6 conditions discovered.

7 MR. MORONEY: Uh-huh.

8 MEMBER ROSEN: And then destroying the
9 evidence of those unexpected conditions by a repair
10 before anybody could really say oh gosh, here's
11 something very important. Let's carefully take it
12 apart.

13 CHAIRMAN SIEBER: For understanding.

14 MEMBER ROSEN: And understand it, and feed
15 it into our regulatory process, for one thing, but
16 also into the whole engineering/scientific database so
17 that we can evaluate it. And so the slow pitch is,
18 can you put in a regulatory requirement that
19 effectively quarantines such cases so that the
20 industry and the regulatory system could learn the
21 lessons that are learned before they're put back in
22 service, in a way that destroys the evidence?

23 MR. MORONEY: I think we probably can.

24 MEMBER ROSEN: At least it's a fair ball.

25 MR. MORONEY: No. I can't see why we

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1 couldn't, you know, work that into the rule somehow or
2 other.

3 CHAIRMAN SIEBER: Yeah. On the other
4 hand, you have to do that with great care.

5 MR. MORONEY: Absolutely.

6 CHAIRMAN SIEBER: Because you're basically
7 forcing the plant to remain shutdown in order to
8 quarantine and preserve the evidence. And the
9 industry, whether we like it or not, this is a --

10 MEMBER ROSEN: This is a business.

11 CHAIRMAN SIEBER: This is a capitalist
12 society, and they can't stay shutdown very long and
13 still survive.

14 MEMBER ROSEN: But there's a balance.

15 MR. MORONEY: Yeah.

16 MEMBER ROSEN: That's what I'm saying is
17 we need -- and the right answer to the fair ball, as
18 far as I'm concerned, even a base hit is for the
19 industry and the staff to jointly work out a way to
20 meet both objectives. Recognize it's a business, but
21 recognize that business is better served by
22 understanding these phenomenon, and that that may take
23 a bit longer than it takes to simply grind out the
24 crack, re-weld it and get back in service.

25 CHAIRMAN SIEBER: Well, if it hadn't been

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1 at Davis- Besse the fact that they were attempting a
2 repair in the mechanism, you'd be putting it back
3 together --

4 MR. MORONEY: May not have found it.
5 Right. I mean, you know, part of the principles, I
6 think, of a good corrective action program is to
7 properly understand what the condition was when you
8 started.

9 MEMBER ROSEN: Root cause.

10 MR. MORONEY: Root cause. And, you know,
11 my experience has been that, you know, you do your
12 best to at least identify and preserve the evidence
13 that you have initially, and then work from there.
14 You know, that doesn't mean you quarantine the thing
15 and say you don't start up for a month so that, you
16 know, every scientist or whatever could come in and
17 review a leak, but you at least, you know, preserve
18 enough of the initial evidence, and take pictures or,
19 you know, whatever you do, videotapes and --

20 MEMBER ROSEN: Ultrasonic examination.

21 MR. MORONEY: Yeah, things like that. And
22 I don't think that's extensive --

23 MEMBER ROSEN: No, I think you've answered
24 the question correctly. I think it's the correct
25 answer, and you've also indicated the regulatory hook

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1 you already have to do so, which is Appendix B to 10
2 CFR 50.

3 MR. MORONEY: Right.

4 MEMBER ROSEN: It requires you to take
5 corrective action. Corrective action always includes
6 determining root cause.

7 MR. MORONEY: Uh-huh.

8 MEMBER ROSEN: I mean, any good corrective
9 action.

10 MR. MORONEY: That's right.

11 MEMBER ROSEN: Or at least the apparent
12 cause, you know, something other than just remedial
13 action, which fixes the thing. Broke pump/fix pump.

14 MR. MORONEY: Uh-huh.

15 MEMBER ROSEN: That's the standard one.
16 WE don't know why it broke, but we fixed it.

17 CHAIRMAN SIEBER: Well, we've had enough
18 philosophy.

19 MR. MORONEY: The third phase of this
20 action plan has to do with inspection program guidance
21 that we give to our inspectors, or our people that go
22 out and evaluate plant programs, and activities. And
23 there's three areas or recommendation that we're going
24 to address there.

25 The guidance for the periodic review of

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1 the licensee ISI activities, this is inspectors
2 actually going out, observing during outages what kind
3 of activities are going on, how the inspections are
4 progressing, and actually taking a look at some of the
5 things independently on their own.

6 Second would be to provide guidance for
7 timely periodic inspections of the plant Boric Acid
8 Corrosion Probe Programs. One of the problems that
9 are potential contributors to the Davis- Besse event
10 was the fact that there had been some follow-up
11 planned inspections of Boric Acid Corrosion Control as
12 a result of the Generic Letter 88-05, and some other
13 activities. It got deferred, displaced by the new ROP
14 Program, so there were a couple of potential missed
15 opportunities there, and they went for several years.
16 I forget the exact number, without having any kind of
17 inspection by the NRC, any detailed inspection of
18 their programs. So part of this would be to, you
19 know, establish guidelines that would set some minimum
20 standards for how often and how -- what scope of
21 inspection should be doing on Boric Acid Control
22 Programs.

23 And then the corollary to that would be to
24 provide guidance to the inspectors as to what to look
25 for when they go out and inspect the programs, so that

1 they can make judgments as to how well the programs
2 are accomplishing their objectives, whether they're
3 adequate to properly identify and take corrective
4 action on leakage, things like that.

5 CHAIRMAN FORD: Brendan, we heard
6 yesterday and a little bit today some information on
7 this topic of inspection techniques, periodicities and
8 I must admit, I personally had some heartburn because
9 maybe I didn't understand the process. From what I
10 understood, for the cracking situation, the NRC does
11 not qualify inspection techniques, quantitate, qualify
12 inspection techniques, nor do they qualify inspectors.
13 Would you tell me if I'm correct or incorrect on that
14 statement?

15 MR. MORONEY: If that's what you were
16 told, I have to assume it was correct. I'm out of my
17 element there. I'm not an inspector.

18 CHAIRMAN FORD: So when you say you have
19 inspectors who go to the plants to oversee inspection,
20 inspection taking place by some outside vendor, what
21 are you looking for?

22 MR. MORONEY: It may be by an outside
23 vendor or by the plant people themselves. Sure.

24 CHAIRMAN FORD: What are you using as a
25 quantitative guidance, that it's being done correctly?

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1 MR. MORONEY: Right now?

2 CHAIRMAN FORD: Right now or in the
3 foreseeable future.

4 MR. MORONEY: Right now I'm not sure there
5 is a quantitative guidance. I mean, there are
6 guidelines that exist that, you know, there are
7 certain standards that, you know, people have to
8 apply. There are, you know, techniques as to how to
9 use the instrumentation and, you know, how to
10 interpret it. And I think our NRC inspectors, a lot
11 of them are capable of making judgments as to whether
12 those things are being done properly. Other than
13 that, you know, I'm not sure I can give you any real
14 detail.

15 CHAIRMAN SIEBER: Maybe I can tell you a
16 little bit about that. The NRC assures itself that
17 you have an inspection plan and program which is an
18 ISI-type program. And in that plan, you are supposed
19 to use qualified people, and there is a certification
20 process where you are a Level 1, Level 2, Level 3,
21 Level 3 being the most sophisticated of it. And
22 various inspection techniques, like visual,
23 ultrasonic, EDY current, radiography and what have
24 you, and so you assemble an inspection force out of
25 your own folks, or a contractor, train them, and then

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1 have them pass these certifications. And the
2 processes that you use, you have to qualify.

3 For example, you qualify the use of
4 rotating pancake coils and steam generator tubes. You
5 qualify the use of ultrasonics on various kinds of
6 welds, including the material, the configuration and
7 the thickness. And that's all controlled by the
8 licensee's program, which is inspected by NRC
9 inspectors to assure that it conforms to Appendix B
10 and the other requirements and rules. And so that's
11 how the qualification process occurs, so you qualify
12 the person, the operator, and you qualify the process.
13 The instrument then is calibrated with standard cal
14 blocks or whatever it is.

15 CHAIRMAN FORD: I've seen that
16 demonstrated for steam generator --

17 CHAIRMAN SIEBER: For everything.

18 CHAIRMAN FORD: Well, yesterday, Jack, I
19 did not see any quantification of the ability of
20 various techniques or inspection teams in terms of
21 probability of detecting defects in the vessel head
22 penetration sub-assemblies to any specified degree of
23 accuracy. I mean, is that fair to say?

24 MEMBER ROSEN: No, you said exactly right.
25 We didn't see that yesterday. That doesn't mean it

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1 doesn't exist. In fact, it does. And where it exists
2 is in the qualification of the procedures.

3 CHAIRMAN FORD: Okay.

4 CHAIRMAN SIEBER: And, in fact, what the
5 RPM folks were trying to explain to us is research
6 process that they were using to find the right way, as
7 opposed to the process you would use to qualify the
8 inspection techniques or individually, and that's
9 where you determine during that qualification what the
10 probability of detection is for various kinds of
11 forums. That's a separate process.

12 CHAIRMAN FORD: I guess it's a
13 communications problem, because when we asked the MRP
14 people specifically does that data exist like
15 probability of detection, it does not exist. And now
16 I'm asking the NRC people, and I'm not getting a
17 positive reply back giving me competence, you know,
18 that's what -- when they said guidance, review of
19 licensing, that's where they want to go.

20 MEMBER ROSEN: There's a gentleman up
21 there who wants to talk.

22 MR. MARSH: I wish I had the answer for
23 you. We don't have --

24 COURT REPORTER: Excuse me. Would you use
25 the microphone and identify yourself.

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1 MR. MARSH: I'm Tad Marsh on the NRC
2 Staff. I'm sorry, we don't have our DE Staff experts
3 here with respect to the inspection capabilities, and
4 how we go out and inspect, but I'm going to amplify
5 some of the things that you've said.

6 We do rely in detail on the procedures
7 that are there, the qualification of the inspectors,
8 whether they're Level 1, Level 2, Level 3.
9 Frequently, our inspectors are trained in those same
10 procedures. Frequently, we will have with us
11 contractors who are certified inspectors, as well.
12 And they're trained in those inspection capabilities
13 too, so the experts are not here that lend more than
14 that, but I know we have much more capability than
15 apparently is coming out in this discussion. The
16 quantification that you're seeking is embodied mostly
17 though in the licensee's procedures themselves. Okay?

18 CHAIRMAN FORD: Thank you very much.

19 MR. MARSH: All right.

20 MR. MORONEY: All right?

21 CHAIRMAN FORD: Stirring it up here.

22 MR. MORONEY: Okay. I think we're ready
23 to go on to the other part of the thing, the Barrier
24 Integrity Plan, and I'll turn it over to Cayetano.

25 CHAIRMAN FORD: And this, in terms of the

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1 completion date, I'm sure you could

2 CHAIRMAN FORD:

3 MR. MORONEY: Uh-huh.

4 CHAIRMAN FORD: But that's also
5 approximately the end of 2004?

6 MR. MORONEY: Yes. Or early 2005.

7 MR. SANTOS: Thanks, Brendan. My name is
8 Tanny Santos. I'm with the NRC Office of Research.
9 And similar to what Brendan has just done for the
10 Stress Corrosion Cracking Action Plan, I'll walk you
11 through the assessment of Barrier Integrity
12 Requirements Action Plan.

13 This particular action plan is divided in
14 two major areas. Part one deals with leakage
15 detection and monitoring. The second part deals with
16 barrier integrity performance indicators. Next slide,
17 please.

18 Part one of this action plan, I'll begin
19 with doing reviews of plant technical specifications
20 with regard to RCS leakage and try to identify those
21 plants that might have any non- standard RCS leakage
22 limitations. And another thing we'd like to look at
23 is the plant alarm response procedures for --
24 pertaining to these leakage detection systems.

25 The next major milestone, which you'll see

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1 on the slide, is to try to develop a basis for new or
2 updated RCS leakage requirements. And this would
3 require some of the tasks that are listed there. Of
4 course, you could begin by reviewing the basis for the
5 current leakage detection systems, and also try to
6 identify those other areas that might be impacted by
7 any change in RCS tech specs or leakage requirements.
8 The first thing would be evaluation, which might be
9 keyed towards the unidentified leak rate capabilities.

10 MEMBER ROSEN: What kind of --

11 MR. SANTOS: A leak before break, and what
12 other, you know, impacts might be made by changing RCS
13 leakage limits.

14 The next task that we'd like to do is to
15 review the industry experience with regard to RCS
16 leakage events, and also try to evaluate the
17 capabilities of the leak detection systems that are in
18 the plants right now. Specifically, we try to look at
19 maybe trying to determine the accuracy, the
20 sensitivity, the reliability of these systems, how
21 well can they pinpoint the location of a leak, if at
22 all, or if they can just quantify a leak to some
23 range, that kind of information.

24 MS. WESTON: Excuse me. Since these
25 systems are tech spec, most of the big detection

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1 systems and the tech specs, how do you plan to effect
2 that? Do you plan to look at possible tech spec
3 changes?

4 MR. SANTOS: Yes, that's possible. That's
5 one of the areas we're looking to possibly change.
6 Another task would be try to look at the capabilities
7 of new or state-of-the-art leakage detection systems
8 that might exist now that, you know, just aren't
9 implemented in the plant right now. And with this
10 particular task, we'd like to try to expand the scope
11 of the action plan, not to just look at leakage
12 detection systems, but also other technology that can
13 possibly detect degradation before the leakage even
14 occurs.

15 The first thing that comes to mind would
16 be something like acoustic emission technology that
17 might be able to detect crack initiation and growth
18 before the leakage happens.

19 CHAIRMAN FORD: Now acoustic emission,
20 you're talking about acoustic emission devices which
21 are not placed on the steel or whatever it is?

22 MR. SANTOS: It could be.

23 CHAIRMAN FORD: Just a microphone out in
24 the environment, or something that's on the --

25 CHAIRMAN SIEBER: The transducer --

1 MR. SANTOS: Yeah. Right. Exactly.

2 CHAIRMAN FORD: Okay.

3 MR. SANTOS: That kind of technology.

4 CHAIRMAN SIEBER: You usually have a whole
5 bunch of them.

6 MR. SANTOS: Right, an array.

7 MEMBER ROSEN: Triangulated.

8 CHAIRMAN SIEBER: Well, yeah. That's
9 basically what it does, it triangularizes. It gives
10 you a specific point, and that's a way to, for
11 example, do hydros that in an operating plant with
12 pumps running and valves opening and closing, all
13 kinds of stuff going on, oiling.

14 CHAIRMAN FORD: And these work on --

15 MEMBER ROSEN: Yes.

16 CHAIRMAN SIEBER: Yeah, it's strictly
17 acoustic.

18 MR. SANTOS: Yes. My understanding of the
19 technology - -

20 CHAIRMAN SIEBER: So you may get a
21 different sound out of plastic than paper, but it
22 works.

23 MR. SANTOS: And, of course, the reason
24 we'd like to do this is, you know, with the stress
25 corrosion cracks that you might see in some

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1 components, the amount of leakage you might expect
2 from those types of cracks might be too low to be
3 detected in the leak detection system.

4 CHAIRMAN SIEBER: Do you actually detect
5 cracks by sound?

6 MR. SANTOS: The propagation. From my
7 understanding of the technology, it's the crack
8 propagation.

9 MEMBER ROSEN: You can hear it crack.

10 MR. SANTOS: Essentially.

11 CHAIRMAN SIEBER: I can't imagine --
12 having listened to some of these things in an
13 operating plant, I can't imagine hearing a crack with
14 everything else that's going on. I mean, it's a noisy
15 place.

16 MR. SANTOS: Yes, it is, but I believe
17 there has been some --

18 CHAIRMAN SIEBER: You have to do the
19 analysis.

20 MR. SANTOS: They have monitored some
21 plants --

22 MEMBER ROSEN: Dr. Shack is dying to --

23 MR. SANTOS: Yes.

24 CHAIRMAN SIEBER: Tell us.

25 MEMBER SHACK: I mean, they had a research

1 program at PN&L that, in fact, demonstrated that
2 capability in the laboratory. They also demonstrated
3 the capability in the reactor. I mean, the trick is
4 that you actually have to work into a frequency
5 spectrum that's sort of, you know, one that isn't
6 occupied by something else. But, you know, the --

7 CHAIRMAN SIEBER: Well, cracking has a
8 unique threshold in frequency spectrum. It's
9 different than a lot of other things. For example,
10 different than the leaking valve, for example, or a
11 through-wall leak.

12 CHAIRMAN FORD: When you -- just looking
13 down this list here, this looks as though it's an
14 in-house technique, evaluation, development process.

15 MR. SANTOS: Actually, we're thinking of
16 maybe, maybe with contractor support, doing these
17 tasks.

18 CHAIRMAN FORD: Well, what do the Japanese
19 do, and what do the French do in this regard?

20 MR. SANTOS: I don't know. I'm not sure
21 what -- as far as what their leakage detection systems
22 use? I don't know, but that would be one of the
23 things that would be incorporated in our list,
24 evaluation of the state-of-the-art, or the --

25 MEMBER ROSEN: It's my understanding that

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1 Davis-Besse installed some of this.

2 MR. SANTOS: Yeah. I heard they were also
3 planning on doing some kind of nitrogen detection
4 system or something.

5 CHAIRMAN SIEBER: Yes. Since the
6 incident, they have.

7 MR. SANTOS: Right. So there is clearly
8 a place to go --

9 CHAIRMAN SIEBER: The PWR leakage
10 measurement is pretty -- the fundamental thing that's
11 been there for years actually is a water balanced
12 flow, and it's supposedly accurate to a tenth of a
13 gallon a minute, including all the uncertainties. It
14 is crude.

15 CHAIRMAN FORD: So you're using this
16 Barrier Integrity Action Plan for essentially two
17 reasons. One is for an on-line monitor of the
18 degradation.

19 MR. SANTOS: That's a possibility. A
20 possibility for maybe making it a requirement to maybe
21 use an on-line enhanced monitoring system for maybe a
22 critical component, or a component that might be
23 susceptible to stress corrosion cracking. That would
24 be a possibility.

25 CHAIRMAN FORD: And the other one is to

1 use that continuous monitor as a basis for meeting a
2 tech spec which might be changed. Is that correct?

3 MR. SANTOS: Well, no, that the tech specs
4 could be changed, you know, in addition to or, you
5 know, instead of maybe. These are just possibilities
6 of requirements that could be implemented. What we
7 actually decide will depend on, you know, the results
8 we obtain from these studies.

9 CHAIRMAN FORD: Okay.

10 MR. SANTOS: I guess the final aspect of
11 this basis document would be try to basically answer
12 the question, what leak rates do you want to try to be
13 able to detect in the plant. You need to evaluate the
14 leak rates that you think might occur or lead to
15 degradation in various reactor pressure boundary
16 components. And maybe then you could use that to
17 compare with the capabilities of these different
18 leakage detection systems.

19 Next slide, please. Based on the work
20 described on the previous slide, then you could go on
21 and try to make recommendations for improved
22 requirements. Some examples of these would be, you
23 know, developing new or standardized tech specs for
24 these plants, improved inspection guidance for
25 unidentified leakage that would include action levels,

1 that would trigger increasing levels of NRC
2 involvement as the unidentified leakage rate goes up.
3 That was specific recommendation that came out of
4 LLTF.

5 Another improvement could be maybe the
6 plant procedures for trying to identify pressure
7 boundary leakage from unidentified leakage. Another
8 possibility is, of course, the use of on-line enhanced
9 leakage detection system on certain components that
10 might be susceptible to stress corrosion cracking, or
11 those types of mechanisms. And then, of course, maybe
12 updating, you know, the regulatory guidance on leakage
13 detection system, Reg Guide 145 with some or all of
14 these recommendations.

15 And then finally you could, you know,
16 incorporate some or all of these recommendations to do
17 requirements using the appropriate regulatory tools,
18 you know, whether it be a backfit analysis, rule
19 making, et cetera. But in developing these new
20 requirements, the point we'd like to really emphasize
21 is we want to try to consider improvements in areas
22 which do not rely just on leakage, because relying
23 just on leakage to assure pressure boundary integrity
24 cannot be relied upon, because problems with the small
25 leak rates associated with tight stress corrosion

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1 cracks and those kind of mechanisms. Next slide.

2 MEMBER ROSEN: By the time you have the
3 leakage we've lost the game.

4 MR. SANTOS: Exactly. It's too late for
5 pressure boundary integrity. Exactly. And then
6 finally, the second half of the Barrier Integrity
7 Action Plan has to do with performance indicators. The
8 current Barrier Integrity Performance Indicator is
9 giving like 50 percent of one of the RCS tech spec
10 limits. I think it's either the total leakage or the
11 identified leakage, one of the two.

12 Independent of what the LLTF
13 recommendation in this area was, NRR was already
14 planning on trying to improve this Barrier Integrity
15 PI by incorporating the other reactor coolant system
16 leakage tech specs, as well, to look at both
17 unidentified, total, maybe primary to secondary leak,
18 as well. So that effort was already being planned to
19 do, and has been incorporated into this action plan,
20 as well.

21 One of the specific recommendations from
22 the LLTF was to develop a PI that could track the
23 number and duration of primary system leaks, so we'll
24 investigate the possibility of developing a PI that
25 could do that, and if possible, implement that.

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1 Another possibility for an advanced PI
2 that we're investigating is a risk-informed barrier
3 integrity PI, examine the feasibility of implementing
4 one of those. And, of course, if that's feasible,
5 develop and implement that, as well.

6 MEMBER ROSEN: What sort of algorithm are
7 you thinking about, when you say risk-informed barrier
8 integrity PI?

9 MR. SANTOS: Well, I'm not -- I have to
10 rely on someone else to give more detailed information
11 about that. But the first has to be just to determine
12 the feasibility of something like that, something
13 maybe like looking at wall deflection finding might be
14 something along those lines.

15 CHAIRMAN SIEBER: That wouldn't cover
16 cracking.

17 MR. SANTOS: Right. Don Dube from
18 Research is the area, and might be able to shed more
19 light on this.

20 MR. DUBE: Yeah. Donald Dube from Office
21 of Research. What we had in mind is to go back to
22 the, kind of the starting block, if you will, and look
23 at reactor coolant system barrier integrity as more
24 than just hype for a reactor vessel. It encompasses
25 everything from high pressure/low pressure boundary

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1 relief valves, motor operated valves, check valves,
2 and the gamut. And when the Reactor Oversight Process
3 started to look at potential indicators for reactor
4 coolant system barrier integrity, they had in mind as
5 broader perspective of what encompasses loss of
6 barrier. That is a precursor to let's say a loss of
7 coolant accident, but because of a number of time
8 constraints and the need to get the Reactor Oversight
9 Process moving, it kind of zeroed in specifically on
10 just percent of tech spec limit, which is what we have
11 now. So in summary, just to go back and look at the
12 broader picture, look at first, are there any other
13 potential mechanisms that could result in loss of RCS
14 barrier.

15 And then the second part is, okay, maybe
16 there are, but are there any process variables out
17 there that we can use to provide objective measures of
18 loss of barrier integrity. I mean, we may decide that
19 yeah, we want to look at high pressure/low pressure
20 interface, but there's no objective measurable way of
21 turning that into an indicator, in which case we might
22 be at a dead end. But that's kind of the concept.

23 MR. SANTOS: Then, of course, the final
24 point would be if and when new RCS leakage
25 requirements or barrier integrity requirements are

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1 implemented, go back and look at the PIs again to see
2 if they need to be updated in any way. That's the
3 conclusion of the presentation.

4 CHAIRMAN FORD: Thank you very much
5 indeed. Any questions on this particular segment of
6 the presentation? Thank you very much indeed.

7 MR. MORONEY: Thank you.

8 MR. SANTOS: Thanks.

9 CHAIRMAN FORD: I'd like to ask the
10 members now for thoughts on what we've heard in the
11 last day and a half. And specifically, those which
12 might give advice to the NRC for their presentations
13 to the Full Committee in their next full meeting next
14 month. They've got a two-hour presentation to make to
15 us, so I'd like to hear from us individually as to
16 what has disturbed you, or encouraged you, and what
17 advice do you have. Graham.

18 MEMBER WALLIS: This two-hour presentation
19 is just by the staff.

20 CHAIRMAN FORD: Is just by the staff, yes.
21 The MRP are not able to attend. I'm getting advice
22 from my boss here. We'll take advice from you now,
23 and then put it together.

24 MEMBER WALLIS: I think we need to decide
25 whether it would be good to write a letter or not,

1 what sort of things --

2 CHAIRMAN FORD: Yeah. What I'm proposing
3 on that one to do, Graham, is I will write a draft
4 letter before the event, and we'll chew it over and
5 see whether there's anything constructive being done
6 with that.

7 MEMBER WALLIS: Well, I find myself
8 echoing the remarks of the Chairman, looking for
9 quantitative measures of things, real evidence or
10 evidence of understanding of mechanisms and things.
11 You could gather data on operation experience, count
12 the numbers of leakers and all that, but you don't
13 understand what's going on. It's still difficult to
14 predict the future, to anticipate what might happen,
15 make a more rationally-based judgment about things.
16 These inspection programs and so on, I'm not sure that
17 the scientific basis which you're eventually going to
18 need is in good shape. I didn't see much evidence for
19 progress. Anything that could be done to show
20 progress and understanding I think would help me.

21 CHAIRMAN FORD: Okay.

22 MEMBER ROSEN: And that ties, of course,
23 to my bone of contention, which is when you do -- when
24 you are fortunate enough to have some operating
25 experience, which is generally painful in this area,

1 the worst thing you can possibly do is to not take
2 advantage of that pain by quickly repairing the thing,
3 and never taking the time to figure out what happened.
4 That's really the only -- that's the most powerful way
5 to find out how to keep these things from happening,
6 is find out what happened, and not relive that
7 particular piece of experience. So it's particularly
8 disturbing to me to hear, at least some of the members
9 of the staff say they have no way of providing
10 regulatory controls to avoid licensees destroying
11 evidence when they conduct repair. That's so
12 counter-productive. And I think we really need to
13 encourage the staff to rethink that, at least those
14 elements of the staff who believe that's true,
15 although the gentlemen we just talked to don't seem to
16 think that's true. And I would also think that the
17 industry itself should, in the MRP process some place,
18 maybe at the higher levels of the MRP process, make it
19 incumbent on themselves not to have that attitude,
20 rather than take every painful experience that occurs
21 and dissect it, and slice and dice it as much as they
22 can, notwithstanding the fact that the plant that
23 happens to have that experience may really, you know,
24 want to get back in service. The right answer for
25 them is get back in service maybe, but the right

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1 answer for the industry as a whole is to find out what
2 happened.

3 CHAIRMAN FORD: Okay. Good point.

4 CHAIRMAN SIEBER: You'd led off by asking
5 us whether we were either encouraged or disturbed.

6 CHAIRMAN FORD: Yeah.

7 CHAIRMAN SIEBER: And to demonstrate my
8 control over my emotions, I am neither encouraged nor
9 disturbed. And I have expressed questions and
10 comments over the last two days that my overall
11 feeling, and it is that we continue to be surprised,
12 and I would like to see us get out of the surprise
13 mode. And I think also that as we collect data, at
14 this point it seems to be weakening the hypothesis a
15 little bit, and that is the empirical equation that
16 describes susceptibility. And with the South Texas
17 information, I think that here's an opportunity, or
18 perhaps a warning, that don't rely too much on
19 susceptibility curves because here's a plant that's
20 clearly not in the susceptibility range, highly
21 susceptible range that has a problem on way or
22 another, and it's paramount that we find out exactly
23 what mechanism for the leakage that we've seen and
24 evidenced was, to be able to determine whether the
25 susceptibility curve is valid, or should be taken with

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1 a little bit more of a grain of salt. I don't believe
2 that we are in danger of a major incident. I think
3 there is plenty of inspection going on, both the
4 agency and the industry are paying attention. It's
5 just that we really don't need surprises, and it's
6 fortuitous that South Texas did inspections beyond
7 those that were required for supplying this
8 information. It turns out that it was fortuitous that
9 the deterioration of the Davis-Besse vessel head was
10 actually even found. If they had not dislocated the
11 mechanism by bumping it, perhaps they would be
12 operating today, and so I'm encouraging everyone to
13 maintain an open mind, and to be open to the fact that
14 you can't say because your plant has a cold head, or
15 because you're talking about bottom head which is
16 naturally cooler than anyplace else, that your
17 susceptibility for cracks and leakage is low. And,
18 therefore, I would say if anything the move should be
19 to pretty much classify plants and set the
20 requirements closer together, because unless you can
21 show that the cause of leak in South Texas is not
22 related to stress corrosion cracking, a manufacturing
23 defect, or something of that nature, so that would be
24 my major comment.

25 . On the other hand, I think the staff has

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1 done a lot of work. I think the inspection plans that
2 are in place now from the bulletins and now by the
3 order, are producing results, finding things. And
4 that's the purpose of inspection plans. For that, I
5 offer congratulations to the agency and licensees, so
6 that would be my overall impression. I don't know if
7 that's helpful. Perhaps there are those here who
8 don't agree with me. Those are my --

9 CHAIRMAN FORD: That's what I wanted to --

10 MS. WESTON: I guess my only comment would
11 be that in light of the recent Sequoyah, Davis, South
12 Texas project issues that I would like to see both the
13 industry and the NRC move with a little more
14 deliberate speed in terms of trying to get some
15 answers here, because we've been proactive rather than
16 -- we're being reactive rather than proactive, and we
17 really need some answers to try to better understand
18 the phenomenon that's going on.

19 CHAIRMAN FORD: Okay. Can you --

20 MEMBER SHACK: No. Since I'm working as
21 a contractor on related issues, I don't think I want
22 to make any comments at this point.

23 CHAIRMAN FORD: Fair enough. Tom.

24 MEMBER KRESS: Yeah. With respect to
25 being encouraged versus discouraged, I'm very

1 encouraged. I think the staff and the industry
2 recognizes the importance of this problem, and are
3 treating it very seriously. And are, in fact, on the
4 right track.

5 In my mind, when we get around to finally
6 developing 50.55a rule, there will be two viable
7 ingredients of this program that need to be
8 emphasized, and that is, it is essential that the
9 crack detection and sizing methods be qualified for
10 this geometry and these conditions, paramount
11 conditions. And qualified in the sense of
12 quantification of the probability of detection at
13 given sites, and the probability of non-detection.

14 The other part that's essential to
15 developing a good rule is to have a validated and
16 conservative model for crack growth rate. And this
17 has to include uncertainties, as well as the
18 probability of a crack. Those two things will be
19 sufficient to allow you to develop an inspection
20 program, and an inspection and repair program for the
21 top head. And so those are the things I would
22 emphasize right there.

23 Now with respect to the South Texas
24 problem, I think we need to rethink our overall
25 objective there. The overall objective at the top

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1 head is to, as I said, preserve barrier integrity, but
2 I interpret that to mean to have no leakage, which
3 means you have to stop the crack in an inspection
4 period before it gets a certain depth through the
5 thing. But that's probably the objective of that. I
6 think you ought to rethink that for the bottom head.
7 I think you've got to rethink whether or not you can
8 live with some leakage, because I think the only way
9 you're going to find that, whether you have a crack
10 down there, is by virtue of leakage. And I think
11 staff needs to think about that as a potential
12 regulatory position for the bottom head.

13 I think, for example, with respect to the
14 frequency of inspections, I think each plant ought to
15 be able to specify its own frequency of inspection,
16 and the time for the next inspection. With respect to
17 the crack growth models that are conservative, I think
18 those can be plant-specific, but I think as one
19 proceeds with this crack growth and inspection
20 process, that you use a basing and update to your
21 model to get better and better with it as you go
22 along, on a plant-specific basis.

23 Of course, you have to have certified
24 inspectors and qualified techniques, and this goes to
25 -- that's my thoughts on it. I think we need a

1 letter.

2 CHAIRMAN FORD: Yeah.

3 MEMBER KRESS: But I want to repeat, I
4 think the staff and the industry are on the right
5 track, and there are enough programs in place to get
6 this done or under control.

7 CHAIRMAN FORD: My views are that yes, I
8 think we are on the right track. What disturbs me is
9 that we've gone from three years ago, four years ago
10 very much in a reactive mode, to the CRDM
11 circumferential cracking, to coming up with an
12 approach for that. Then went to a more proactive
13 approach for that, then went to reactive, then to
14 proactive as we've met these various stumbling blocks
15 as we go down the line.

16 I agree that we've got to have a holistic
17 approach to it, as the industry said. We cannot
18 distribute the VHP assemblies in isolation from the
19 bottom head and from the pressurizer, so any
20 prioritization algorithm that we have has got to take
21 into account not just temperature, but also material
22 and stress conditions to some degree or other.

23 I think it's good that we have a revised
24 action plan with the four parts to it. I have a
25 feeling that it is overly optimistic, and I agree with

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1 Graham that there should be much more of a tone of
2 understanding of some of the fundamentals behind it,
3 which will therefore increase the -- or decrease the
4 degree of uncertainty.

5 What I'll do is I'll formulate a letter
6 which I'll pass on to everybody in terms of our
7 suggestions for the staff as to how they formulate a
8 time, and prioritize the time, but I suspect probably
9 it would be along the lines of having Al update us on
10 the situation from the bulletins and the orders. Then
11 go into the plan outline and then have Research give
12 some outline of how they're going to tackle some of
13 the parts to that plan. We'll follow-up on those
14 recommendations.

15 MEMBER KRESS: On the effective
16 degradation years. I think we're going to have to
17 have a debate on that in Committee, because I still
18 think it's an appropriate way to prioritize for
19 current where you're going. I think it's going to
20 take too long to get these other unknown effects into
21 it, and I think what we have with the effective
22 degradation years, based on Oconee as a baseline, is
23 somewhat conservative. It may miss plants that aren't
24 degraded, but it'll catch the ones that are. And I
25 think it's probably an appropriate way to go right

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1 now, as we have. And I don't think South Texas
2 changes that. Again, it's a personal opinion.

3 CHAIRMAN FORD: Okay. Are there any other
4 comments from anybody in the audience? Al.

5 MR. HISER: I just have one comment.

6 CHAIRMAN FORD: Yes.

7 MR. HISER: Right at the end, and it's
8 maybe a little bit off target.

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10 [THE DISCUSSION HAS BEEN REMOVED DUE TO PROPRIETARY
11 INFORMATION]

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23 CHAIRMAN FORD: Are there any other
24 issues, any other comments? Paul.

25 MR. GUNTER: Paul Gunter with Nuclear

1 Information Resource Service. I would just only add
2 that we concur that we've long been disturbed by the
3 issue of evidence -- I should say the issue of repairs
4 without an autopsy, or the removal of evidence,
5 destruction of evidence in haste for repair. And in
6 particular, we were disturbed by the removal of
7 corrosion products even in the wash-out of the
8 Davis-Besse cavity, where I think that there could
9 have been a lot gained by a chemical analysis of what
10 was in that cavity, and that was just all washed-out.
11 So the question is, how far do you -- I mean, where do
12 you begin the recovery of evidence. And what are the
13 initiating opportunities for recognizing that
14 evidence.

15 CHAIRMAN FORD: Thank you. If there are
16 no more comments, then I will call and end to this
17 meeting, or whatever the proper language is.

18 MS. WESTON: Adjourned.

19 CHAIRMAN FORD: Adjourned.

20 (Whereupon, the proceeding in the
21 above-entitled matter went off the record at 2:20
22 p.m.)
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